thermoscientific



HERASAFE 2030i
MAXISAFE 2030i

Safety cabinets

Operating instructions

50156379 Rev. E 13.03.2023

ThermoFisher SCIENTIFIC

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General Notes

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General Safety Instructions

These safety instructions describe the safety features of the HERAsafe 2030i / MAXISAFE 2030i series. The safety cabinet has been manufactured in keeping with the latest technological developments and has been tested before delivery for its correct function. It may, however, present potential hazards if it is not used according to the intended purpose or outside of operating parameters. Therefore, the following procedures must always be observed:

- The safety cabinet must be operated only by trained and authorized personnel.
- For any operation of this unit, the operator must prepare clear and concise written instructions in the language of the operating and cleaning personnel based on these operating instructions, applicable safety data sheets, plant hygiene guidelines, and technical regulations, in particular:
  - which decontamination measures are to be applied for the cabinet and accessories,
  - which protective measures apply while specific agents are used,
  - which measures are to be taken in the case of an accident.
- Repairs to the device must be carried out only by trained and authorized expert personnel.
- The contents of the operating instructions are subject to change without further notice.
- Concerning translations into foreign languages, the German version of these operating instructions is binding lease.
- Keep these operating instructions close to the unit so that safety instructions and important information are always accessible.
- Should you encounter problems that are not detailed adequately in these operating instructions, please contact Thermo Electron LED immediately for your own safety.

Use this product only in the way described in the product literature and in this manual. Before using it, verify that this product is suitable for its intended use. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



Your unit must be properly grounded in conformity with national and local electrical codes. Do not connect the unit to overloaded power sources.



Disconnect the unit from all power sources before cleaning, troubleshooting, or performing other maintenance on the product or its controls.

Warranty

Thermo Electron LED warrant the operational safety and functions of the safety cabinet only under the condition that:

- the device is operated and serviced exclusively in accordance with its intended purpose and as described in these operating instructions,
- the device is not modified,
- only original spare parts and accessories that have been approved by Thermo Electron LED are used,
- inspections and maintenance are performed at the specified intervals,
- an installation test is performed prior to the initial operation of the device and that a repeat test is performed on the occasion of all inspections and repairs.

The warranty is valid from the date of delivery of the device to the operator.

CAUTION Any changes or modifications not expressly approved by Thermo Scientific could void the user's authority to operate the equipment.

Explanation of Symbols

Symbols used in the Operating Instructions

WARNING Is used if non-observance may cause serious or even lethal injuries.

CAUTION This symbol, in the context of a CAUTION, indicates a potentially hazardous situation which if not avoided could result in minor to moderate injury or damage to the equipment.

NOTE
is used for hints and useful information.

Valuable raw materials can be reused.



This symbol when used alone indicates important operating instructions which reduce the risk of injury or poor performance of the unit.

This indicates a situation which may result in property damage.





Before installing, using or maintaining this product, please be sure to read the manual and product warning labels carefully. Failure to follow these instructions may cause the product to malfunction, which could result in injury or damage.



This symbol indicates possible pinch points which may cause personal injury.



During movement of the front window do not try to access the inner chamber.



The use of Gas burner is not recommended.



UV lamps only be activated if front window is completely closed.



Unauthorized repair of your safety cabinet will invalidate your warranty. Contact Technical Service at 1-800-438-4851 for additional information.



This symbol indicates a situation which fire hazards exits in the product.

Symbols on the Device



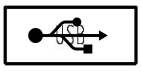
Observe operating instructions (cover electrical box)



Biohazard (left device front)



T5A note (sample chamber fusing)



USB interface

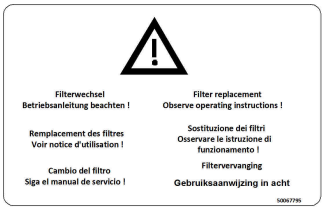




Cytostatic agents are plant-derived or synthetic substances that can cause death or inhibit growth and dividing of a cell.





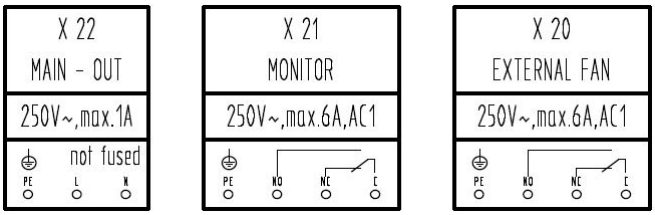


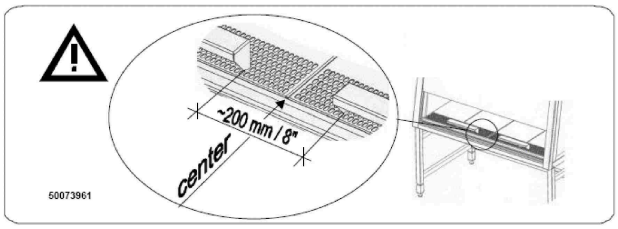








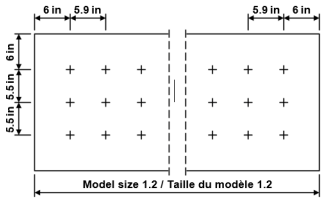






Nominal Setpoint – 1.2 Downflow
Consigne nominale – 1.2 Air évacué

Average velocity / vitesse moyenne: 63 ± 5 fpm

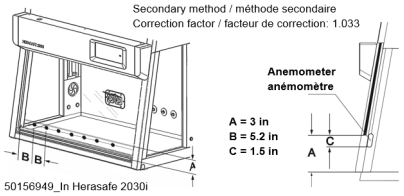


50156949_Do Herasafe 2030i

Nominal Setpoint – 1.2 Inflow
Consigne nominale – 1.2 Air entrant

Window aperture / ouverture de fenêtre: 10 in
Average velocity (DIM) / vitesse moyenne (MDI): 105 ± 5 fpm

Secondary method / méthode secondaire
Correction factor / facteur de correction: 1.033

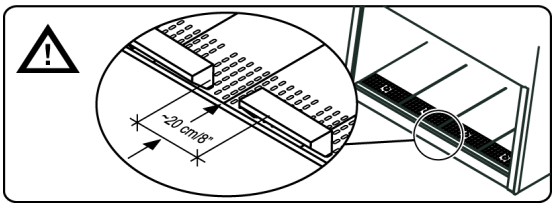


50156949_In Herasafe 2030i

This equipment is FCC listed

EXHAUST¶
CAUTION·DECONTAMINATE¶
CABINET·BEFORE·OPENING¶

SUPPLY¶
CAUTION·DECONTAMINATE¶
CABINET·BEFORE·OPENING¶



Armrest installation
(right side of light dome)

Use of the Device

Intended Use

HERAsafe 2030i version:

The safety cabinet is a laboratory device for installation and operation in microbiological and biotechnical laboratories of safety levels 1, 2, and 3. It has been designed as a Class II microbiological safety cabinet, in accordance with EN 12469:2000.
Depending on the hazard level of the agents involved, the operator must prepare in writing appropriate decontamination procedures for the device and the accessories used in the sample chamber.

Following media should be used:

- Vacuum (Rough vacuum 10 E-2 bar / 0,145 psi)
- Combustible gas (e.g. Propane)
- Non-combustible gas (e.g. Nitrogen)

Maxisafe 2030i version:

The safety cabinet also conforms with the requirements of the DIN 12980:2016, allowing it to be used in the production of cytostatic agents.
For cytostatics applications, use only the one-piece, low-profile workplate.

Before the device is taken into service for the first time, the operator must perform an installation test and document the results in a test record. The device may only be released for production use if it conforms with the operating parameters specified by Thermo Electron LED.

Whenever changes to the installation conditions or modifications to the technical system have been made, the operator must perform a repeat test and keep a complete record thereof to document that the device conforms with the operating parameters specified by Thermo Electron LED.

Non-intended Use

The safety cabinet must not be used in laboratories that do not comply with the requirements of safety levels 1, 2, and 3.
The unit must not be operated as a Class II safety cabinet, if:

- no repeat test is performed after changes to the installation conditions or after modifications to the technical system.
- the alarm system of the device has issued a failure message and the cause for the failure has not been repaired.

The alarm system must not be tampered with or disabled. If alarm system components have been removed or disabled for service or repairs, the unit must only be released for operation if all alarm system components are functioning again properly.

The filters installed in the device are not capable of separating gaseous substances. Therefore, do not work with or store substances in the device:

- who in quantity or concentration are toxic,
- if a reaction with other substances may result in hazardous toxic concentrations or formation of toxic gases,
- that may form combustible or explosive mixtures in combination with air.

Compliance Information

NOTE
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Contains FCC ID: NDD9576111602
Contains Transmitter module IC: 4701A-76111701

NOTE
This ISM device complies with Canadian ICES-001.

Delivery

Items supplied

Delivery for the safety cabinet includes the following:

Herasafe 2030i version:

- safety cabinet
- armrests

Maxisafe 2030i version:

- safety cabinet
- armrests
- stand

All versions:

- device documentation with:
  - operating instructions (CD)
  - factory test report
  - summarized safety instructions (SSI)
  - HEPA filter certificate

Optional components and accessories are listed as separate items in the delivery document.

Acceptance Inspection

After the device has been delivered, immediately check the device:

- for completeness,
- for possible damage.

If the delivery is incomplete or if you detect any transport damage to the device, contact the forwarding agency and Thermo Electron LED immediately.

Transport Lock and Device Packaging

Do not transport the device over large distances without transport lock and original device packaging.

Installation of the Device

Ambient Conditions

The operational safety and correct function of the unit depend on the location where it is to be operated. The safety cabinet must be operated only at locations that meet the ambient conditions listed below.

Location requirements:

- The electrical system of the device has been designed for an operating height of up to 2000 m above sea level.
- The mains power supply outlets should be out of casual reach to prevent accidental shut-off. Ideally, the outlets should be installed above the safety cabinet and be readily accessible.
- The flooring of the location must be adequately strong and not flammable.
- The support frame must be designed with an adequate load-carrying capacity (supporting four times the weight of the device).
- The room in which the device is installed must be of adequate height. For units not connected to an exhaust system, the distance between the exhaust air opening and the room ceiling must be at least 200 mm. There is potential to install with a lower clearance of 200mm. This should be discussed with a Thermo Fisher Scientific BSC specialist.
- The location must be equipped with an appropriate ventilation system, see “Room Ventilation” on page 14.
- The temperature within the room must be between 10 °C and 40 °C.
- The power supply voltage should not vary by ±10 % from its nominal value.
- Transient overvoltage peaks shall not exceed the usual range prevailing within the AC power supply grid. The nominal transient overvoltage level shall be the surge withstand voltage according to overvoltage category II of IEC 60364-4-443.
- An appropriate ground fault circuit interrupter must be installed by the customer to protect the device system.
- Condensation must be avoided, for example, subsequent to relocation or transport. Should condensation exist, wait for the humidity to evaporate completely before connecting to a power source or powering up the device.
- The relative humidity in the vicinity of the device must not exceed 90 %.

NOTE Ambient conditions
If ambient conditions vary from those described above, please contact Thermo Electron LED for assistance in installing the device.



Temporary storage
If the device is stored only temporarily (up to four weeks), the ambient temperature must be between -20 °C and +60 °C (-4 °F and +140 °F) at a relative air humidity of up to 90 %. For longer storage periods, the location requirements apply.

Room Ventilation

The room ventilation should preferably be a ventilation system that complies with the national requirements for the application.

- The inlet air and exhaust air openings of the room ventilation must be located so that drafts are prevented from impairing the function of the safety cabinet air system.

Correct Location

Choose a draft-free location where the safety cabinet does not interfere with the plant traffic.

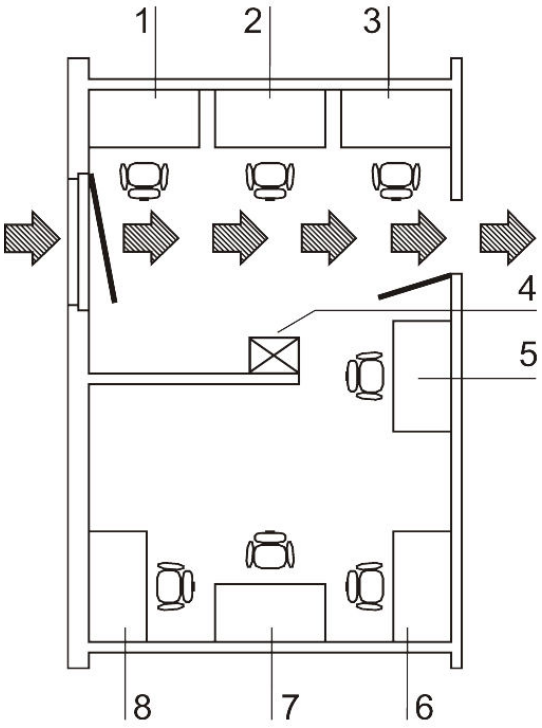


Figure 1 Correct Location

This figure shows preferred locations for safety cabinets and unsuitable locations, not in accordance with the safety requirements.

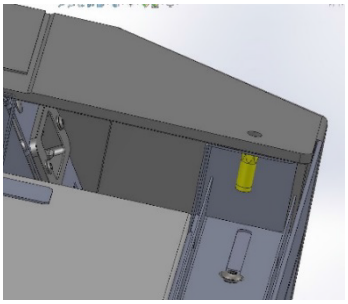
Unsuitable locations: The locations [1], [2] and [3] are not suitable because they are exposed to drafts from windows and doors.
Location [5] is undesirable because it is in range of plant traffic and within the exhaust air range of a ventilation system [4].
Preferred locations: Preferred locations [6], [7], and [8] are correct because they are in a draft-free section of the room and not exposed to plant traffic.

Installation in Series

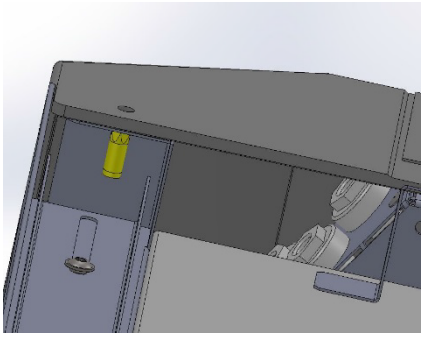
When several devices are to be installed in series, please observe the following:

- Make sure that vibrations cannot be transferred between adjacent units,
- exterior surfaces of the cabinets must always be accessible for cleaning and disinfection,
- minimum distance of 2 m (6.6 ft.) between workbenches on opposite position.

Connections



Power cable

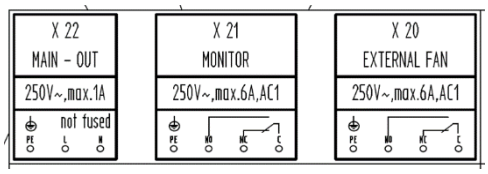


X22 X21 X20



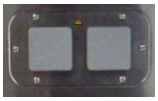
NOTE

Cable glands allow for connecting up to 3 external devices.
Connect directly to the printed circuit board!
Caution! Make sure the max. current output is not exceeded!



X22 230V Power Supply / X21 Monitor Alarm / X20 External Fan

Power Receptacles



Both power receptacles are fused using a T 5A slow-blow fuse.

Transport

Version HERAsafe 2030i:

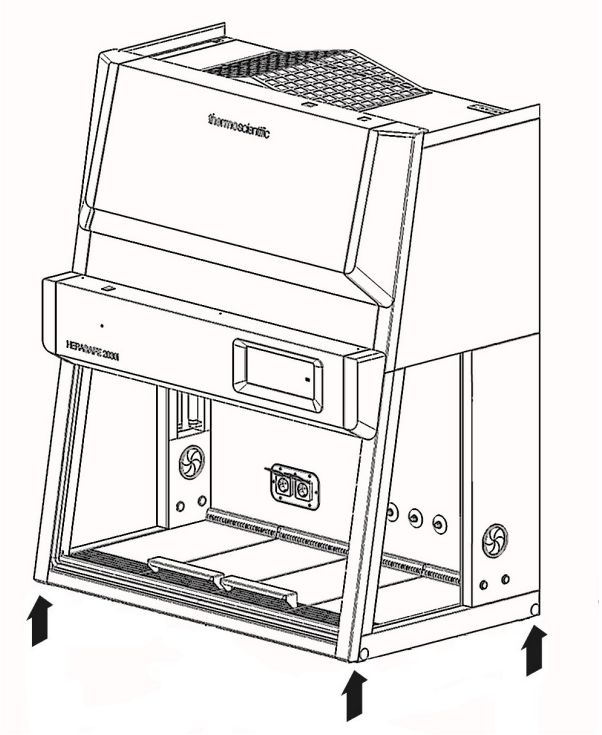


Figure 2 Lift Points

To prevent tilting, always transport the device using a suitable carrier, even for a transport within a building, and separate it from the stand.

CAUTION

Danger of tipping over!
For transport, lift the device only using the lift points shown in the illustration.
Do not load the drain pan with the weight of the device frame!

CAUTION

Contusion hazard!
When lifting the safety cabinet, do not put hands or fingers between drain pan and frame!

Maxisafe 2030i version:

If required, the body must be separated from the stand and be reinstalled on the stand prior to the initial operation of the device (see “Installing Unit and Accessories” on page 33).

Unit Description

Overall View

Version HERAsafe 2030i:

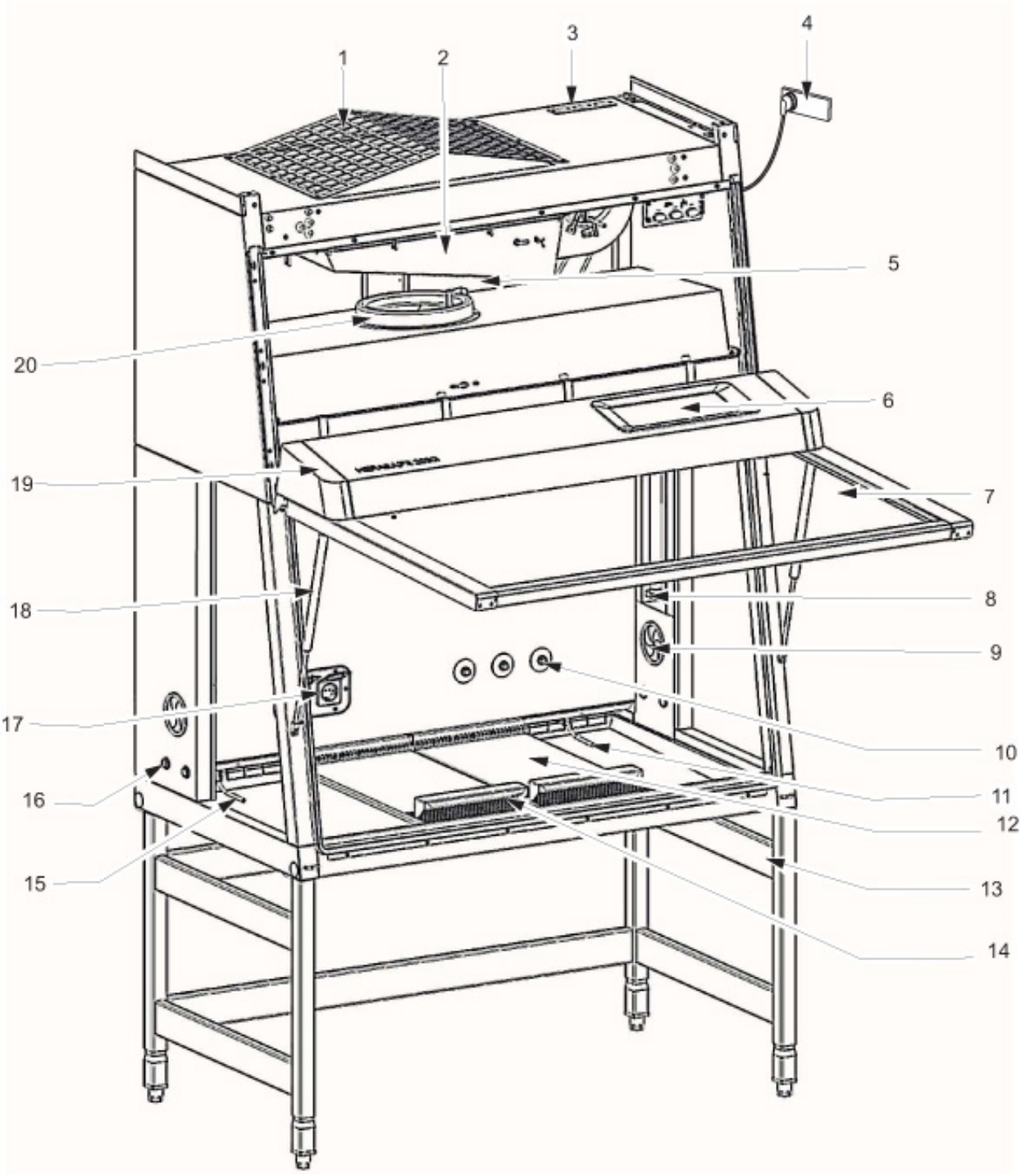


Figure 3 Overall View, Version HERAsafe 2030i

- Plenum assembly [5] with plenum for downflow blower [20] and plenum for exhaust air blower [2]. The downflow filter and the exhaust air filter are installed directly to the pertaining blower. The exhaust air is released into the environment around the device through the opening [1].

- At the side of the plenum, the optional media supply lines [3] are routed into the sample chamber [10].
- Power supply cable [4].
- Front cover [19] with integral, electrically movable front window [7]. An auxiliary rocker switch for basic BSC window operation is located on the top right of the light dome.

  The gas struts [18] secure the front cover in the open state.
  Optionally, two safety latches can be installed to the front cover so that the door can be protected against unauthorized opening.
- The light dome [19] with two tubes is part of the front cover assy.
- Side slates with two sealed access openings [16]. These can be equipped with media valves.
- Internal outlets [17] for power supply of accessories.
- Optional UV lamp unit [8] consisting of two UV lamps per side.
- Optional stands [13], adjustable in height and with fixed height.
- Workplate segments [12] with arm rests [14]. A one-piece workplate and special work plates are available options.
- GUI Operating Panel [6] with cabinet controls, alarm system indicators, and cabinet status display. A USB connection to download data log is installed at the GUI display [6].
- Test hoses for the supply unit [15] at the left side of the workspace and for the exhaust unit [11] at the right side of the workspace.

CAUTION

Test hoses
Do not remove the two test hoses for checking downflow and exhaust air.

Maxisafe 2030i version:

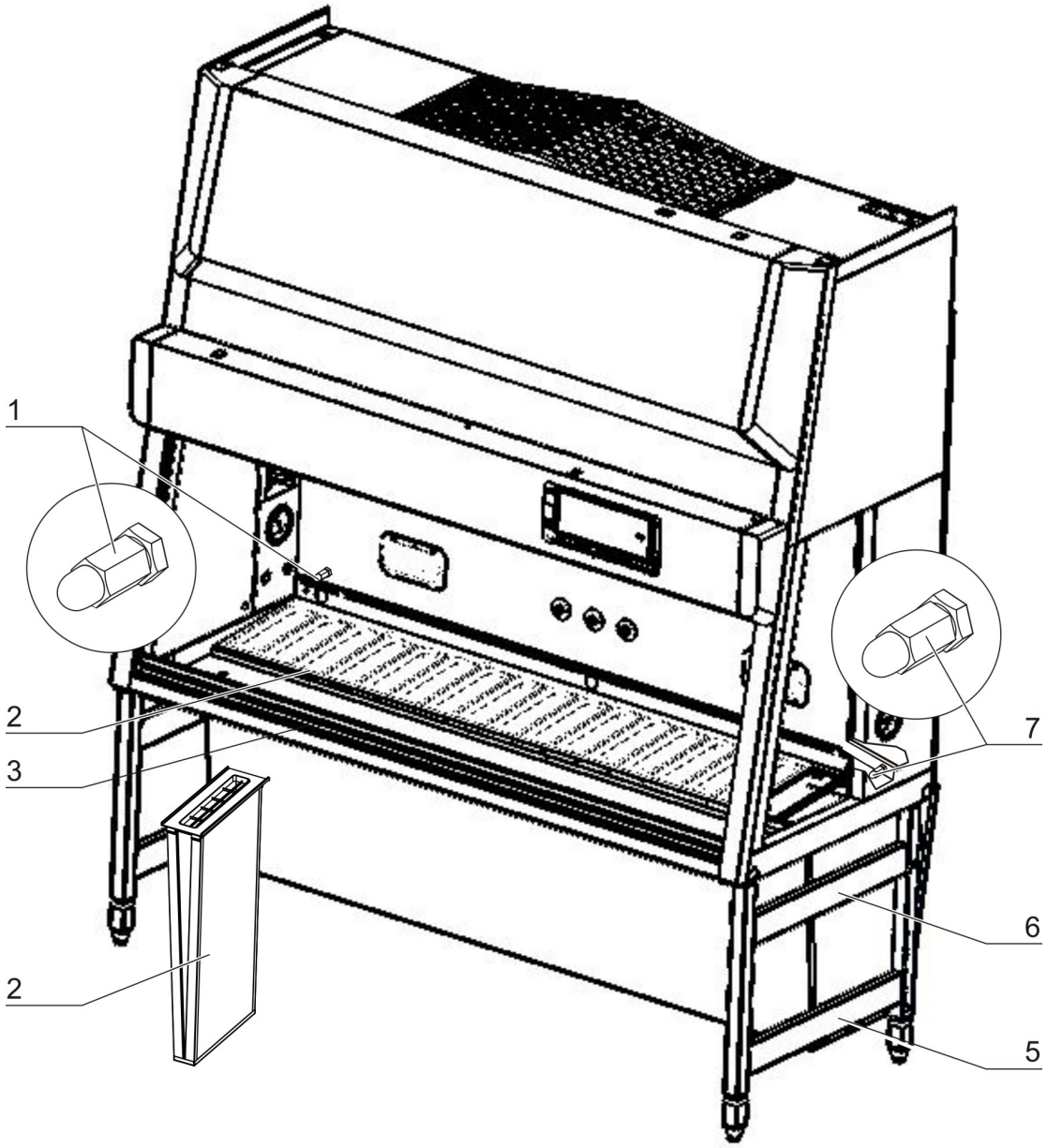


Figure 4 Overall View, Maxisafe 2030i version

- Figure 4: Stand [5] with built-in prefilter casing [6].
- Filter cartridges [2] for installation in prefilter casing. The number of filter cartridges supplied with the device depends on the overall width of the unit. To prevent the accumulation of fluid residues, the filter cartridges are arranged at a slight angle to the rear wall of the unit to form a drain channel towards the drain pan [3].
  The filter cartridges [2] are sealed with tape.
- Membrane grommet or orifice for filling with aerosol for filter test on downflow blower unit [1] on the left side of the workspace and exhaust blower unit [7] on the right side of the workspace.

Safety System

The safety system comprises a combination of protective and alarm systems that ensure maximum personal and material protection.

Safety systems:

- Vacuum-sealed air system
  An air system in combination with HEPA filters for downflow and exhaust air forms the basis of the safety system for personal and material protection.
- Personal protection
  Air aspired from the exterior along the entire working opening at a constant high velocity prevents that:
  - agents may leak through the working opening of the chamber.

  As the exterior air pressure around the unit exceeds the pressure of the internal air system, it is ensured that:
  - agents cannot be released to the exterior in the case of a leak in the cabinet housing.
- Product protection

  A steady airflow within the air system ensures that:
  - a constant downflow allows the HEPA filters to remove contaminants so that the samples are always surrounded by ultrapure air,
  - harmful particles are not carried over through the sample chamber (protection from cross-contamination).
- HEPA filters

  The downflow (i.e. the air circulating within the device) and the exhaust air (air that is released to the exterior) are cleaned by HEPA filters (HEPA = High Efficiency Particulate Air Filter.
- Safety lockout

  To protect from UV radiation, the optional UV disinfection routine can be run only if the front opening is closed During UV disinfection, the front opening safety lockout is activated and prevents harmful UV radiation from being emitted from the sample chamber.
- Media connections and components are to be installed by expert personnel only.

Warning system:

- Airflow monitoring

  Airflow monitoring determines the velocity of the airflow in the sample chamber as well as the inflow velocity of the air aspired from the exterior through the working opening. As soon as airflow velocities move above or below a specified safety value, a signal is transmitted to the alarm system.

- Visual and audible alarm system

  The warning system constantly monitors the safety-relevant device functions:

  - Inflow velocity of the air aspired from the exterior,
  - downflow velocity,
  - working position of the front window.

  If the warning system detects changes to one of these device functions, it issues:

  - an audible and a visual alarm signal.

- Position monitoring

  The position sensors monitor the position of the front window; it will indicate when the front window is in the working position.

Filter System

Version HERAsafe 2030i

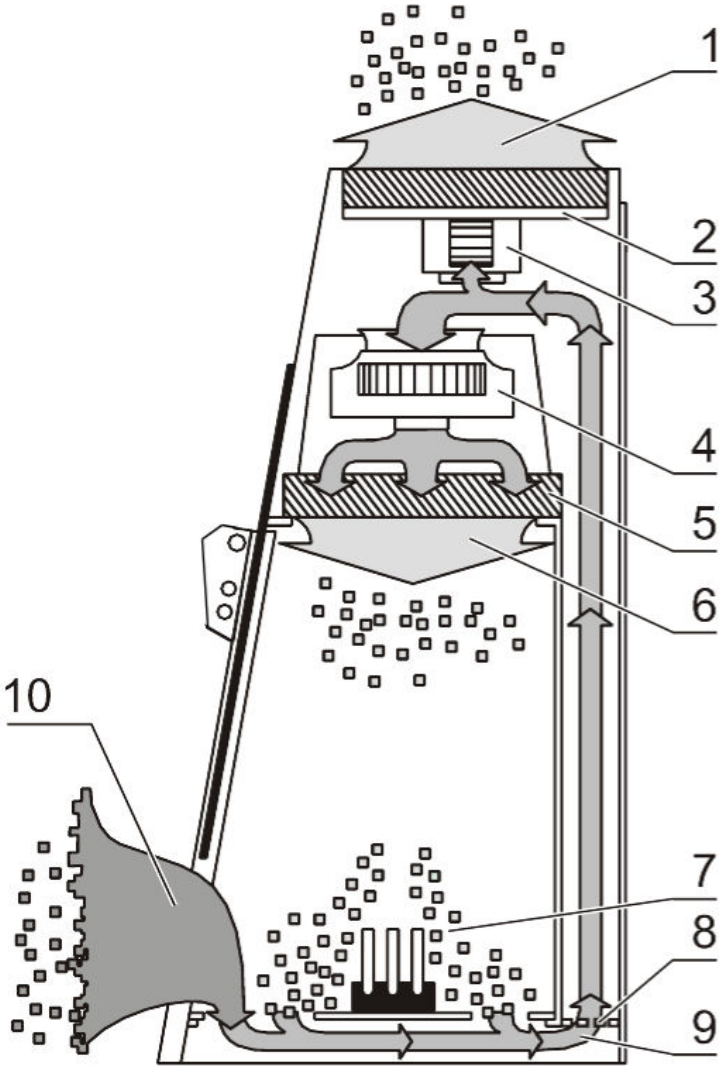


Figure 5 Filter System with Downflow Filter and Exhaust Air Filter

The filter system consists of two HEPA filters [2] and [5] for the circulating air and for the exhaust air and a coarse filter for the aspired air.

HEPA filters: Room air [10] is drawn into the sample chamber through the working opening. In the air duct, room air and the downflow within the chamber [7] are then blended to make up the blend air [9]. The blend air is then:

- filtered proportionally by the downflow filter [5] and supplied as ultrapure air [6] evenly into the sample chamber of the device,
- filtered by the exhaust air filter [2] and released as ultrapure air [1] to the exterior of the device.

Inlet air protection: The air duct between the sample chamber and the device plenum has an inlet air protection [8] below the working surface to prevent coarse particles from entering the plenum where they may impair blower [3] and [4] and filter functions.

Maxisafe 2030i version

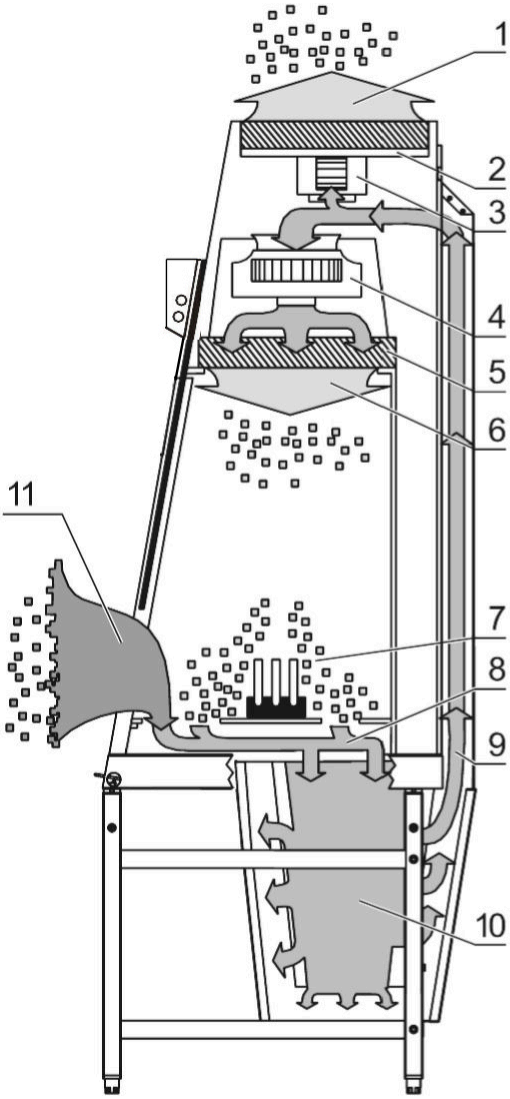


Figure 6 Filter System with Prefilters, Downflow Air Filters and Exhaust Air Filters

The filter system consists of a set of HEPA prefilters [10] (the number of filters depends on the overall width of the workspace) and two HEPA filters [2] and [5] for the downflow and exhaust air flow.

HEPA Prefilter:

Due to the compact size of the filter cartridges, filter replacement can be achieved with minimum contamination. The use of prefilters relieves the workload on the downflow and exhaust filters considerably.
The filter cartridges used are Class H14 HEP filters (to DIN EN 1822). Alternatively, activated carbon filters can be inserted into the casing as odour filters.
Ambient air [11] is drawn in through the working opening. In the intake area above the prefilter, ambient air and exhaust air from the device [7] mix to form blend air [8]. This blend air is then:

- drawn into the prefilter [10], then filtered and channeled to the air duct [9].

HEPA Filter: From the air duct, the prefiltered air is then:

- filtered proportionally by the downflow filter [5] and supplied as ultrapure air [6] evenly into the sample chamber of the device,
- filtered by the exhaust air filter [2] and released as ultrapure air [1] to the exterior of the device.

Controls and Display

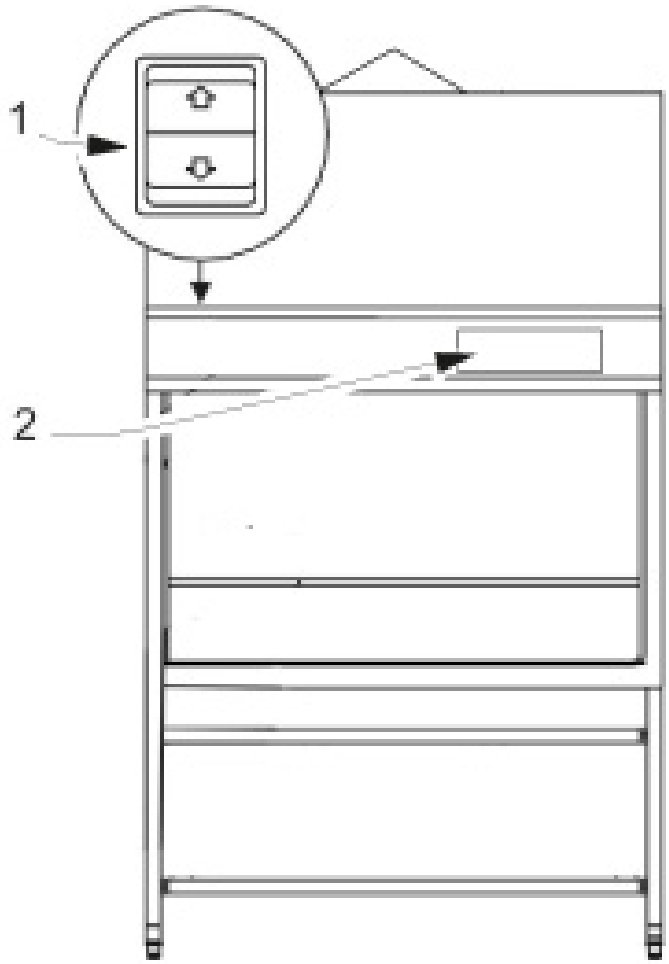


Figure 7 Controls and Display

The safety cabinet is equipped with two separate control elements that operate independently of each other:

- auxiliary rocker switch [1] to move the front window up and down
- GUI - Graphical User Interface [2]

The status indicators of the display [2] indicate control operations initiated with the control elements.

In the GUI the current status of the cabinet is shown.

Sample Chamber Access

The sample chamber of the device is accessible via two modes.

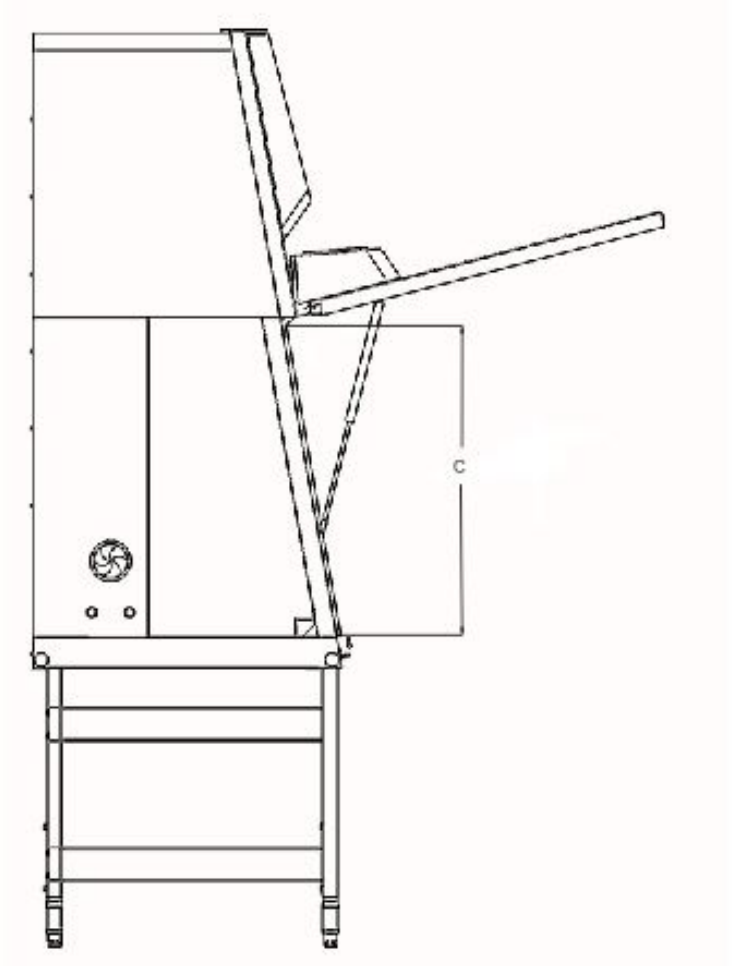


Figure 8 Access through Front Cover

Front cover:
Manual opening of the front cover [1] allows access to the complete sample chamber width with an opening height C. It is generally needed for decontamination and introduction of larger accessories.

NOTE Front cover lockout
The front cover is equipped with a safety lockout and can only be opened in standby mode, i.e. when the front window is completely closed.

A - minimum working opening
B - maximum opening height

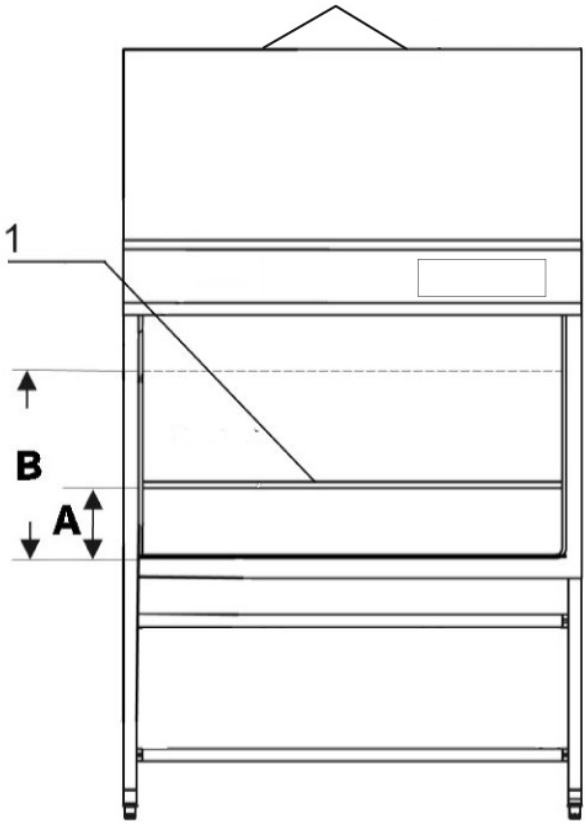


Figure 9 Access through Front Window

Front window:
The electrically operated front window [1] is made of multi-layer safety glass and integral to the front cover frame. It can be raised to a maximum opening height B. To access the sample chamber during the work process, the front window must stay in the work position with opening height A.





Crushing hazard
During movement of the front window do not try to access the inner chamber.



Front window movement!
Do not attempt to move the front window manually as otherwise the motor drive may be damaged.

Lowering the front window when the device is deenergized:

The safety feature is backed up by a battery. Should a power failure occur, the auxiliary rocker switch (see “Using the auxiliary Rocker Switch” on page 58) can be used to lower the front window completely.

Device Interfaces

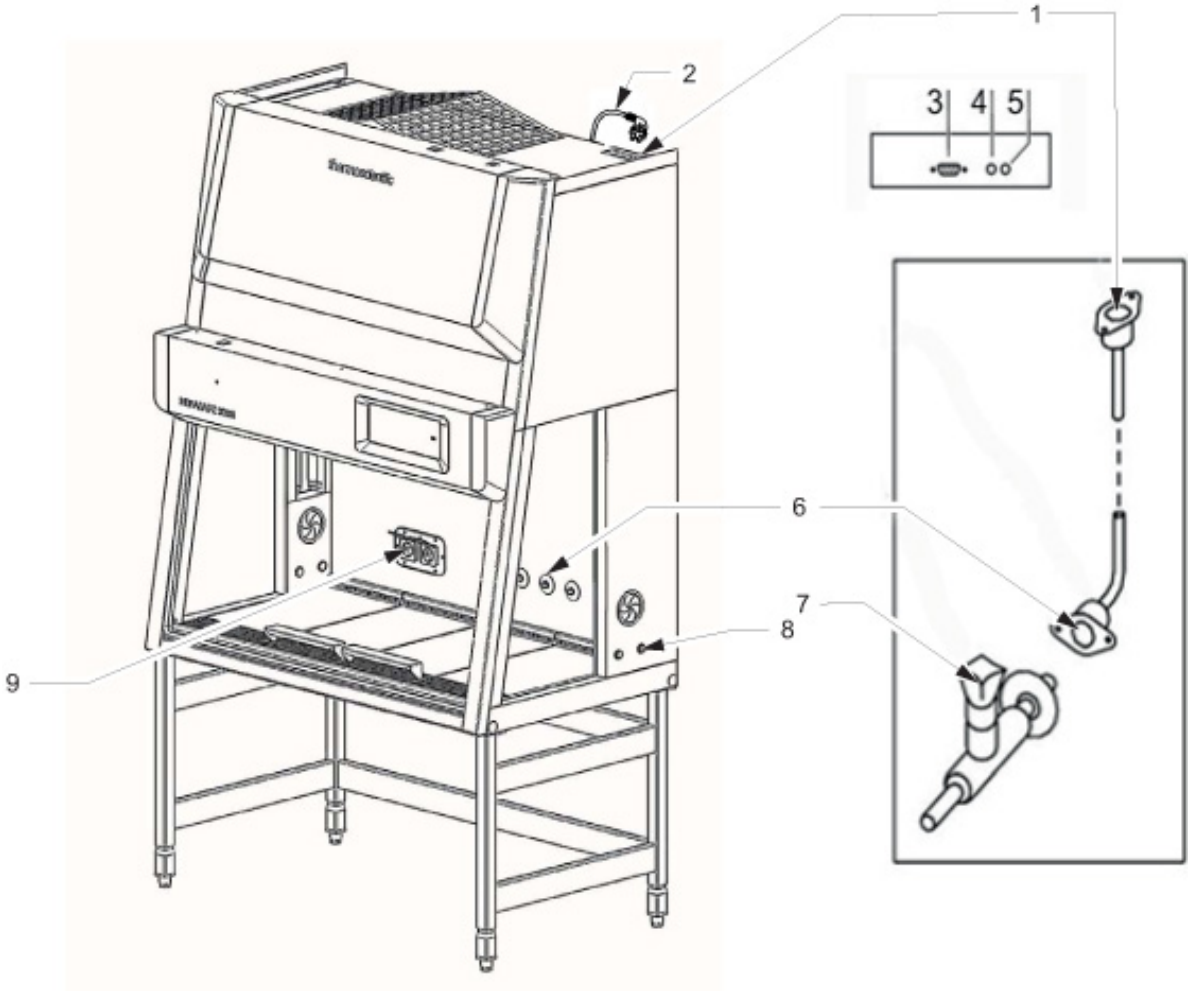


Figure 10 Supply Interfaces

The standard equipment includes the outlets [9] for internal power supply as well as the SmartPort and openings [8] on both sides for routing of cables and hoses. All other supply connections are available as options and may also be retrofitted.

Power supply connection: The connection to the power supply system is achieved through a cable with grounding plug [2].

Contact connection: The operating panel has an USB interface for the connection to a PC. Two fuse holders for 5A miniature fuses are located at the top rear of the cabinet:
[4] for (L),
[5] for (N).

Internal power supply: According to the model size there are electrical outlets at the left or/and right side (5A) [9] located on the rear wall.

Feed throughs: There are two sealed feed throughs [8] on each side. These may be used for installation of media valves [7]. On delivery they are sealed with plastic stoppers.

Media supply lines: Additionally, media can be supplied into the sample chamber through three pipes. The inlets [1] are located on top of the housing, the outlets [6] are placed at the sample chamber backpanel.

Media connections (optional): The media supply unit consists of three pipes that are routed into the sample chamber through the top of the unit. The inlet connections [1] and outlet connections [6] with thread (R 3/8”), e.g. for media valves [7], are preinstalled and equipped with a sealing plug.
The media connections are universal-type connections. One equipotential bonding connection is installed at the top of the unit.



Combustible gas!
The use of a gas burner is not recommended.
If a gas burner is to be operated in the sample chamber, then a low profile burner should be used and an appropriate shut-off device for the gas supply system (shut-off valve, solenoid valve) must be installed.
Use only laboratory safety burners in the sample chamber.

External systems: Failure detection systems or gas supply solenoid valves may be connected to the safety cabinet control.

Workspace Illumination

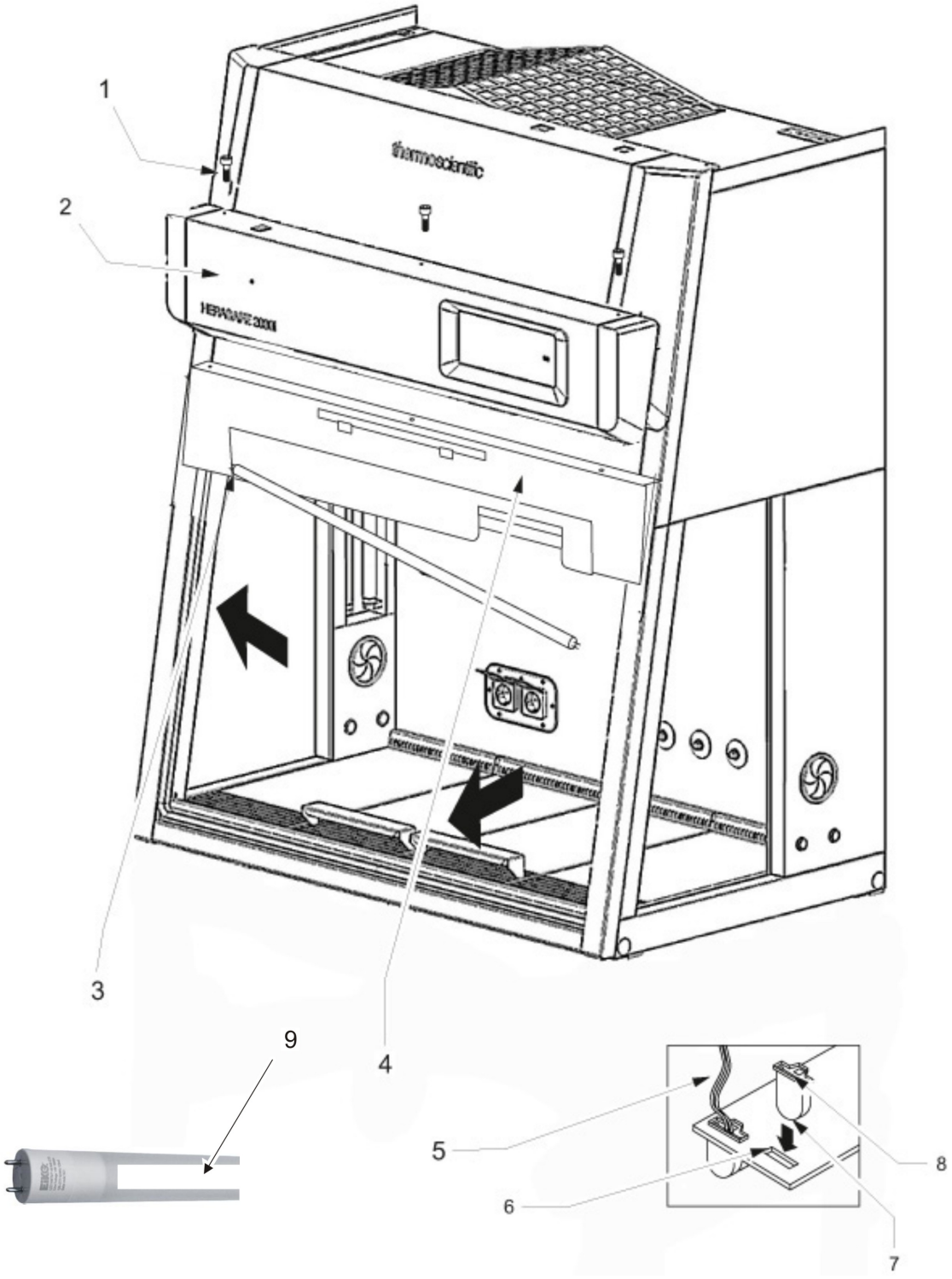


Figure 11 Workspace Illumination

The workspace illumination [2] is equipped with two LED that are installed behind the light dome [3].

NOTE
The reflector side (9) with the white strip must be installed upwards.

UV Lamp Unit

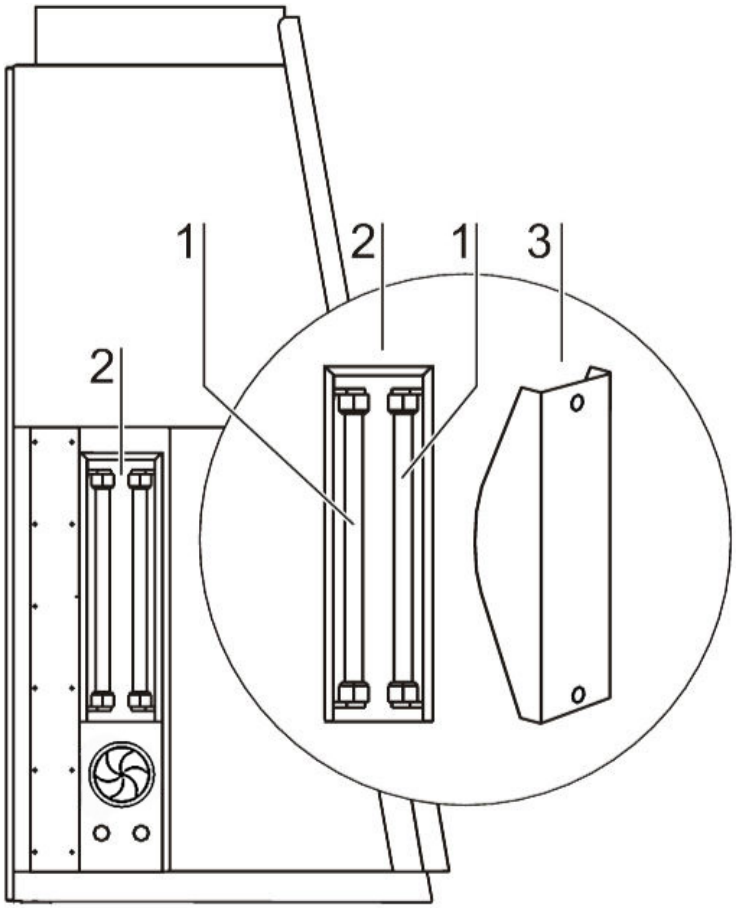


Figure 12 UV Lamp Unit

The UV lamp unit consists of two lamp housings [2] with two UV lamps each [1] that are integral to the side walls. Both lamp housings are protected by a stainless steel cover [3].
By cross-radiation of the UV units, all surfaces will be disinfected as the shadow zone is reduced.
The operating time of the UV lamps is preset.

NOTE Protection from UV radiation
As a protection from harmful UV radiation, the UV lamps can only be activated if the front window is completely closed.

Working Area

The standard equipment comprises the segmented workplate for the Herasafe 2030i and the one-piece workplate for the Maxisafe 2030i. Special workplates are available as optional accessories.
The workplates or workplate segments are placed onto the frame above the workspace drain pan.

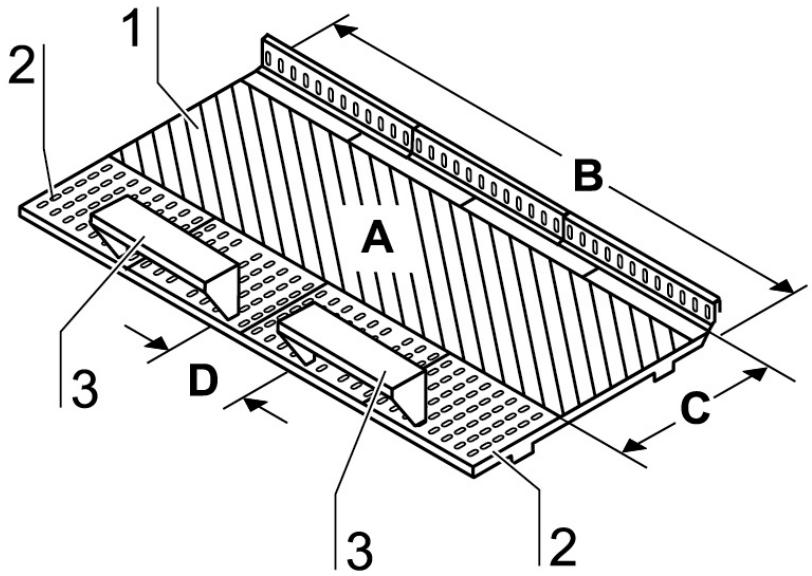


Figure 13 Working Area on the Workplate, Armrests

The working area A for perfect material protection extends over the entire width B and depth C of the workplate [1]. The two arm rests [3] are positioned at a distance D (20 cm) to each other centrically on the workplate [1] or on the workplate segments. The armrests are installed to the second perforation line [2] of the workplate.

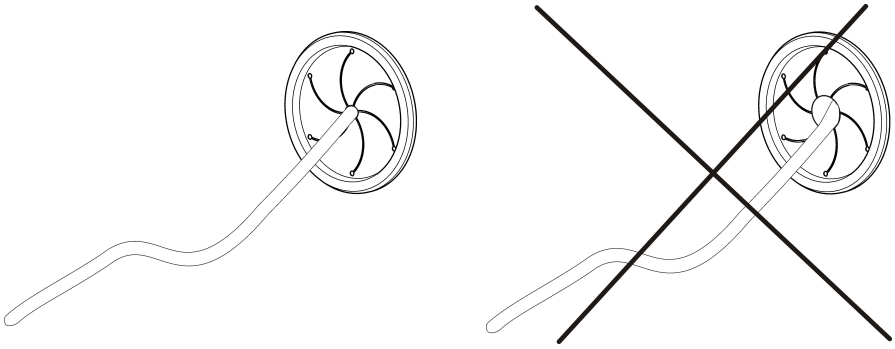
⚠WARNING

The 2 armrests (3) are safety relevant component parts!

SmartPort

Installation of low voltage cables and hoses:

The low voltage cables and hoses that are used must be designed for the purposes intended. Hoses have to be < 10 mm (Ø 10 mm). The opening in the rubber grommet of the SmartPort [5] should be maintained as small as possible so as not to compromise the efficiency of containment. Always introduce hoses from the outside inwards and apply only little force. Make sure that the seal is seated correctly! The SmartPort is intended for single use and may not be reused.

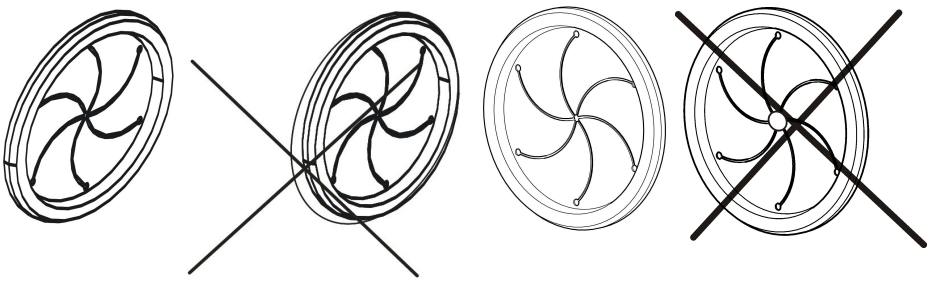


CAUTION

Models with NF label!
Any deviation from the installation instructions for low-voltage cables or tubing through the access port constitutes a non-compliant use of the NF. Such action will, in the event of an accident with biohazardous materials, result in the complete loss of the manufacturer's liability. For the warranty conditions, please see section 1.4 and 1.5 Standards and safety regulations.

CAUTION

Containment!
If feedthrough seals previously pierced are not used in operation, new seals must be installed in order to ensure a stable vacuum in the workspace. The correct seating of the SmartPorts in the side walls must be verified.



Start-up

Initial Operation

Prior to initial operation, the safety cabinet must be subjected to an installation test. Correct assembly and installation performed by the operator are essential for good start-up.

Installing Unit and Accessories

Version HERAsafe 2030i:
Device without stand:

- Place the device without stand onto a sufficiently stable substructure so that the weight of the device frame does not rest upon the drain pan.

CAUTION

High lever load!
Depending on the size, the units have a weight of 170 kg to 280 kg, see Technical data.
Lift the unit with an appropriate lifting device.

- Remove the protective foil from the worktops and arm rests.

Device with stand:
To assemble the (optional) stand and to install the device frame to the stand:

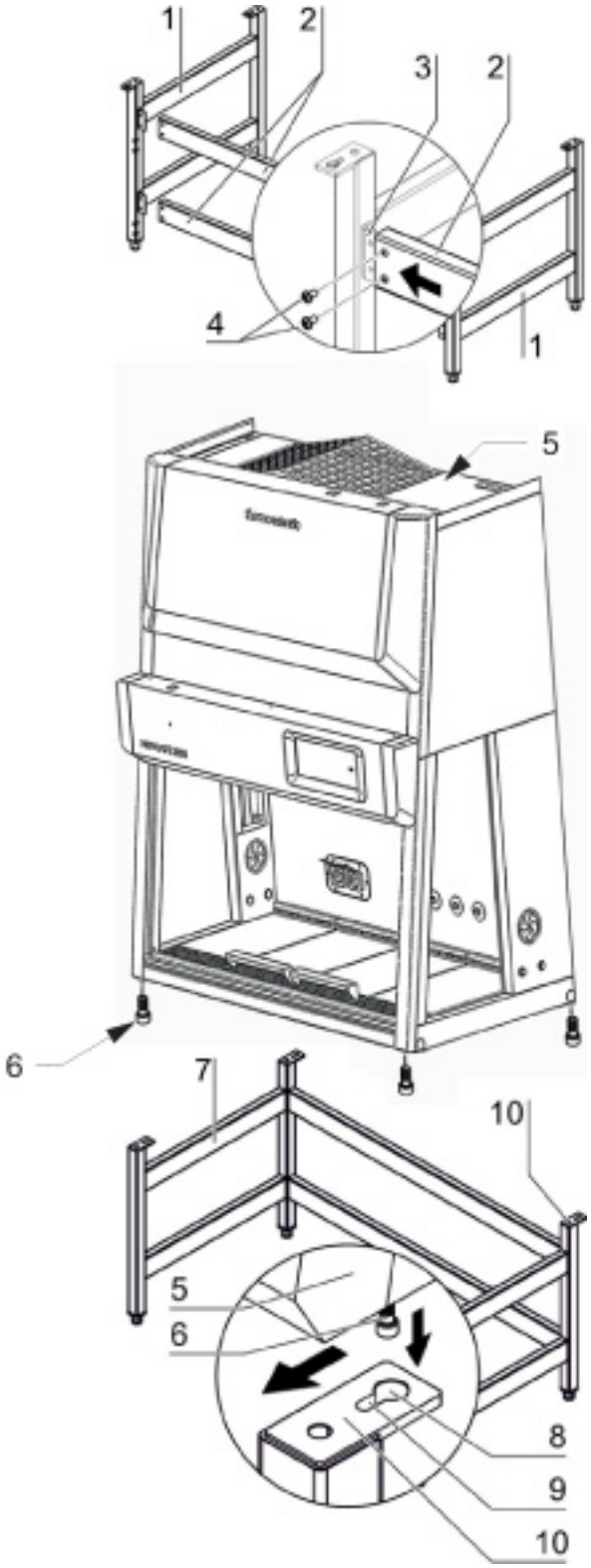


Figure 14 Stand Installation

1. Slide the two crossmembers [2] onto the retaining angles [3] of the sidemembers [1]. Secure the crossmembers to the two sidemembers using the screws [4].

2. To attach the device frame [5] to the stand [7], install four Allen screws [6] loosely into the corresponding threaded holes at the underside of the device.
3. Place the safety cabinet [1] onto the stand so that the Allen screws [6] pass through the corresponding holes [8] of the retaining tabs [10].
4. Push the device frame [5] in the grooves [9] of the retaining tabs [10] all the way to the stop.
5. Tighten the four Allen screws [6].



Drain valve lock!
To prevent contaminated liquid from being accidentally drained from the drain pan, the drain valve must be secured using a conventional padlock.

Maxisafe 2030i version:

The stand [3] and prefilter casing [1] form a mechanical unit. To facilitate the installation of the body, the stand is equipped with a lifting device.
The four columns [7] of the stand have built-in spindles [6], on which the body can be placed and lowered to its final position.

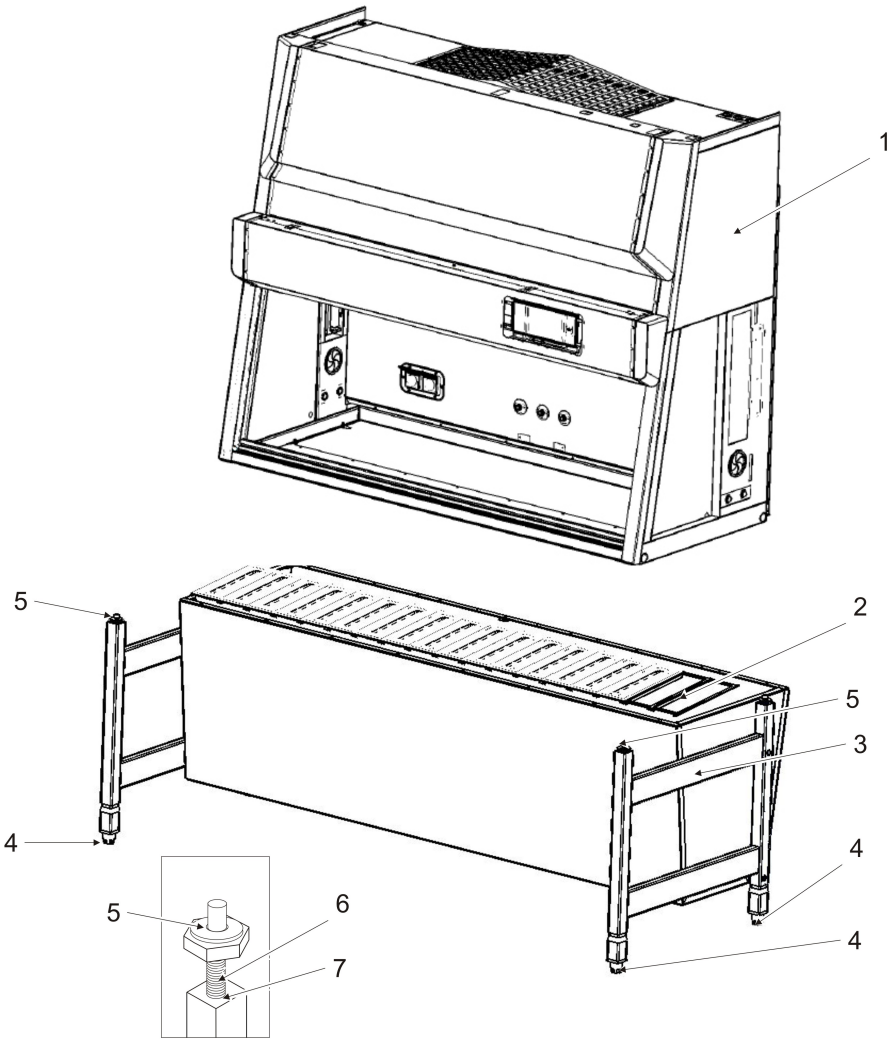


Figure 15 Installing the Maxisafe 2030i version

1. Extend the spindles by approx. 10 cm by turning the respective hexagon heads [5] and adjust the spindles to the same height on all four columns.
2. Place the safety cabinet on the spindles. Check whether the guide pins [4] fit exactly in the receptacles on the lower frame of the body.
3. Screw in the spindles evenly and in small steps until the hexagon heads butt against the column heads.

CAUTION

Leveling the device

Never use the spindles to level the device, but use the adjustable levelers instead.

4. To level the working area of the safety cabinet, place a bubble level on the workplate and turn the levelers [2] at the bottom of the stand with a wrench (size: 24 mm) until the workplate is exactly level in all directions. When adjusting the device levelers, you should proceed from left to right and from rear to front.

Leveling the Device

The cabinet should be levelled only after it has been positioned.

1. Remove transport protection (foil) from the workplate or from the workplate segments.
2. Lift the workplate or the workplate segments and place it/them onto the front and rear rails in the sample chamber with the wide line of holes facing forward.
3. Device without stand: Place a bubble level onto the workplate and align the substructure until the bubble level indicates an exactly horizontal position in all directions.
4. Device with a stand: Place a bubble level onto the workplate and use the four levellers to effect a level state in all planes.
   When adjusting the device stand height, proceed from right to left and from rear to front.

Deinstallation for Transport

To disassemble the workbench for internal transport, remove the workbench from the underframe. Do not loosen the screws on the side of the workbench while it is still on the filterframe.

To remove the workbench from the base, proceed as follows:

1. To demount the prefilter housing swing open the front window manually.
2. Loose the screws [12] of the prefilter housing against the floorpan. The number of screws depends on the device version.
3. Upper the lifting mechanism threaded rods until there is free space between workbench and underframe.
4. Now you can lift the workbench from the underframe.

Power Supply Connection

WARNING



High voltage!
Contact with current-carrying components may cause a lethal electric shock.
Before connecting the device to the power supply system, check plug and power supply cable for possible damage. Do not use damaged components to connect the device to the power supply system!
The connection has to be carried out according to country specific standards.

Establishing the power supply connection:

1. Before connecting the device to the power supply system, check to see if the voltage of the outlet corresponds with the specifications on the nameplate of the device. If the ratings given for voltage (V) and maximum current (A) are not correct, the device must not be connected to the power supply system.
2. Connect the grounding plug of the device to a properly grounded and fused outlet.
   - The outlet must be fused separately using a fusible link T 16 A or using a circuit breaker B 16.
3. Make sure that the power supply line is not subjected to tensile or compressive force.

Installation of the power supply connection:
To protect against accidental switch-off, the outlets for the connection to the power supply must be located outside the normal hand reaching range and must be accessible only to authorized personnel. Ideally, the outlets should be installed above the safety cabinet and be readily accessible. Route the power cables so they do not run across hot surfaces (such as exhaust tubing or similar tubing runs).

Connecting the equipotential bonding:
If the sample chamber is supplied with media (gas, water, etc.), the on-site equipotential bonding must be connected to one of the premounted threaded bushings either at the top of the housing or at the stand.

Initialization routine:
After the unit has been connected to the power supply system, the device control runs through a start-up initialization routine.

Initial Setup

This section explains how to set up the device using the initial setup routine.

When the unit is turned on for the first time after delivery to the customer site, you must complete an initial setup process before you can use the unit. There are five single screens with initial adjustments you must make and confirm using the **"Next"** button to complete the full setup.

On some screens, you may return to the previous screen by tapping the **"Back"** button. At the top of each screen a step counter shows your progress through the setup routine, indicating the number of the current step and the total number of steps, for example **"Step 2 of 5"**. A screen title appears directly underneath the step counter to indicate where you are in the setup routine.

Proceed as follows to start up the unit:

1. Power up the device by connecting the external power source.

   A startup screen with a "Start Setup"" button appears, prompting you to run the setup, as shown in Figure 16 below.



Figure 16 Initial Startup: Startup Screen

2. Tap the **"Start Setup"** button.

   The "Language" screen appears with a wheel picker, prompting you to choose a display language, as shown in Figure 17 below.



Figure 17 Initial Setup: Setting the Language

3. Tap the up/down arrows or swipe your finger across the wheel up or down to set the language (default is English).
4. Once you have chosen your display language, tap the **"Next"** button.

The next screen allows you to select your location. Enter the name of the city/country and select from the list of suggestions displayed (see "Appendix: City Time Zones" on page 211
.

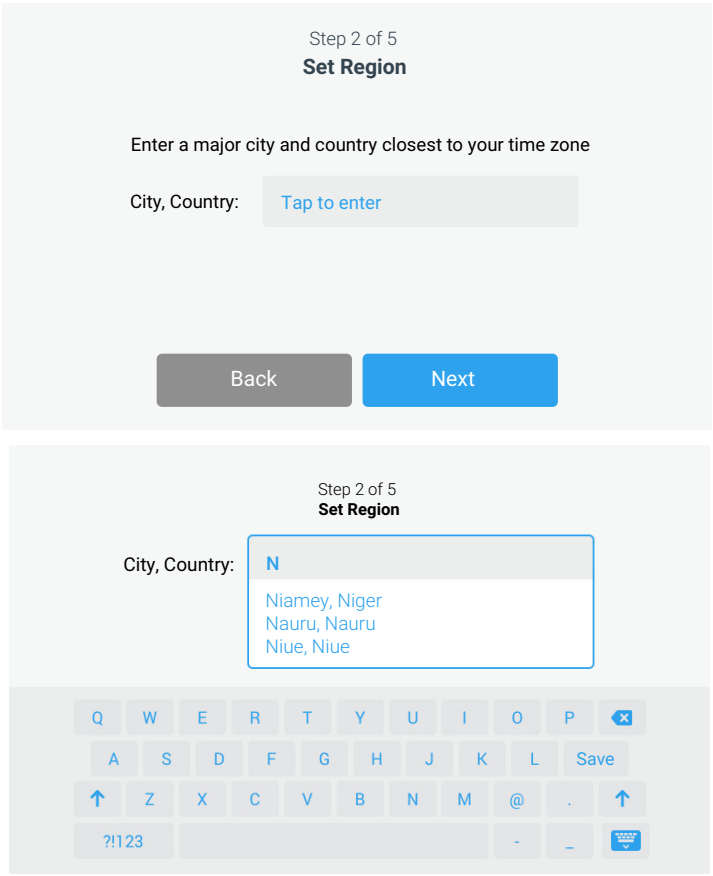


Figure 18 Initial Setup: Setting the Region

After selecting the region, tap the "Save" button.

The "Date Setup" screen appears with a wheel picker, prompting you to set the date, as shown in Figure 19 below.

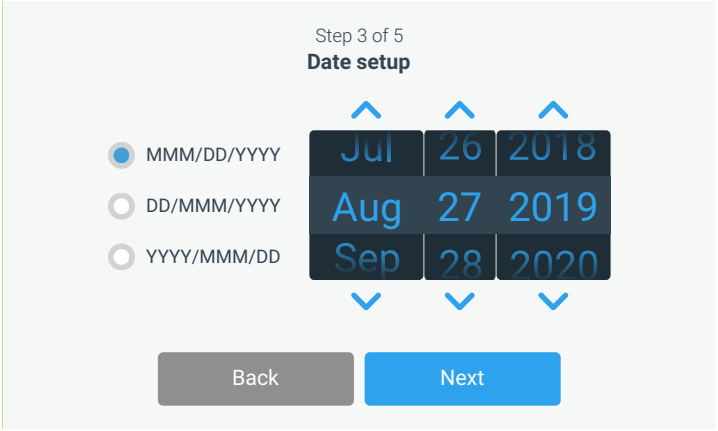


Figure 19 Initial Setup: Setting the Date

5. Tap the "*MMM/DD/YYYY*", "*DD/MMM/YYYY*", or "*YYYY/MMM/DD*" radio button on the left side of the screen to choose a date format.

   The segments of the wheel picker screen are rearranged to reflect the selected date format. For example, if you select the "DD/MMM/YYYY" radio button, the wheel picker will change to 01 I Jan I 2016.

6. Tap the up/down arrows or swipe your finger across the wheel up or down to set the current month, day, and year on each of the three wheel picker segments.

7. Once you have set the date, tap the "Next" button.

   The "Time setup" screen appears with a three-segmented wheel picker, prompting you to set the time of day, as shown in Figure 20 below.

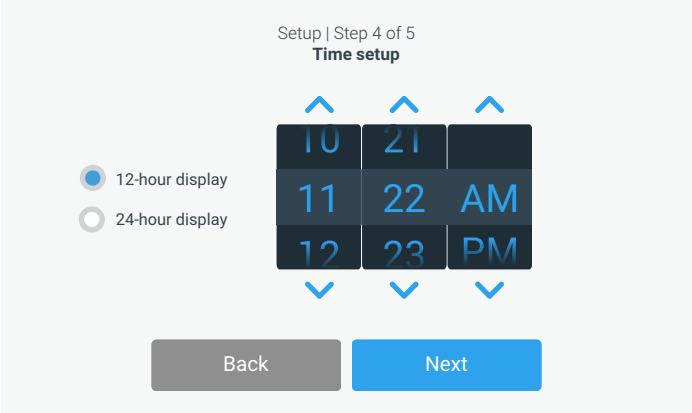


Figure 20 Initial Setup: Setting the Time of Day in 12hr, AM/FM Format

8. If desired, tap the "24hr Display" radio button on the left side of the screen to choose the 24-hour time format. (Default time format is AM/PM, 12-hour format.)

   The segments of the wheel picker screen are rearranged to reflect the 24-hour time format, as shown in Figure 21 below.



Figure 21 Initial Setup: Setting the Time of Day in 24hr CET Format

9. Tap the up/down arrows or swipe your finger across each wheel up or down to set the current time in hours and minutes.
10. Once you have set the time, tap the **"Next"** button.

    The "Setup completed" screen appears with its "Finish" button highlighted, prompting you to complete the setup, as shown in Figure 22 below.

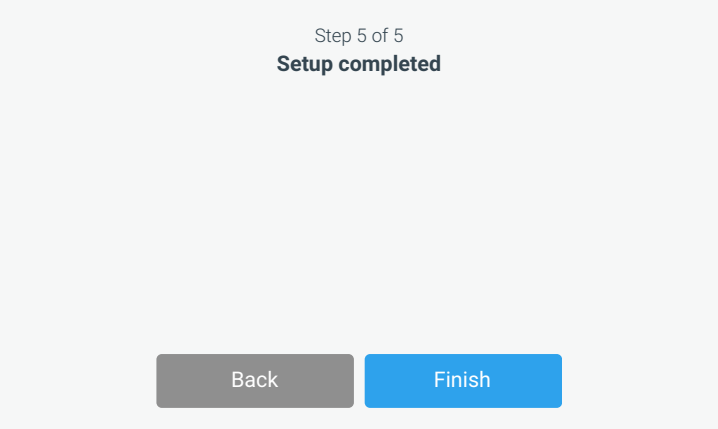


Figure 22 Initial Setup: Completing the Initial Setup

11. Tap the **"Finish"** button to have your setup stored.

    The unit comes up in standby state, as shown in Figure 23 with the window closed.



Figure 23 Main Screen - Unit in Standby Mode, Window Closed

The Setup is complete now. You can now begin using the unit.

NOTE All of the settings made in the previous steps can be edited by tapping the "Settings" icon in the left-hand Main Navigation Bar. See "Main Navigation Bar (Region R3)" on page 52.

Power supply connection
The safety cabinet should remain connected to the power supply system at all times to ensure that settings for the individual unit configuration remain active in the memory. If the power supply is interrupted for more than 5 minutes, the time must be reset correctly. After the power supply connection has been reestablished, the system switches to the operating mode that had been active last. Additionally, a window with the message “Mains voltage has been restored” appears as soon as power has been restored, prompting the user to confirm by tapping “OK”. This message may, for example, be caused by a power outage.

USB Interface



Pin	Name	Description	Level
1	USB_H1_VBUS	Power supply	+5 V DC max 500mA
2	USB_H1_DN	Data minus (D-)	
3	USB_H1_DP	Data plus (D+)	
4	GND	Ground	

Figure 24 USB Interface and Display

The USB port on top of the device is reserved for servicing!

The USB port next to the display window enables the user to save log data and install new software releases.

Power Supply: +5VDC 500 mA

Installation Test

Do not operate the device before the installation test has been completed.

- The installation inspection of the device must be conducted in accordance with EN 12469 and additionally according to DIN 12980 for Maxisafe 2020. The cabinet may be operated as a Class II microbiological safety cabinet, in accordance with EN 12469 / 2000, if the device functions or function patterns listed below were checked and if the test results are within the safety value tolerances specified by the manufacturer:
  - Electrical safety test
  - Inflow speed test
  - Downflow speed test
  - Leakage test of HEPA filters
  - Airflow control test
  - Installation test according to DIN 12980:2016 for Maxisafe 2030i
- A repeat test must also be performed after repairs to the device or after considerable changes (more than 5 cm) to the location of the device.
- The operator must prepare a test report or request a written test report from the authorized test service.

CAUTION

Safety warranty
The operational safety of the device, particularly the personal and material protection, are guaranteed only if all safety functions of the device have been tested and approved.
Thermo Electron LED will not warrant the operational safety if the device is operated without performance of the required installation test or if the installation test and repeat test are not performed by adequately trained and authorized personnel!

CAUTION

Device hygiene
The initial start-up with subsequent installation test does not include any decontamination measures. For operation in the work process, the sample chamber of the device and the accessories required for the work process must be disinfected and cleaned in accordance with the hygiene guidelines set forth for the application.

Operation

This chapter describes how to control the Herasafe 2030i and Maxisafe 2030i Biological Safety Cabinets from the touchscreen display mounted in the light dome of the unit.

The screen display unit measures 17.8 cm (7 inches) diagonally across and has touch-sensitive areas that support finger gestures like tapping, swiping and pinching. It can be used with gloves.

Screen Layout

The touchscreen display unit of the Herasafe 2030i and Maxisafe 2030i Biological Safety Cabinets is subdivided into the four main screen regions. Figure 25 presents the arrangement of the screen areas discussed in the following.



Figure 25 Screen Areas

The four screen areas offer the following features:

- The Info & Health Status area (Region 1 in Figure 25 above) shows the biological safety cabinet‘s name, the current date and time, the unit‘s overall health status, and a login area when password protection is activated. For an overview, see “Info & Health Status Area” on page 46.
- The Main Screen (Region 2 in Figure 25 above) displays the main operating parameters of the unit, including window status and airflow speeds. When alarms or reportable events occur, this part of the display screen shows alarm or event information. For an overview, see “Main Screen (Region R2)” on page 47.
- The Control Panel (Region 2B in Figure 25 above) offers touch-sensitive buttons for controlling the major functions of the unit, such as window up/down, sample chamber illumination, gas supply, and power receptacles. For an overview, see “Control Panel (Region R2B)” on page 49.
- The Main Navigation Bar (Region R3) holds iconic shortcuts to the **“**Settings**”** screen and is visible at all times. Clicking any of these icons displays **“**Settings**”** screen in the Main Screen area. For an overview, see “Main Navigation Bar (Region R3)” on page 52.

Info & Health Status Area

The Info & Health Status Area at the top of the display window appears in all screen displays. Figure 26 shows an example of the Info & Health Status Area on a unit that is in a proper working condition.



Figure 26 Info & Health Status Area

The Info & Health Status Area displays the following information:

- Unit Name (top left in Figure 26), see “Setting the Unit Name” on page 89.
- Date/Time (bottom left in Figure 26), as entered during the initial setup (see “Initial Setup” on page 39) or adjusted later on (see “Setting the Date” on page 85 and “Setting the Time of Day” on page 86).
- The “Unit Health Status” icon (center in Figure 26) is a touch-sensitive area that opens a Health Status pop-up window on top of the Main Screen. Four different icons may appear in this place, representing the overall health status of the biological safety cabinet:

  The green **“**Health Status Good**”** icon indicates that the unit is in proper operating condition. For more details, see “Viewing General Status Information” on page 76.

  The yellow alert triangle is a **“**Health Status Alert**”** icon. It indicates that there is an issue that does not stop operation of the biological safety cabinet immediately, yet requires the operator‘s attention soon, such as a HEPA filter to be replaced. For more details, see “Handling Alerts” on page 76.

  The “red bell” **“**Health Status Alarm**”** icon indicates that there are one or more major alarm conditions that need to be corrected because they may constitute a hazard to the operator or the unit itself. The blue circle indicates how many alarms exist. A red bell with sound waves on both sides (top) means that the alarm is sounding, while the red bell with the diagonal line across (bottom) shows that the alarm has been snoozed. For more details, see “Silencing and Handling Alarms” on page 72.

- The **“**Login**”** prompt (top right in Figure 26) appears only if the unit is set up to operate in Secure Mode (see “Access Control” on page 119).

Main Screen (Region R2)

The Main Screen takes up the main part of the **"**Display Settings**"** screen and displays the status details on the biological safety cabinet.

Figure 27 shows the unit in working mode, with the window ready in the working position and the downflow and inflow speeds at operational speeds. The sample space illumination, fans, gas supply and power receptacle functions are all on.



Figure 27 Main Screen

The screen content changes with operational state, depending on whether the unit is:

- in working mode, as shown in Figure 27 above
- starting up, as explained in "Startup Mode" on page 54
- in standby mode, as explained in "Standby Mode" on page 55
- ready for loading and/or cleaning, as explained in "Cleaning and Loading Mode" on page 55
- in idle mode, as explained in "Idle Mode" on page 56
- running UV disinfection, as explained in "Running UV Disinfection" on page 64

The side-view symbol graphic on the left shows the current state of the unit. Figure 28 gives an overview of how the symbol graphic varies with different operational states.



Window closed



Window open



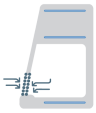
UV disinfection running, window closed and purple orb in the sample chamber



Ready for cleaning or loading, front window hinged



Disabled, window open symbol



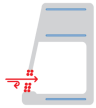
Working properly, with animated “Downflow” and “Inflow” icons to show that air barrier has been established



Start-up alert symbol, with animated “Downflow” and “Inflow” icons in tangerine color to show that air barrier is building up, but not operational yet



Alarming symbol, with animated “High downflow” and “Low inflow” icons in red color to warn the user that air barrier is not operational



Alarming symbol, with animated “Low downflow” and “High inflow” icons in red color to warn the user that air barrier is not operational



Alarming symbol, with animated “Downflow” and “Inflow” icons in red color to warn the user that air barrier is not operational.



Alarming symbol, alerts the user that window is not ready

Figure 28 Overview of Side-View Symbol Graphics for Unit Status

Three status indicator boxes appear in the center of the Main Screen. They show, from top to bottom, the state of the window, plus the downflow and inflow statuses.

Status indicator boxes may display with four different status icons:



The checkmark on the green circle indicates that this particular function is working properly.



The yellow animated “Timer” icon indicates that the unit is working up towards an operational state.

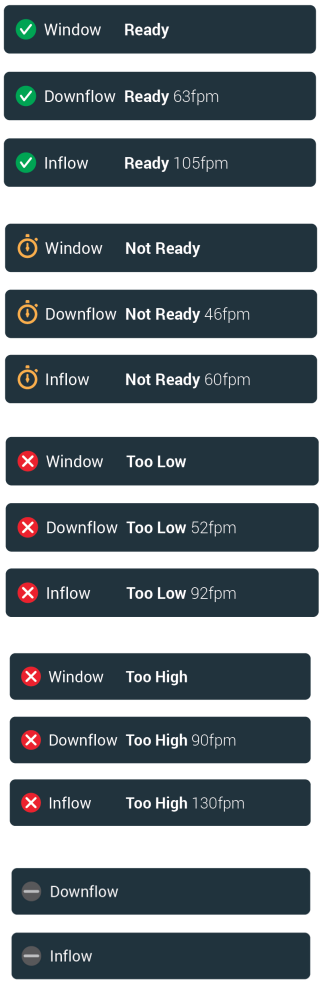


The white cross on the red circle indicates that there is a problem with that particular function.



The light gray dash on the gray circle signifies there is no activity. This icon indicates, for example, that there is no airflow when the unit is on, but the fans are off.

The following examples show different combinations of status indicator boxes for major operational states.



All green circles with checkmark: unit is ready.

All yellow timers: unit is not ready, but running up to operational state.

All red circles with cross: window and airflow values are too low.

All red circles with cross: window and airflow values are too high.

All gray circles with dash: no activity because the fans are off.

Examples for windows with different operational states are shown below.

Control Panel (Region R2B)

The Control Panel in Screen Region R2B contains a complete set of controls for operating the functions of the biological safety cabinet. The inventory of buttons varies with the number of options built into the unit, as can be seen in Figure 29 and Figure 30.

The Control Panel is visible at all times below the Main Screen.

Figure 29 shows the control panel for a biological safety cabinet equipped with all options, including a motorized window, sample chamber illumination, sample chamber fans, gas supply and a power receptacle in the sample chamber.



Figure 29 Control Panel for fully equipped Unit

Functions that are currently working are identified by a light gray frame around the button, as shown in the bottom rows of Figure 29 and Figure 30. A frame dimmed to dark gray, as shown in the top rows, indicates that the function is available, but currently not in use.

Figure 30 shows the Control Panel for a unit equipped with all options but the gas supply.

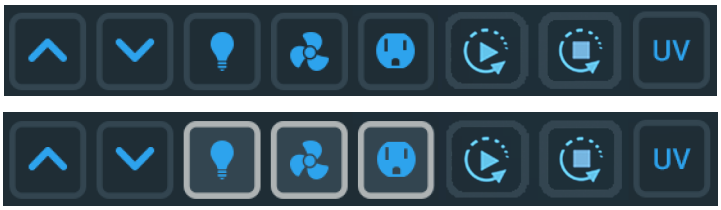


Figure 30 Control Panel for Unit without Gas Option

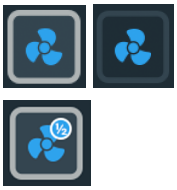
The functions of the individual control panel buttons are explained in Figure 31 below.



The “Open window” and “Close window” buttons (available on units with a motorized window) labeled with up and down arrows raise and lower the window.



The “Light Bulb” button switches the interior sample chamber illumination of the biological safety cabinet on and off.



The “Fan” button switches the interior sample chamber fans of the biological safety cabinet on and off. Tap and hold this button for 5 sec. to switch the fans on or off. During the UV disinfection cycle, the fans run in reduced flow mode, which is indicated by a small blue circle labeled “1/2” (see lower image on the left side). The fans also run in reduced flow mode when the front window is closed and there is no UV disinfection ongoing.



On units equipped with the gas option, the “Gas” button opens or closes the valve that controls the gas supply to the sample chamber. If the window is open to working position, and the fans are running and airflow speed is ok, you may tap the “Gas” button to open the gas valve.
In any other condition, the “Gas” button will not open the gas valve and a pop-up message appears stating:
The gas valve can only be opened when the window is in the working position, the fans are running, and there are no active alarms.
The “Gas” button is deactivated automatically if the user shuts the window, turns the fans off, or if an alarm is triggered.



The “Power Receptacle” button switches the power receptacles in the sample chamber of the biological safety cabinet on and off.



The “Autostart” button starts the unit immediately with the set of functions previously selected in the “Autostart” settings (see “Programs” on page 93). Tap and hold this button for 3 sec. to start the unit in “Autostart” mode.



The “Autostop” button stops the unit immediately, closing the window and leaving only a user-selected set of functions enabled, as previously selected in the “Autostop” settings (see “Programs” on page 93). Tap and hold this button for 3 sec. to stop the unit in “Autostop” mode.
If you have selected the closing of the front window in the Autostop settings (see “Setting up AutoStop” on page 95), you need to keep the AutoStop button  pressed until the movement of the front window stops completely.



The “UV” button switches UV disinfection of the sample chamber on and off.

Figure 31 Buttons on the Control Panel

When operating the “Close window”  and “AutoStop” buttons  , you must tap and hold the button until the window is closed. This is a safety feature.

To aid users in this gesture, the tooltip-style bubble shown in Figure 32 is displayed on screen when you press either button.

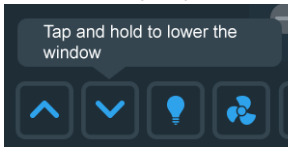
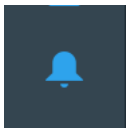


Figure 32 Tooltip Bubble over “Close window” Button

Main Navigation Bar (Region R3)

The Main Navigation Bar (in Screen Region R3) holds icons for all major settings of the Herasafe 2030i and Maxisafe 2030i biological safety cabinets.

The Main Navigation Bar is visible at all times on all screens.

Icon	Meaning
	“Back” button: cycles through all screens previously displayed (grayed out if on Main Screen).
	“Home” icon: returns to the Main Screen.
	“Settings” icon: opens the “Settings” screen (see “Settings” on page 79) with various options for parameter settings.
	“Event Log” icon: (see “Event Log” on page 121)
	“Alarms and Alerts” icon[1]: opens the “Alarms and Alerts” screen (see “Alarms and Alerts” on page 96).
	“Data Plate” icon[1]: opens the “Data Plate” screen (see “Data Plate” on page 103) showing general data about the unit.
	“Programs” icon[1]: opens the “Programs” screen (see “Programs” on page 93), where you can program the AutoStart and AutoStop functions.

[1] can also be accessed from the “Settings” screen

Figure 33 Main Navigation Bar

Working Mode

Figure 34 shows the Main Screen in working mode.



Figure 34 Main Screen - Unit working

The side-view symbol graphic shows that the window is opened to working position, and the arrows in the animated “Air barrier” icon show that he air barrier is working properly. The three status indicator boxes to the right of the symbol graphic show green checkmarks to indicate that the window is at the correct position, and that downflow and inflow speed are at their correct values.

Buttons are highlighted in the Control Panel Area to indicate that the sample chamber illumination, fans, gas supply, and power receptacle functions are all on, as needed for a working session. The “AutoStop” button  is available because the unit is running.

Startup Mode

Figure 35 shows the Main Screen while the unit is starting up. The following startup screen shows what happens when the “AutoStart” or “Fan” button is tapped: The screen shows alerts for the air barrier because the airflow speeds are not up to speed yet.

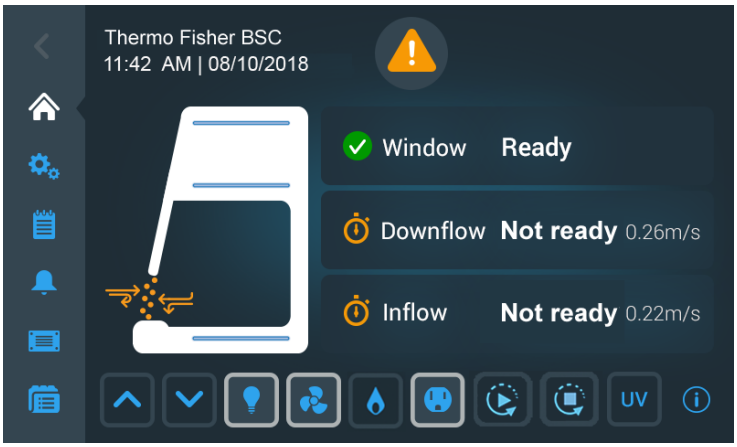


Figure 35 Main Screen - Unit starting up

The symbol graph shows that the window is opened to the working position, and the animated yellow arrow and air barrier symbols indicate that the airflow is not ready. The three status indicator boxes show:

- a green checkmark icon in the window status box to indicate that the window is ready, but
- yellow “Timer” icons with rotating hands show in the Downflow and Inflow boxes, signifying that the airflows are not up to proper speed yet.

NOTE When the operational downflow and inflow speeds are reached, the yellow timers are replaced by green checkmark icons.

Figure 35 shows a typical startup mode example for “AutoStart”, with the “Lights”, “Fans”, and “Power receptacle” buttons already enabled (see “Programs” on page 93 for more details). If enabled in AutoStart, the “Gas” button may come on later when the airflows are up to speed.

Standby Mode

Figure 36 shows the Main Screen in standby mode.



Figure 36 Main Screen - Unit in Standby

Standby mode is entered when you close the window from within a working session, which is indicated by the closed window in the side-view symbol graphic. A Standby header appears to the right of the graphic, showing the unit is in standby mode, maintaining cleanliness and containment, and ready to resume work when you move the window back to the working position. The green checkmark next to the Standby header signifies that everything is working properly.

In the Control Panel Area, buttons are highlighted to indicate that functions are still on, including the sample chamber illumination, the fans, and the power receptacles. The “AutoStop” button is also available because the unit is running.
If the window is closed, the fans will switch to reduced flow, as indicated by the small blue circle with the “1/2” label .

Cleaning and Loading Mode

Cleaning mode is entered when you fully open the front window using the hinge for accessing the sample chamber, for example, in order to decontaminate or introduce larger accessories. Cleaning mode is indicated by the flipped-up window in the side-view symbol graphic and the “Cleaning mode” header that appears next to it, as shown in Figure 37.

Additional text like “SmartClean Plus” and “Sample chamber open for cleaning and/or loading or unloading.” further explains what cleaning mode is for.

The “Health Status” Icon in the Info & Health Status Area is a yellow alert triangle.



Figure 37 Main Screen - Unit cleaning

Idle Mode

Idle mode is entered when you turn all functions (including the fans) off, with the window either in the working position or closed. Idle mode is indicated by the gray “no activity” icons in the downflow and inflow status indicator boxes, as shown in Figure 38.



Figure 38 Main Screen - Unit in Idle Mode, Window closed

Idle mode is also possible with the window opened to the working position, as shown in Figure 39. In this case, the downflow and inflow status indicator boxes show an “Alert” icon.



Figure 39 Main Screen - Unit in Idle Mode, Window open

Sleep Mode

After an inactivity period of 15 minutes, the device goes to Sleep Mode and displays a screensaver. The screensaver is a blank screen with a moving “Tap to wake” prompt, as shown in Figure 40.

Sleep Mode is activated after 15 minutes when the following prerequisites are met:

- the user does not interact with the device
- no pending or new alarms exist
- the window is closed
- the fans are switched off

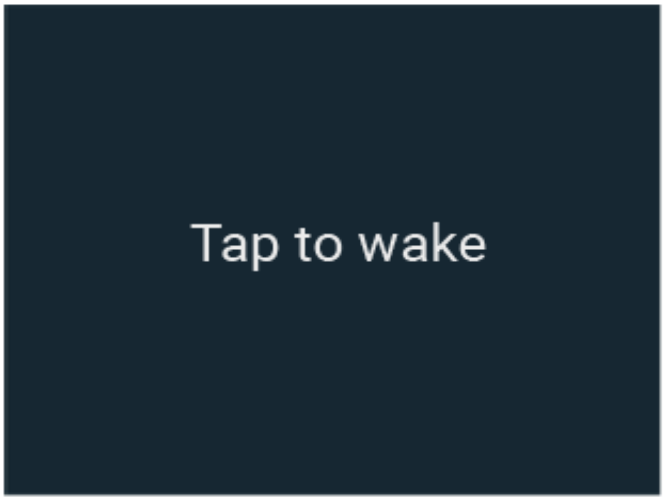


Figure 40 „Tap to wake“ Screensaver

To exit Sleep Mode and return to the previous screen, tap anywhere on the touchscreen display.

The device exits Sleep Mode automatically when one of the following occurs:

- a new alarm occurs
- the window is opened by pressing the rocker switch (see “Using the auxiliary Rocker Switch” below)
- the fans are switched on

Sleep Mode can be activated or deactivated in the display settings (see “Display Settings” on page 83).

Handling and Control

The following section describes basic, everyday operations you need for working with the device:

Using the auxiliary Rocker Switch

The basic window functions required for the operation of the device can be controlled using the auxiliary rocker switch:

- During a power failure the front window can be lowered, raising is possible only, if mains supply is re-established.

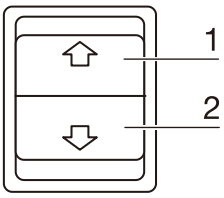


Figure 41 Basic window functions of the auxiliary Rocker Switch

Moving the Front Window

The movement of the front window is controlled by depressing the auxiliary rocker switch control element with the corresponding arrow symbol.





Crushing hazard
During movement of the front window do not try to access the inner chamber.

Proceed as follows to raise the window:

1. Press the control element [1/Figure 41].

   When the front window reaches the working position, the movement stops automatically. If the movement starts above the working position, the front window stops at the maximal opening position.

2. To stop the upward movement, release the control element.
3. To lower the window, keep the control element depressed [2/Figure 41].
4. To stop the downward movement, release the control element.

   When the front window reaches its working position, the movement stops automatically, the audible alarm signal is switched off, and the green “Health Status Good” icon appears in the Info & Health Status Area at the top of the “Display Settings” screen.

When the front window does not reach the working position, the “Health Status Alarm” icon appears in the Info & Health Status Area at the top of the display screen, along with a scrolling alarm description. For details on how to handle alarms, please refer to the section “Silencing and Handling Alarms” on page 72.

The audible alarm signal is switched off when the front window is completely closed.

Moving the Front Window to the Working Position



WARNING

Crushing hazard
During movement of the front window do not try to access the inner chamber.

Proceed as follows to move the front window up to the working position:

1. Tap the “Open window” button on the Control panel to raise the window from the closed to the working position.

   When the front window reaches the working position, the movement stops automatically. When the movement starts above the working position, the front window stops at the maximal opening position.

NOTE The working position is factory pre-set and cannot be changed in the Settings.

Proceed as follows to stop the upward movement:

2. Tap the “Close window” button.

Proceed as follows to continue the upward movement beyond the working position:

3. Tap the “Open window” button.

Lowering the Front Window

Proceed as follows to lower the front window:

1. Tap the “Close window” button on the Control panel and keep it depressed until the window reaches its closed position.

Proceed as follows to stop the downward movement:

2. Release the “Close window” button.

Switching the Sample Chamber Illumination on and off

In each operating mode but the UV disinfection cycle, the sample chamber illumination can be switched on or off.

Proceed as follows to switch the illumination on or off:

1. Tap the “Light Bulb” button to switch on or off.

   The illumination comes on, and the “Light Bulb” button is displayed with a light gray border.

Activating and Deactivating the internal Power Supply Receptacles

All power outlets in the sample chamber can be activated (power supply on) or deactivated (power supply off) simultaneously.

Proceed as follows to activate the power receptacles:

1. Tap the “Power Receptacle” button.

   The powered accessories in the sample chamber are turned on, and the “Power Receptacle” button is displayed with a light gray border.

Proceed as follows to deactivate the power supply receptacles:

2. Tap the “Power Receptacle” button.

   The powered accessories in the sample chamber are turned off, and the light gray border on the “Power Receptacle” button disappears.

Activating and deactivating the internal Gas Supply

The solenoid valve controlling the gas inflow can be opened and closed from the Control Panel.

NOTE The solenoid valve for activating the internal gas supply is an additional safety feature that enables the gas supply to the safety cabinet. The main gas supply is controlled by a media valve or other external shut-off device.

Proceed as follows to activate the gas inflow:

1. Tap the “Gas” button.

   Gas starts streaming through media valves within the sample chamber, and the “Gas” button is displayed with a light gray border.

Proceed as follows to deactivate the gas supply:

2. Tap the “Gas” button.

   The solenoid valve gives a clicking sound, the gas supply to the sample chamber is turned off, and the light gray border on the “Gas” button disappears.

Logging into a Passcode-protected Unit

In laboratory environments with exacting biosafety requirements, there may be a need to restrict access to the biological safety cabinet.

This enhanced level of biosafety is afforded by Secure Mode.

NOTE Secure Mode can only be enabled by an administrator. The process of enabling Secure Mode is described in the section “Access Control” on page 119.

If the unit is in “Secure” Mode, the word “Login” appears in the top right corner of the Info & Health Status Area, as shown in Figure 42 below.



Figure 42 Info & Health Status Area with “Login” Prompt

As a regular user, your login is not time-limited, that is, the session will never time out.

When you tap “Login”, a login box appears in the center of the screen, then slides up while a keyboard slides in from the bottom.

NOTE If the unit is set to “Open” mode, the word “Login” will not be displayed in the top right corner of the screen. Some specialized functions require that you log in, though. For example, when you tap the “Factory Settings” or “Field Certification” buttons in the “Settings” screen (see “Settings” on page 79) you will be prompted to log in.

Logging in

Proceed as follows to log into a unit in “Secure” Mode:

1. Tap the word “Login” in the top right corner of the screen, or tap anywhere else on the screen.

   The “Login” screen appears on top of the screen, then a keypad slides up from the bottom and pushes the “Login” screen up towards the top of the screen (see Figure 43).

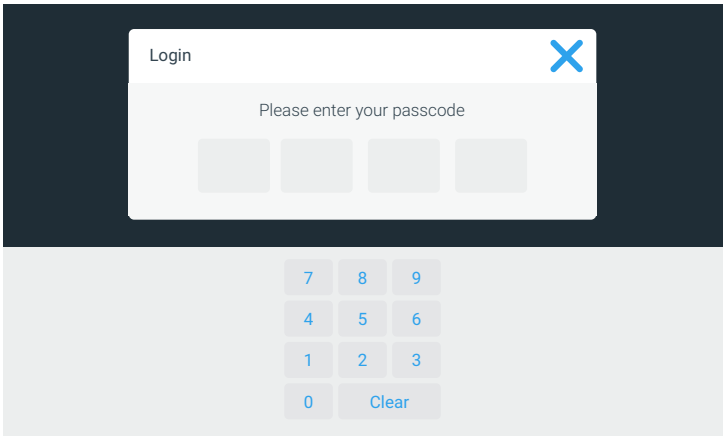


Figure 43 “Login” Screen

2. Enter your four-digit passcode, or tap the “X” icon to exit and close the window if you do not want to log in.

   After entering the last digit, you will be logged in. The Main Screen appears, with the word “Logout” (instead of “Login”) in the top right corner.

NOTE If you have entered an incorrect passcode, an error message appears below the passcode field. Try again using the correct passcode.

Logging out

1. Tap the word “Logout” in the top right corner of the screen.

   The “Log out” screen shown in Figure 44 appears on top of the screen, asking you to confirm that you want to log out.

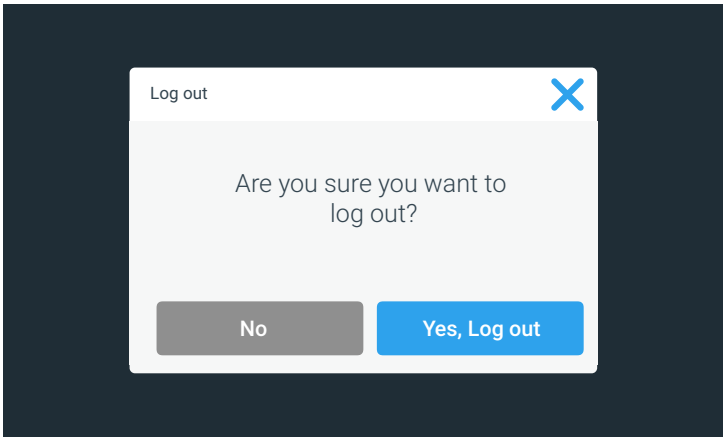


Figure 44 “Log out” Screen

2. Tap the “Yes, Log out” button to confirm, or tap the “No” button or “X” icon in the top right corner to exit and close the window if you do not want to log out.

   The confirmation message appears shown in Figure 45, confirming that you have been logged out successfully.

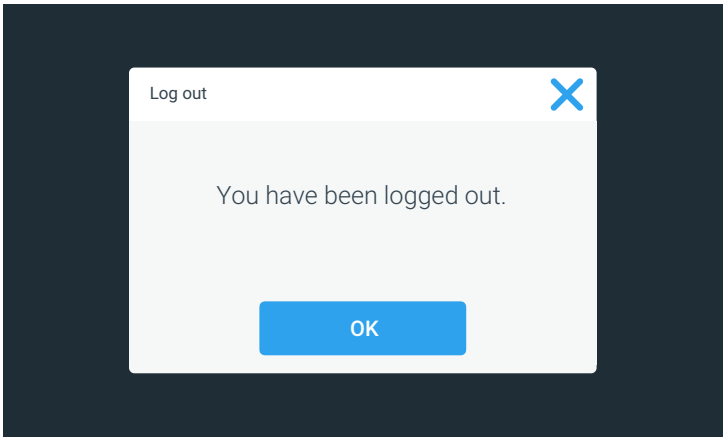


Figure 45 “Log out” Screen: Logged out Message

You will be returned to the main home screen, regardless of the screen you were viewing before you decided to log out. In “Secure” mode, the unit also automatically shuts off all functions that were previously on, such as illumination, fans, power receptacles, gas. You may still raise or lower the window on the unit.

Running UV Disinfection

The biological safety cabinet has a built-in UV disinfection routine that affords an intensifying additional disinfection after a standard wipe/spray disinfection. UV disinfection can be started by pressing the “UV” button on the Control Panel.

For running the UV disinfection routine, the front window must be completely lowered to protect against UV radiation. A safety interlock ensures that the routine cannot be run until the front window is in the closed position.

While the routine is running, the “UV disinfection” screen shown in Figure 46 below is displayed on the Main Screen.



Figure 46 Main Screen: “UV disinfection” running

The “UV disinfection” screen sports the side-view symbol graphic with the window closed and a purple orb in the sample chamber. To the right of the graphic a green checkmark and the “UV disinfection” header identifies the current mode of operation.

Additionally, the “Total cycle time” in hours and the time remaining in hours, minutes and seconds are displayed.

UV disinfection ends when the preset total cycle time for the routine has elapsed. Then, the UV lamps are switched off automatically, and the “UV disinfection” screen goes away.

If the setting for “UV disinfection” (see “Setting UV Disinfection Cycle Time” on page 80 for instructions) includes an adjustment for bulb life, the label for the total cycle time display reads “Total adjusted cycle time”, as shown in the example in Figure 47.



Figure 47 Main Screen: Disinfection running with Adjustment for Bulbs

Tapping the “Total cycle time: n hr” label will take you to the “Disinfection Cycle Settings” screen if you need to change the setting. The process of setting cycle time is described in the section “Setting UV Disinfection Cycle Time” on page 80.

You can also tap the “Power Receptacle” button on or off during an ongoing UV disinfection cycle.

When the “Light Bulb” button is tapped, a pop-up window appears, stating “The LED light cannot be switched during the UV disinfection cycle. Would you like to abort the UV cycle and switch the LED lights on?”

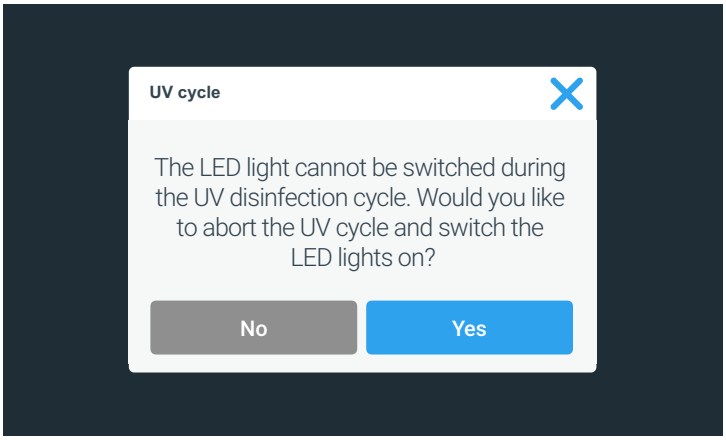


Figure 48 UV Cycle Alert when “Light Bulb” Button is tapped during UV Disinfection

You may then choose to continue by tapping “No”, or abort UV disinfection by tapping “Yes”.

Starting the UV Disinfection Cycle

Proceed as follows to start the UV disinfection cycle:

1. Tap the “Close window” button on the Control panel to close the window. Hold the button all the way until the window is closed.

   The tooltip-style bubble shown in Figure 49 appears above the button as a reminder that you need to close window completely.

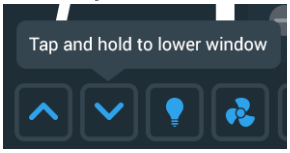


Figure 49 Tooltip Bubble over “Close window” Button

2. If the “UV” button is pressed while the front window is open and/or the sample chamber illumination is on, the following pop-up window will appear.

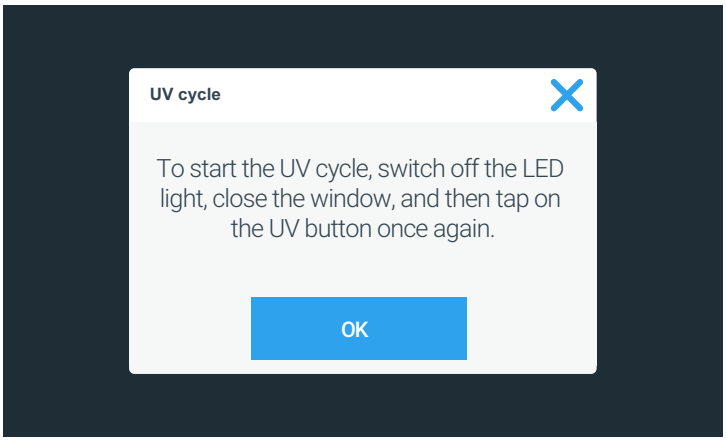


Figure 50 UV Cycle Alert when Window is open / Illumination is on

3. If this happens, tap the “OK” button to close the pop-up window, then use the “Light Bulb” button to turn off the sample chamber illumination and/or the “Close window” button to close the window.

4. Tap the “UV” button on the Control panel (again) to start the UV disinfection cycle.

   The “UV Disinfection” screen shown in Figure 46 appears. The sample chamber illumination is off, the fans are on at reduced speed, the gas supply is off, and the power receptacle is off. The “AutoStop” button is available as the unit is running. The “UV” and “Fan” buttons are highlighted with a light gray frame to indicate that both functions are on. The “Fan” button is displayed with a “1/2” label in a small blue circle to indicate that the fans are running in standby mode.

NOTE If you need to extend or shorten the UV disinfection cycle, you can tap the “Total cycle time: n hr” label to go the “Disinfection Cycle Settings” screen. The process of setting cycle time is described in the section **“Setting UV Disinfection Cycle Time” on page 80**.

5. Wait until the UV disinfection cycle is complete.

Completion of the UV disinfection cycle is announced by the alert message shown in Figure 51.

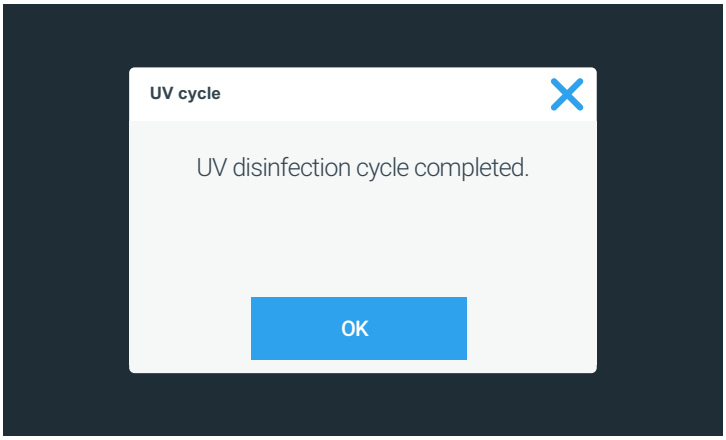


Figure 51 UV Disinfection Cycle complete Alert

6. Tap the “OK” button to complete the UV disinfection cycle.

Turning the Fan on and off during UV Disinfection

In UV Disinfection mode, the only other button that can be pressed is the “Fan” button. When the “Fan” button is pressed on, the fans are turned on in Stand-by mode and will remain on until you turn them off.

Proceed as follows to turn the fan on during a UV disinfection cycle:

1. From within the running UV disinfection cycle, press the “Fan” button for 5 seconds.

If this is the first time you turn the fans on during the ongoing UV disinfection cycle, the pop-up window shown in Figure 52 will appear, reminding you that the fans will continue to run in reduced flow mode after the UV disinfection cycle is complete.

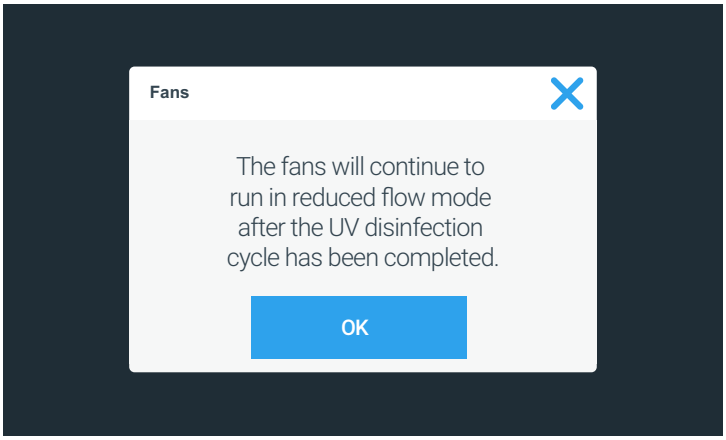


Figure 52 Reduced Flow Mode Alert during UV Disinfection Cycle

The "Fan" button will change its appearance, displaying a gray border and a small blue circle labeled "1/2" to indicate that the fans are running in reduced flow mode (see Figure 53).

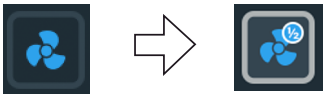


Figure 53 "Fan" Button in Off Mode vs UV Disinfection Mode

2. Tap the "OK" button or the "X" icon in the top right corner to close the window, or wait for the window to close automatically after 10 seconds.

Proceed as follows to stop the fans while a UV disinfection cycle is running:

1. Tap the "Fan" button on the Control panel to stop the fans.

   The "Fan" button will change its appearance, returning to its "off-state" image (see Figure 54).

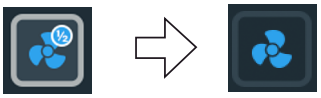


Figure 54 "Fan" Button in UV Disinfection Mode vs Off State

2. Tap the "OK" button or the "X" icon in the top right corner to close the window, or wait for the window to close automatically after 10 seconds.

Restarting a disrupted UV Disinfection Cycle

If the UV disinfection cycle is disrupted, for example, because the front window has been opened or another error has occurred, a pop-up window appears, stating that the UV disinfection cycle has been disrupted (see Figure 55 below).

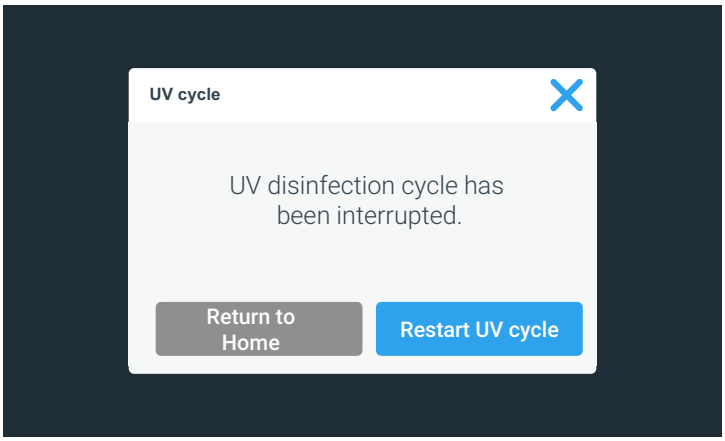


Figure 55 UV Disinfection Cycle was disrupted Alert

Proceed as follows to restart a disrupted UV disinfection cycle:

1. Correct the problem, for example by closing the window.
2. Tap the “Restart UV cycle” button, or tap the “Home” icon to exit.

   The UV disinfection cycle will start over.

Alarms

If the downflow, inflow or window parameters are not at operational settings, there may be at risk of exposure to biohazardous material or contamination. In this case, the biological safety cabinet emits a visual and audible alarm to alert the user, as shown in Figure 56 below.



Figure 56 Alarming Screen for Downflow too high and too low Alarm

A “Health status” icon in the shape of an alarm bell appears on a red background, along with a “Snooze” button. Directly below the “Bell” icon, descriptive text explains the issue and provides instructions on how to troubleshoot it. If there is more text than will fit on screen, the text scrolls from right to left in “newsticker fashion”. When multiple alarms occur at the same time, the “Health status” icon has a small blue circle overlay that shows the number of pending alarms, and additional alarm descriptions appear in the newsticker section.

The symbol graphic in the Main Screen appears with a pertinent animation that identifies the type of problem and its location. For example, the air barrier sliced in two by red arrows shown in Figure 56 indicates that there is a downflow problem (see Figure 28 on page 48 for a complete overview of appearances).

Tapping the “Snooze” button silences the audible alarm temporarily for a pre-set timeout period. (The default alarm snooze timeout period is 5 minutes, but the setting may be changed in the **“**Alarms and Alerts**”** screen, as explained in “Snooze Timeout” on page 99). The “Alarm bell” icon is crossed out to indicate that the audible alarm signal has been snoozed (see Figure 57 on page 71).

NOTE
Applicable BSC standards in effect may not allow temporary muting of audible alarm and limit the available choice of alarm tones.

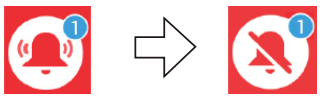


Figure 57 “Health Status Alarm” Icon (“Alarm Bell”) in unsnoozed and snoozed Modes

If you tap the red “Health Status Alarm” icon instead of the “Snooze” button, the audible alarm is automatically snoozed, but the countdown timer shown in Figure 58 appears immediately next to the “Snoozed alarm” icon to indicate when the audible alarm will return.



Figure 58 Alarming Screen with snoozed Alarm

Additionally, you will be taken directly to the Health Status Danger screen with its alarm list shown in Figure 59.

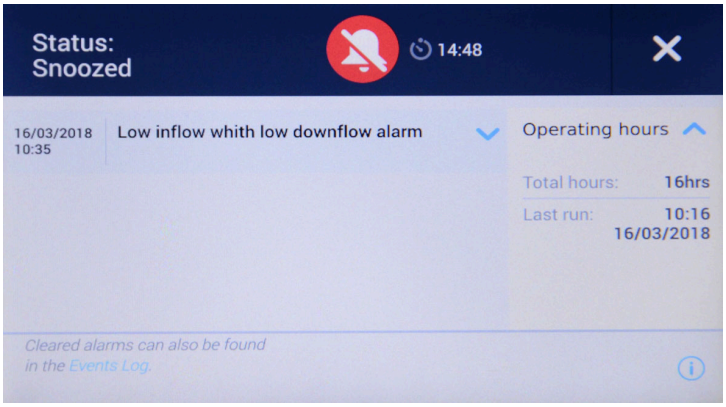


Figure 59 "Health Status Alarm" Screen

Once the ticker message has been visible for two cycles of displayed text, the screen changes to the appearance shown in Figure 60 below:

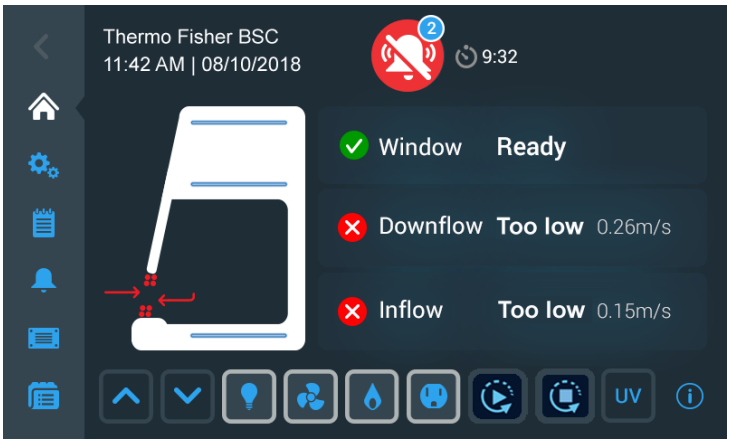


Figure 60 Main Screen after two Cycles of Alarm Ticker Message

The "Health status" icon has changed to show the audible alarm is snoozed. To the right of the "Health status" icon is a countdown timer showing the snooze time remaining, that is, the time period after which the audible alarm is resumed.

When the issue causing the alarm has been resolved, for example, when the user moves the front window to the appropriate position, the audible and visual alarms automatically disappear, and the screen display returns to the healthy state (see "Viewing General Status Information" on page 76).

Silencing and Handling Alarms

Proceed as follows to silence the audible alarm and handle the problem:

1. When an audible alarm is sounded, go to the biological safety cabinet and tap the "Snooze" button Snooze to temporarily silence it.
2. Inspect the small blue alarm counter in the red "Health Status Alarm" icon to find out whether you have to handle one or more alarms.

3. Read the instructions in the newsticker area to learn more about the issue(s) and available troubleshooting options.

   After two cycles of displayed text, the ticker message disappears and is replaced by the Main Screen shown in Figure 60 above.

4. Tap the red “Health Status Alarm” icon to display the “Health Status Alarm” screen shown in Figure 59 and review the alarm list.

5. Correct each issue that has caused an alarm.

   As you correct the pending issues, they will disappear from the alarm list on the “Health Status Alarm” screen one by one.

   When the last issue has been cleared, the screen display returns to the healthy state and the green “Health Status Good” icon replaces the red “Health Status Alarm” icon .

WARNING

The alarm volume should be adjusted in the “Alarms and Alerts” screen according to the sound level of the environment lab.

Alerts

Some events in the biological safety cabinet that do not immediately affect containment or cleanliness produce alerts. These alerts appear with the visual features shown in the example in Figure 61.



Figure 61 “Alert” Screen with Filter Replacement Reminder

The “Health Status Alert” icon in the shape of a yellow “Alert triangle” icon appears on a black background and a short signal sounds. Directly below the “Alert triangle” icon, descriptive text explains the issue and provides instructions on how to correct it. If there is more text than will fit on screen, the text scrolls from right to left in “newsticker fashion”. When multiple alerts occur at the same time, the “Health status” icon has a small blue circle overlay that shows the number of pending alerts, and additional alert descriptions appear in the newsticker section.

The symbol graphic in the Main Screen appears remains unchanged. In the filter message example shown in Figure 61, the air barrier is displayed as fully functional (see Figure 28 on page 48 for a complete overview of appearances).

If you tap the “Alert triangle” icon, you will be taken directly to the “Status Alert” screen with its alert list, shown in Figure 62.

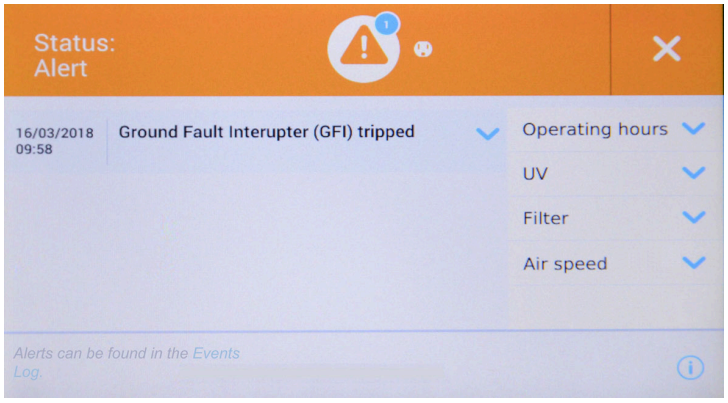


Figure 62 “Status Alert” Screen with Alert Screen Message, Status Alert GFI

Events that produce alerts include:

- GFI (Ground Fault Interruptor; US versions only) has tripped and switched off the power receptacle
- Filter nearing end of life and needing replacement
- UV light bulb nearing end of life and needing replacement
- Field Certification expiring

Each type of alert has a specific icon hat appears both to the right of the “Alert” icon and in the “Status Alert” screen.

Once the ticker message has been visible for two cycles of displayed text, the ticker will go away and the screen changes to the appearance shown in Figure 63 below:

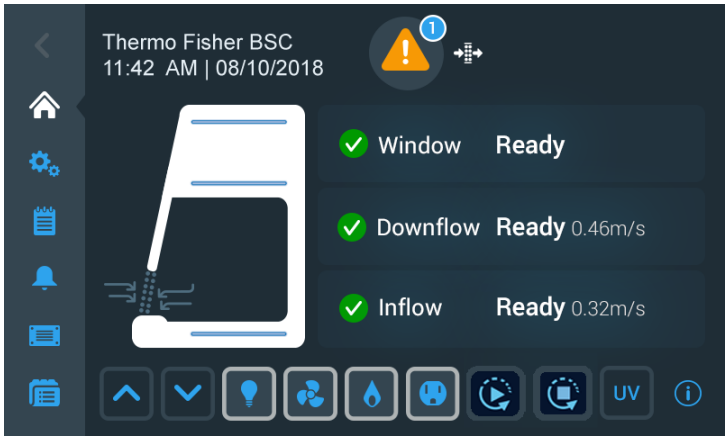


Figure 63 Main Screen after two Cycles of Alert Ticker Message

When the issue causing the alert has been resolved, for example, when the user has replaced the filter, the alert can be cleared from the status screen, and the screen display returns to the healthy state (see “Viewing General Status Information” on page 76).

Handling Alerts

Proceed as follows to handle alerts:

1. When an alert appears, inspect the small blue alarm counter in the “Health Status Alert” icon to find out whether you have to handle one or more alerts.
2. Read the instructions in the newsticker area to learn more about the alert(s) and available troubleshooting options.

   After two cycles of displayed text, the ticker message disappears and is replaced by the Main Screen shown in Figure 63 above.
3. Tap the yellow “Health Status Alert” icon to display the “Status Alert” screen shown in Figure 62 and review the alerts list.
4. Tap any entry in the alarm list to view additional details, as in the GFI Tripped (US versions only) example in Figure 64 below.

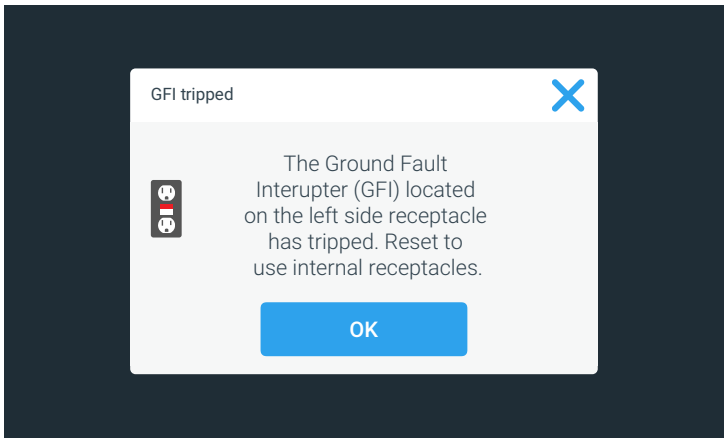


Figure 64 “GFI tripped” Alert Details Screen

5. Correct each issue that has caused an alarm.

   As you correct the pending issues, they will disappear from the alerts list on the “Health Status Alert” screen one by one.

   When the last issue has been cleared, the screen display returns to the healthy state and the green “Health Status Good” icon replaces the yellow “Health Status Alert” icon.

Viewing General Status Information

There are two dedicated screens for viewing general status information on a unit that is free of alarms and alerts. The first of the **“**Status Good**”** screens opens when you tap the **“**Health Status Good**”** icon in the Info & Health Status Area of the screen. See the description of the “Info & Health Status Area” on page 46 for details.

Additionally, you may reset the UV light bulb operating hours in this screen.

NOTE Although a “Reset” button appears on-screen, resetting of the HEPA filter operating hours can only be done by an authorized field service technician.

The “Status Good” screens display the following information:

- First screen:
  - Total Operating Hours including last time the cabinet was run
  - UV light total operating hours, last cycle, and install date
- Second screen:
  - Filter running time, estimated time left, and install date
  - In-Cabinet power receptacles: GFI Status (Ready or Tripped; North American market version only)
  - Air speed: Inflow and Downflow

The two screens can be navigated by swiping left or right or tapping the small left/right chevron icons. Two dots signify the number of screens available in this section and indicate which screen you are currently viewing: the dot for the active screen is always solid, while the hidden screen appears in outline shape.

Viewing UV Light Bulb and HEPA Filter Lifetime

Proceed as follows to display the remaining useful service life of the UV light bulb and HEPA filter:

1. Tap the “Status Good” icon in the Info & Health Status Area on top of the Main Screen.

   The “Status Good” screen shown in Figure 65 appears, displaying the first suite of status data.

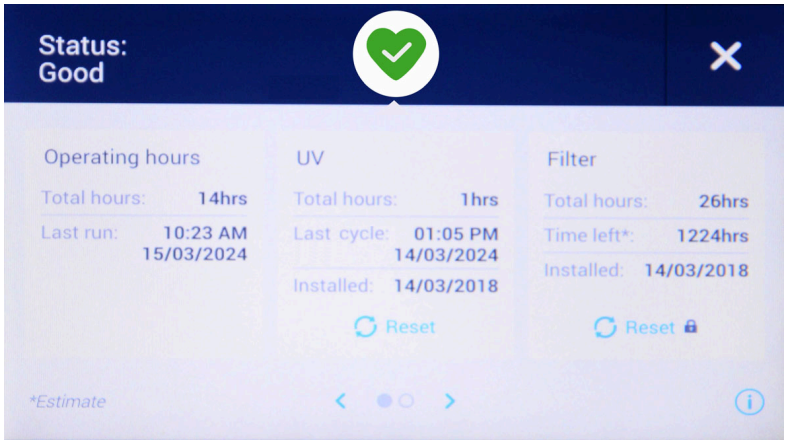


Figure 65 “Status Good” Screen #1: Operating Hours, UV and Filter

2. If you have just changed the UV light bulb, tap the “Reset” button below the UV display area.

The "UV Total hours" counter and "Last cycle" date will be reset to zero and a default date, while the "Installed" date will be reset to the current date.

WARNING

Reset the UV operating hours only when you have positively replaced the UV light bulb. Resetting the operating hours without previously replacing the UV light bulb results in a misleading operating hours count. When the lifetime of the UV bulb expires, UV disinfection efficiency may be compromised, but no pertinent alarm message will be given. This may result in latent biohazards that may go unnoticed.

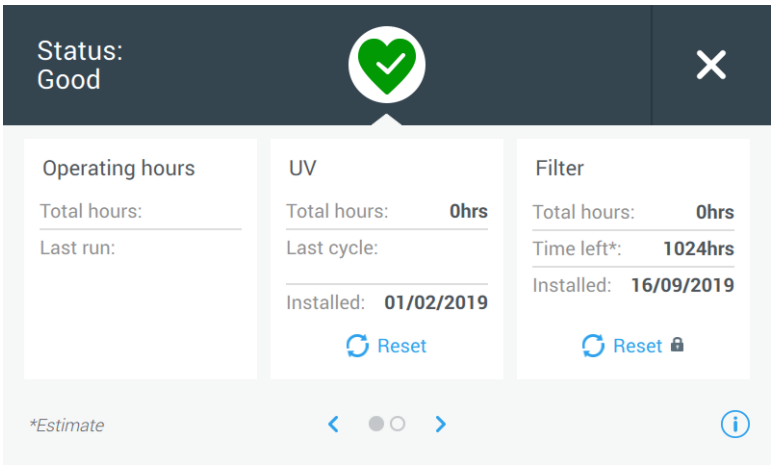


Figure 66 "Status Good" Screen #1: Operating hours, UV and Filter

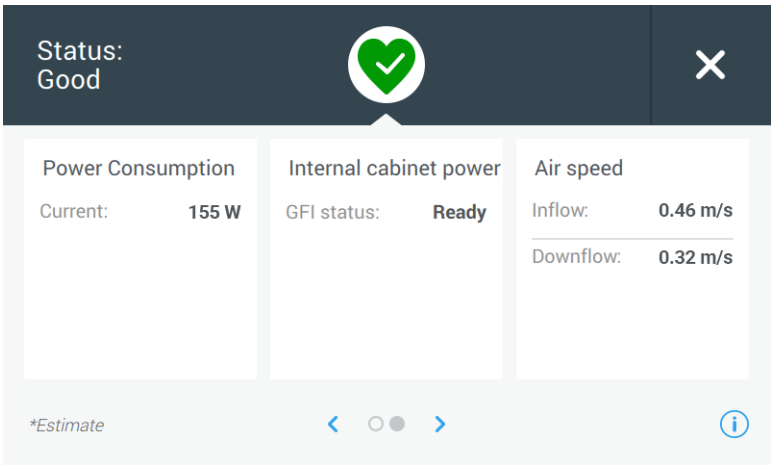


Figure 67 "Status Good" Screen #2: Power Consumption, Internal Cabinet Power and Air Speed

3. Swipe the screen to the left or tap the right blue chevron in the navigation area at the bottom center to display the second suite of status data.
4. When you are done viewing status data, tap the "X" icon in the upper right corner to close the "Status Good" screen.

   You will be returned to the Main Screen.

Settings

This section explains how to set up the unit using the various options of the “Settings” screen.

After completing the initial setup process, you can further set up and customize the unit by using the options of the “Settings” screen shown below in Figure 68.

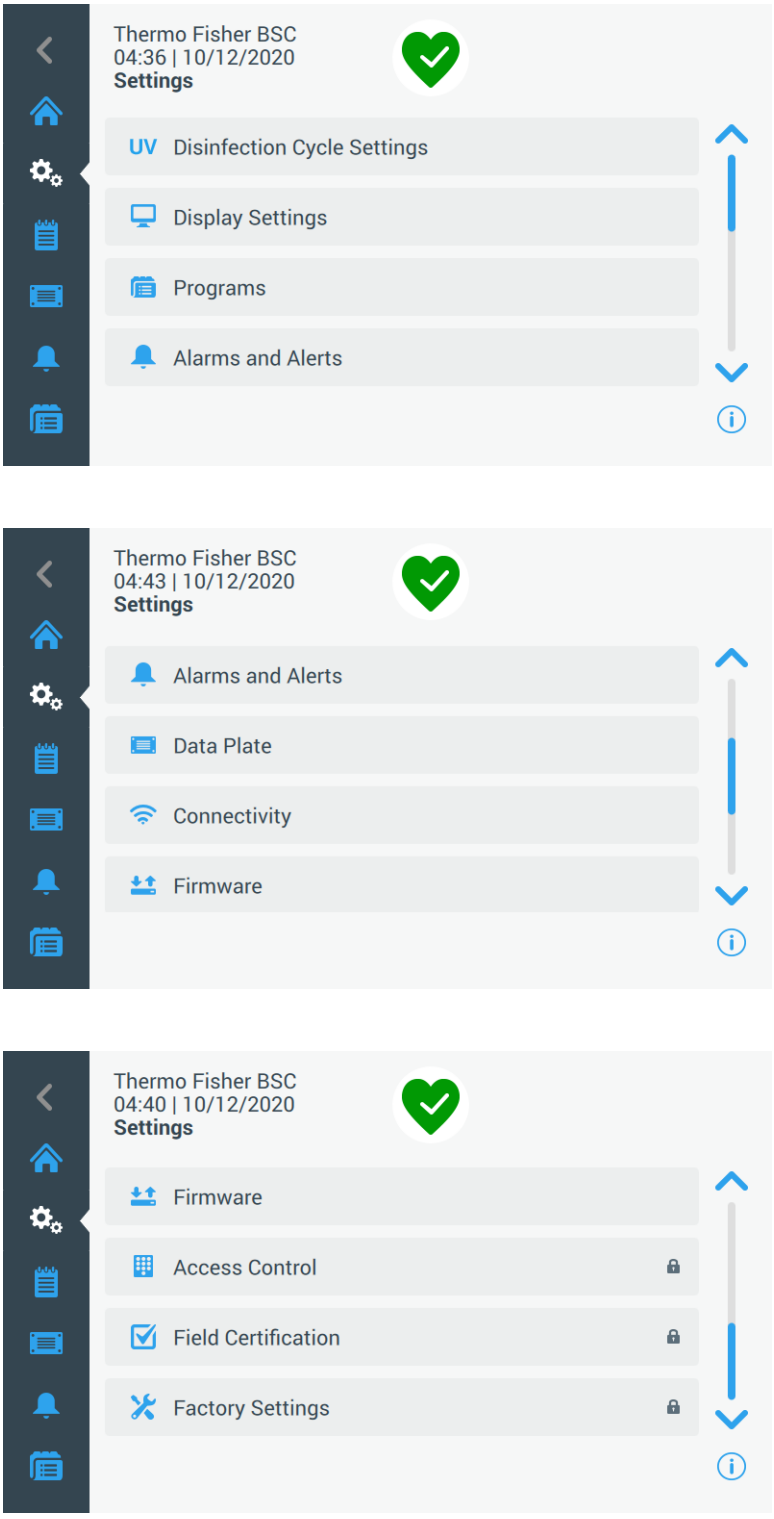


Figure 68 “Settings“ Screen

The “Settings” screen opens up when you tap the **“**Settings**”** icon in the Main Navigation Bar. It offers nine menu items that can be tapped to open further screens with advanced adjustment options:

- “Disinfection Cycle Settings”: See “Setting UV Disinfection Cycle Time” on page 80.
- “Display Settings”: See “Display Settings” on page 83.
- “Programs”: See “Programs” on page 93.
- “Alarms and Alerts”: See “Alarms and Alerts” on page 96.
- “Data Plate”: See “Data Plate” on page 103.
- “Connectivity”: See “Connectivity” on page 104
- “Firmware”: See “Firmware Update” on page 118
- “Access Control” (password protected): See “Access Control” on page 119.
- “Field Certification” (password protected): See “Field Certification” on page 120.
- “Factory Settings” (password protected): See “Factory Settings” on page 120.

NOTE Some of these items are also available as shortcuts on the Main Navigation Bar.

Setting UV Disinfection Cycle Time

Tapping the “Disinfection Cycle Settings” button UV takes you to the “Disinfection Cycle Settings” screen, shown in Figure 69 below. From this screen, you can change the default running time of the UV disinfection cycle. This value is used by default when you start the Disinfection cycle by tapping the “UV light” button in the Control Panel Area of the display window.

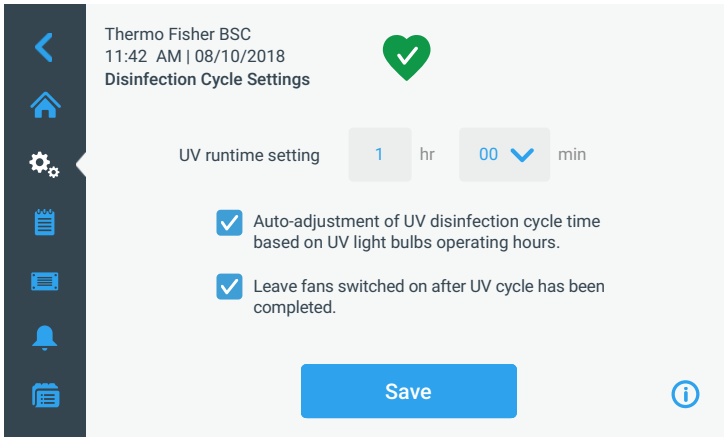


Figure 69 “Disinfection Cycle Settings” Screen

The “Disinfection Cycle Settings” screen displays the following fields:

- “UV runtime setting”: Sets the duration of the UV Disinfection cycle from 0 to 24 hours, with additional intervals of 00, 15, 30, and 45 minutes.

Hours are entered by using a calculator-style keypad, minutes are selectable from a drop-down list.

NOTE The default setting is 1 hour, 00 minutes. 0 hours and 00 minutes is NOT a selectable option.

- *"Auto-adjustment of UV disinfection cycle time based on UV light bulbs operating hours"*: Automatically adjusts cycle time for optimizing the operation of UV bulbs as they age.
- *"Leave fans switched on after UV cycle has been completed"*: keeps the fans running beyond the UV disinfection cycle. You must turn off the fans manually by tapping the "Fan" button  .

Proceed as follows to set the Disinfection Cycle time:

1. Tap the "Settings" icon  on the Main Navigation Bar.
2. Tap the "Disinfection Cycle Settings" button  on the "Settings" screen.
3. Tap on the hours field to bring up a "calculator-style" keypad.
4. Enter a duration between 0 and 24 hours.
5. Tap on the arrow in the minutes field and choose 00, 15, 30, or 45 minutes.
6. If you wish to keep the fans running after the disinfection cycle, tap on the checkbox *"Leave fans switched on after UV cycle has been completed".*
7. When you are done choosing the default cycle time, tap the "Save" button.

NOTE Some of these elements are also available as shortcuts in the main navigation bar.

A pop-up window appears stating that *"Your settings have been saved."*. If a disinfection cycle is active at this time, you will be asked whether you would like to apply the changes to the current cycle. A header in the top left corner states: *"Settings Saved"*.

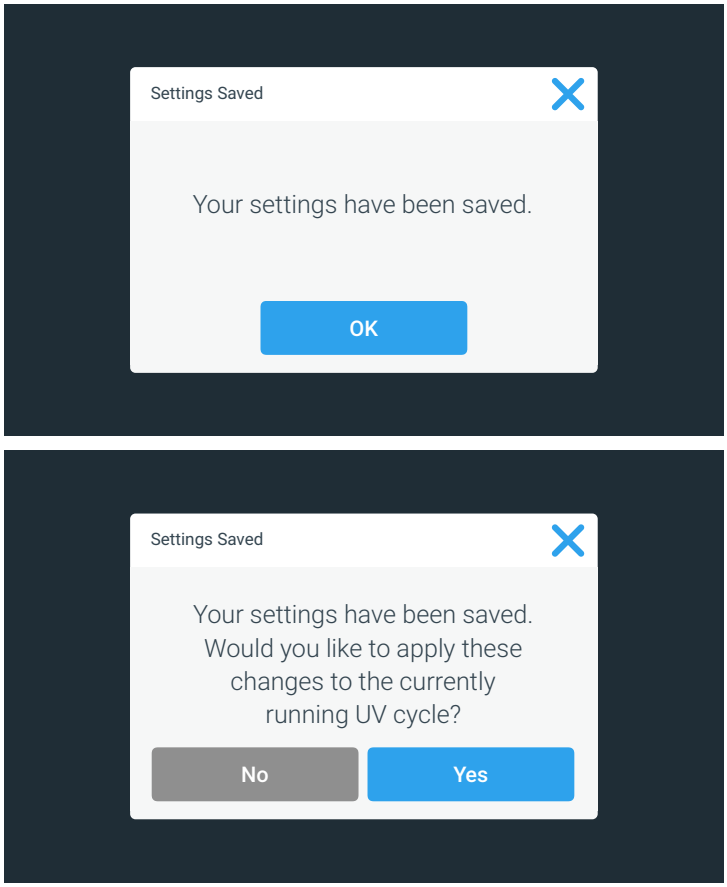


Figure 70 "Settings Saved" Pop-up Windows for Disinfection Cycle Settings

8. Tap the "Yes" button to apply the changes and close the window.

NOTE The window will close automatically after 5 seconds if you do not tap the "Yes" button.

You will be returned to the "Settings" screen.

NOTE If you have entered this screen by tapping the "UV" button on the Main Navigation Bar while the UV disinfection cycle was running, you will be returned to the home screen instead.

Display Settings

Tapping the “Display Settings” button on the “Settings” screen takes you to the “Display Settings” screen shown in Figure 71.

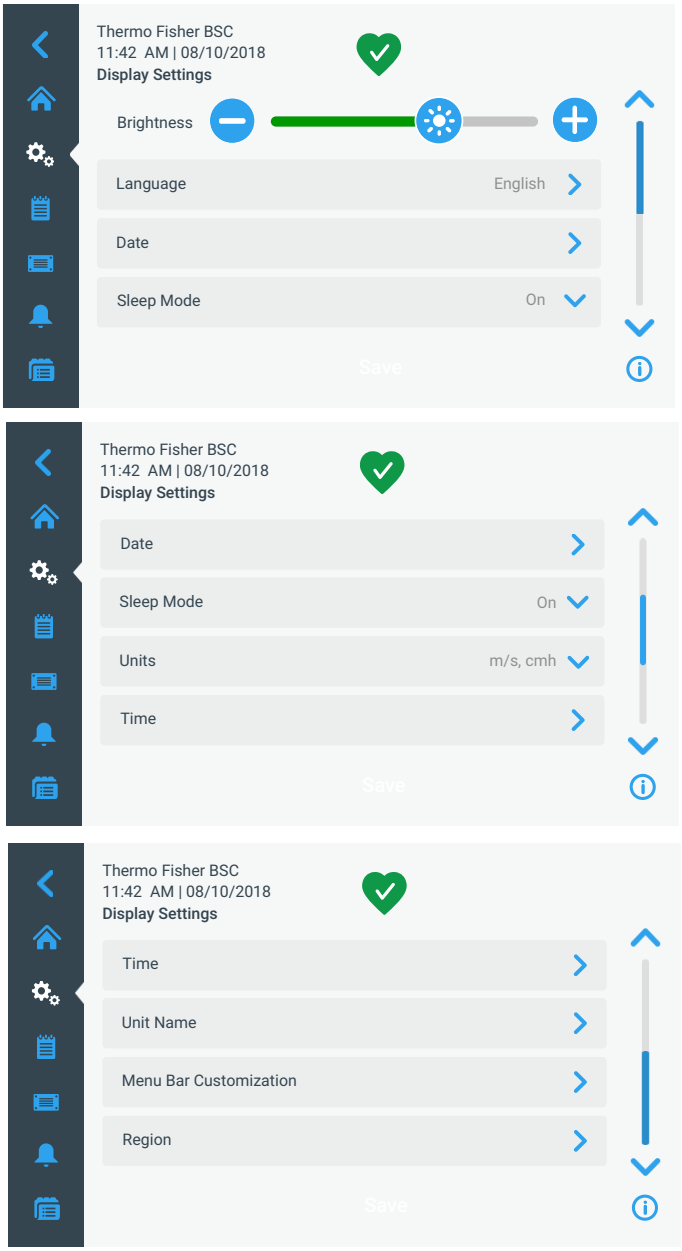


Figure 71 “Display Settings” Screen

The “Display Settings” screen lets you make and/or select the following settings:

- “Brightness”; see “Setting Brightness” on page 84
- “Language”; see “Setting the Display Language” on page 84
- “Date”; see “Setting the Date” on page 85
- “Sleep Mode“; see “Activating / Deactivating Sleep Mode” on page 88
- “Units” (of Measurement); see “Setting Units of Measurement” on page 88

- “Time”; see “Setting the Time of Day” on page 86
- “Unit Name”; see “Setting the Unit Name” on page 89
- “Menu Bar Customization”; see “Customizing the Menu Bar” on page 91
- “Region”; see “Setting the Region” on page 91

Setting Brightness

Brightness is set on the main “Display Settings” screen shown in Figure 71.

Proceed as follows to change brightness of the screen:

1. Tap the “Settings” icon on the Main Navigation Bar.
2. Tap the “Display Settings” button on the “Settings” screen.
3. Tap the “Brightness” button on the “Display Settings” screen.
4. Drag the “Brightness” slider button to the right or to the left, or tap the plus (“+”) or (“-”) button to increase or decrease.

   If you have made any changes, the “Save” button appears at the bottom of the screen.
5. When you are done adjusting brightness, tap the “Save” button.
6. To commit the changes, tap the “OK” button in the pop-up window that appears (see “Saving Changes” on page 101).

   You will be returned to the “Display Settings” screen.

Setting the Display Language

The “Language” button on the “Display Settings” screen opens the “Language” screen where you may choose a display language of your choice. This setting overwrites the display language selection made during the initial setup, as described in the section “Initial Setup” on page 39.

Proceed as follows to set the display language:

1. Tap the “Settings” icon on the Main Navigation Bar.
2. Tap the “Display Settings” button on the “Settings” screen.
3. Tap the “Language” button on the “Display Settings” screen.

The "Language" screen appears with a wheel picker, prompting you to choose a display language, as shown in Figure 72 below.

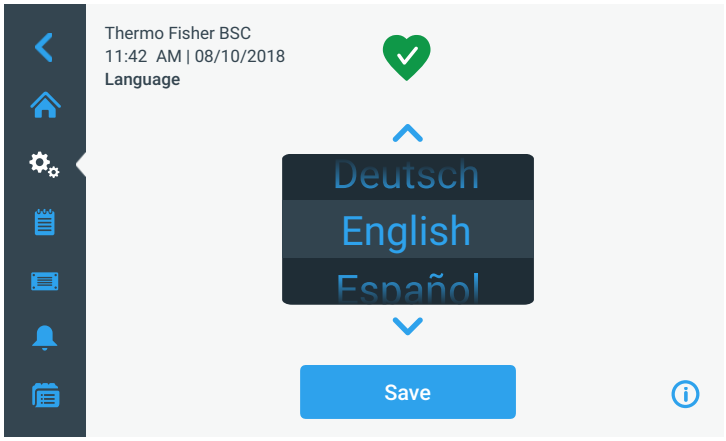


Figure 72 "Display Settings" Screen: "Language" Screen

4. Tap the up/down arrows or swipe your finger across the wheel up or down to set the language (default is English).

   If you have made any changes, the "Save" button appears at the bottom of the screen.

5. When you are done choosing the language, tap the "Save" button.

6. To commit the changes, tap the "OK" button in the pop-up window that appears (see "Saving Changes" on page 101).

   You will be returned to the "Display Settings" screen.

Setting the Date

The "Date" button in the "Display Settings" screen opens the "Date" screen shown in Figure 73 below. The "Date" screen lets you set the date that appears in a date field in the Info & Health Status Area at the top of all screens.

Proceed as follows to set the date:

1. Tap the "Settings" icon on the Main Navigation Bar.
2. Tap the "Display Settings" button on the "Settings" screen.
3. Tap the "Date" button on the "Display Settings" screen.

The “Date” screen appears with a wheel picker, prompting you to set the date, as shown in Figure 73 below.

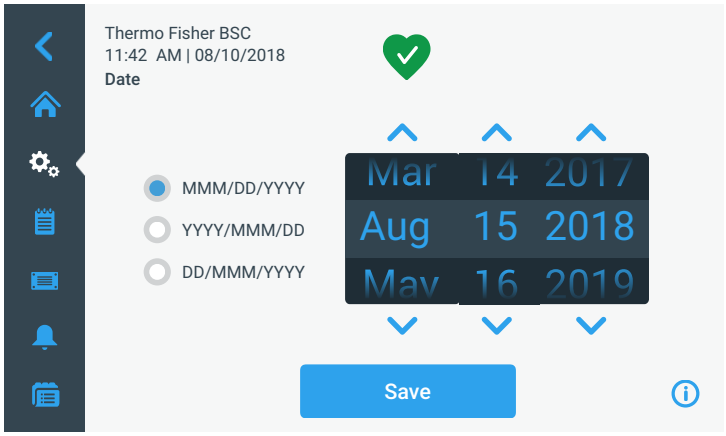


Figure 73 “Display Setting” Screen: “Date” Screen

4. Tap the *“MMM/DD/YYYY”*, *“DD/MMM/YYYY”*, or *“YYYY/MMM/DD”* radio button on the left side of the screen to choose a date format.

   The segments of the wheel picker screen are rearranged to reflect the selected date format. For example, if you select the *“DD/MMM/YYYY”* radio button, the wheel picker will change to 01 | Jan | 2016.

5. Tap the up/down arrows or swipe your finger across the wheel up or down to set the current month, day, and year on each of the three wheel picker segments.

   If you have made any changes, the “Save” button appears at the bottom of the screen.

6. When you are done setting the date, tap the “Save” button.

7. To commit the changes, tap the “OK” button in the pop-up window that appears (see “Saving Changes” on page 101).

   You will be returned to the “Display Settings” screen.

Setting the Time of Day

The “Time” button in the “Display Settings” screen opens the “Time” screen shown in Figure 74 below. The “Time” screen lets you set the time of day that appears in a time field in the Info & Health Status Area at the top of all screens.

Proceed as follows to set the time:

1. Tap the “Settings” icon on the Main Navigation Bar.
2. Tap the “Display Settings” button on the “Settings” screen.
3. Tap the “Time” button on the “Display Settings” screen.

The "Time" screen appears with a three-segmented wheel picker, prompting you to set the time of day, as shown in Figure 74 below.

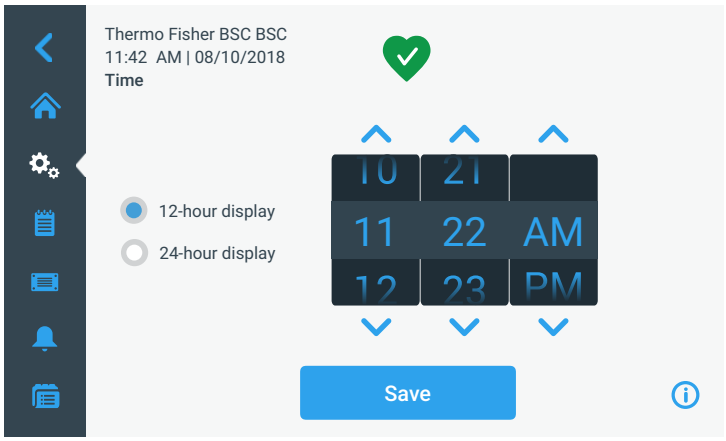


Figure 74 "Display Setting" Screen: "Time" Screen with 12-hour AM/PM Format

4. If desired, tap the *"24-hour display"* radio button on the left side of the screen to choose the 24-hour time format. (Default time format is AM/PM, 12-hour format.)

   The segments of the wheel picker screen are rearranged to reflect the 24-hour time format, as shown in Figure 75 below.

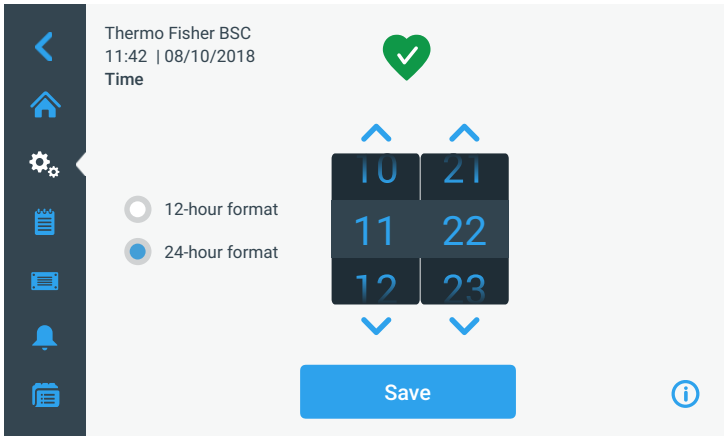


Figure 75 "Display Setting" Screen: "Time" Screen with 24-hour Format

5. Tap the up/down arrows or swipe your finger across each wheel up or down to set the current time in hours and minutes.

   If you have made any changes, the "Save" button appears at the bottom of the screen.

6. When you are done setting the time of day, tap the "Save" button.

7. To commit the changes, tap the "OK" button in the pop-up window that appears (see "Saving Changes" on page 101).

   You will be returned to the "Display Settings" screen.

Activating / Deactivating Sleep Mode

Proceed as follows to activate/deactivate Sleep Mode (see “Sleep Mode” on page 57):

1. Tap the “Settings” icon on the Main Navigation Bar.
2. Tap the “Display Settings” button on the “Settings” screen.
3. Tap the “Sleep Mode” dropdown list on the “Display Settings” screen.

   The dropdown list is expanded and displays its options, as shown in Figure 76 below.

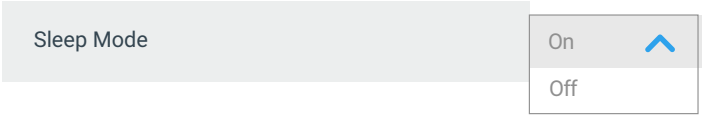


Figure 76 “Sleep Mode” Dropdown Menu

4. Choose either “On” or “Off” for activating or deactivating the Sleep Mode.

   If you have made any changes, the “Save” button appears at the bottom of the screen.
5. When you are done choosing the Sleep Mode option, tap the “Save” button.
6. To commit the changes, tap the “OK” button in the pop-up window that appears (see “Saving Changes” on page 101).
7. **You will be returned to the “Display Settings” screen.**

Setting Units of Measurement

The units of measurement for airflow can be chosen directly on the main “Display Settings” screen shown in Figure 71. A dropdown list lets you chose between:

- metric units: m/s (meters per second), cmh (cubic meters per hour)
- imperial units: fpm (feet per minute), cfm (cubic feet per minute)

Proceed as follows to switch units of measurement:

1. Tap the “Settings” icon on the Main Navigation Bar.
2. Tap the “Display Settings” button on the “Settings” screen.
3. Tap the “Units” dropdown list on the “Display Settings” screen.

The dropdown list is expanded and displays its options, as shown in Figure 77 below.

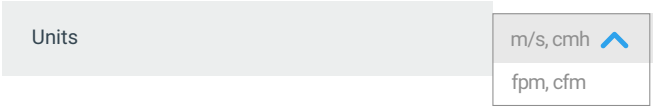


Figure 77 "Units" Dropdown Menu

4. Choose either "m/s, cmh" for metric units or "fpm, cfm" for imperial units (default is metric).

   If you have made any changes, the "Save" button appears at the bottom of the screen.

5. When you are done choosing the units of measurement, tap the "Save" button.
6. To commit the changes, tap the "OK" button in the pop-up window that appears (see "Saving Changes" on page 101).

   You will be returned to the "Display Settings" screen.

Setting the Unit Name

You may set a name for the unit that will be displayed above the time/date field in the Info & Health Status Area at the top of all screens.

Proceed as follows to edit the name of the unit:

1. Tap the "Settings" icon on the Main Navigation Bar.
2. Tap the "Display Settings" button on the "Settings" screen.
3. Tap the "Unit Name" button on the "Display Settings" screen.

   The "Unit Name" screen appears, as shown in Figure 78 below.

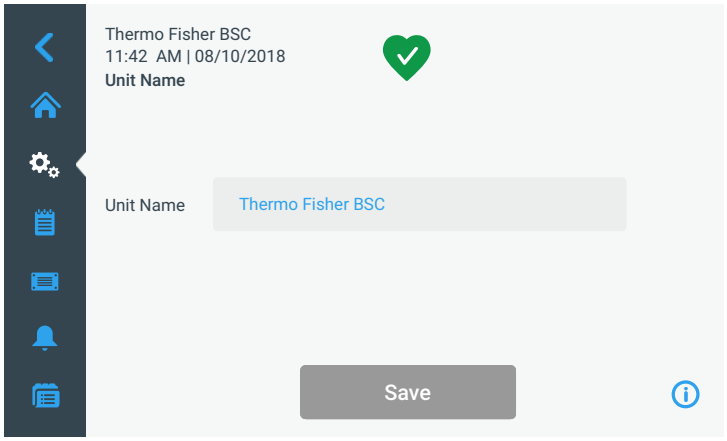


Figure 78 "Display Settings" Screen: "Unit Name" Screen

4. Inspect the "Unit name" field:

   If no unit name has been previously set, the "Unit Name" field will read *"Tap to enter"*.

   If a unit name has been previously set, that name appears in the *"Unit Name"* field.

5. Tap on the *"Unit Name"* field to display a full keypad, as shown in Figure 79 below.

   If no unit name has been previously set, a cursor will appear in the *"Unit Name"* field and prompt you to start typing.

If a unit name has been previously set, that name will be selected for overwriting.



Figure 79 "Display Settings" Screen: "Unit Name" Screen

6. Type the desired unit name.
7. When you are done typing, do one of the following:
   a. Tap the "Save" button on the keypad.
   b. Tap anywhere outside of the keypad and the *"User Name"* field to hide the keypad, then tap the "Save" button at the bottom of the screen.
8. To commit the changes, tap the "OK" button in the pop-up window that appears (see "Saving Changes" on page 101).

   You will be returned to the "Display Settings" screen.

Customizing the Menu Bar

The “Menu Bar Customization” screen shown in Figure 80 lets you swap the three bottom icons in the left-hand Main Navigation Bar.

Proceed as follows to swap any of the bottom icons in the left-hand Main Navigation Bar:

1. Tap the “Settings” icon on the Main Navigation Bar.
2. Tap the “Display Settings” button on the “Settings” screen.
3. Tap the “Menu Bar Customization” button on the “Display Settings” screen.

   The “Menu Bar Customization” screen appears, as shown in Figure 80 below.

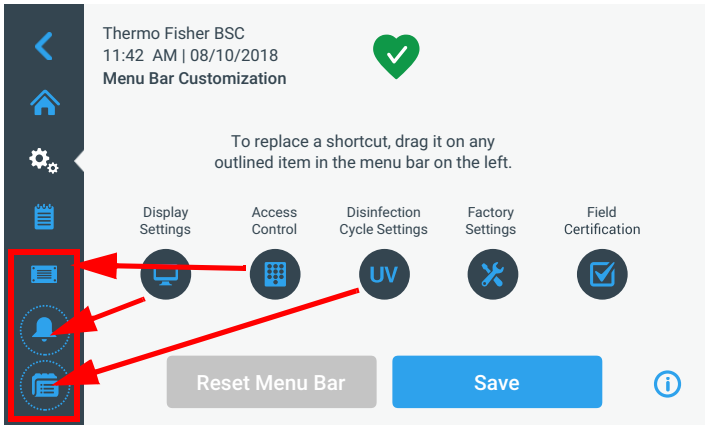


Figure 80 “Display Setting” Screen: “Menu Bar Customization” Screen with Icon Swapping Options

4. Tap one of the five icons in the center of the “Menu Bar Customization” screen.
5. Drag the icon on top of one of the three highlighted icons in the left-hand Main Navigation Bar.

   The icon you have just dragged will appear in the Main Navigation Bar. The icon previously displayed in the Main Navigation Bar will appear among the five icons in the center of the screen, along with the pertinent text label.

   If you have made any changes, the “Save” button appears at the bottom of the screen.

6. When you are done customizing the Main Navigation Bar, tap the “Save” button.
7. To commit the changes, tap the “OK” button in the pop-up window that appears (see “Saving Changes” on page 101).

   You will be returned to the “Display Settings” screen.

Setting the Region

The “Region” button in the “Display Settings” screen opens the “Region” screen shown in Figure 81 below. The “Region” screen lets you enter a city and country combination.

Proceed as follows to set the region:

1. Tap the “Settings” icon on the Main Navigation Bar.

2. Tap the “Display Settings” button on the “Settings” screen.
3. Tap the “Region” button on the “Display Settings” screen.

   The “Region” screen appears. Enter the name of the city or country and select from the list of suggestions displayed **(see “Appendix: City Time Zones” on page 211:**

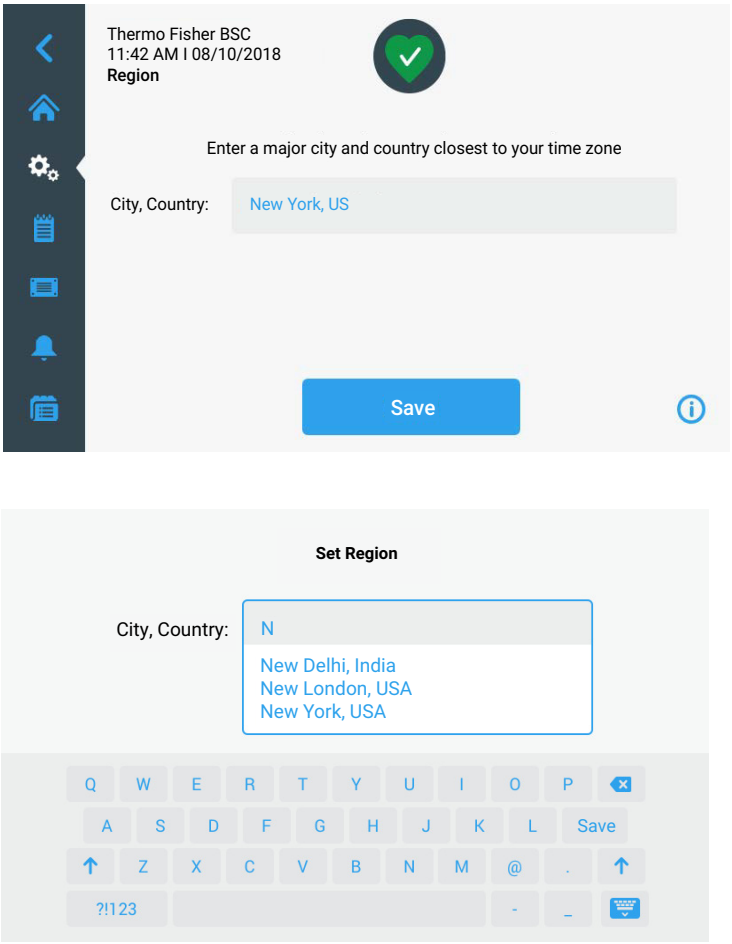


Figure 81 “Display Setting” Screen: “Region” Screen

You can tap the field to display the keyboard. Then you can start typing your city. As you type, the field auto-suggests the city/country combinations. You may either continue to type to narrow the suggestions being presented, or tap on one of the suggestions to select.

Press the “Save” button to save your changes and return to the “Display Settings” screen. Once you tap the “Save” button, a pop-up window overlay screen appears stating: Your settings have been saved.

Programs

Tapping the “Programs” button in the “Settings” screen takes you to the “Programs” screen shown in Figure 82. The “Programs” screen lets you set up the “AutoStart” and “AutoStop” buttons that switch the biological safety cabinet on and off, respectively.

The settings you make in these screens determine which of the unit‘s functions are turned on by default when you press the “AutoStart” button or which functions are turned off when you press the “AutoStop” button in the Control Panel.

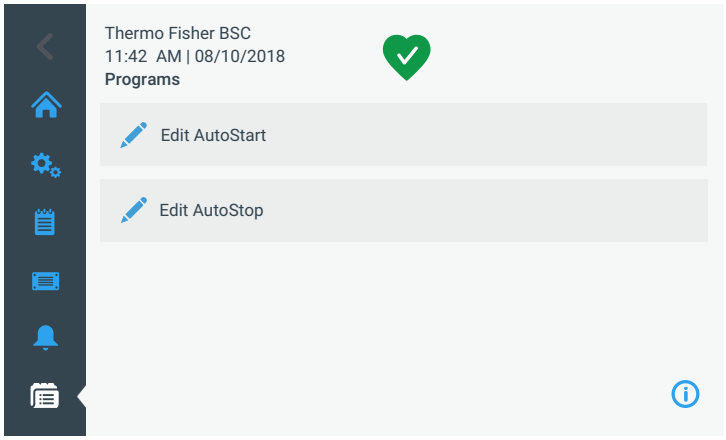


Figure 82 “Programs” Screen

The “Programs” screen offers two menu buttons that can be tapped to open further screens with editable settings for the auto-start and auto-stop timers.

Setting up AutoStart

Proceed as follows to set up the biological safety cabinet for AutoStart:

1. Tap the “Settings” icon on the Main Navigation Bar, followed by the “Programs” button on the “Settings” screen.

   Alternatively, you can also tap the “Programs” icon on the Main Navigation Bar.

2. Tap the “Edit AutoStart” button on the “Programs” screen.

Doing so will open up the “Edit AutoStart” screen shown in Figure 83 below. By default, the “Edit AutoStart” screen comes up with all four checkboxes already selected, as shown in the top image in Figure 83.

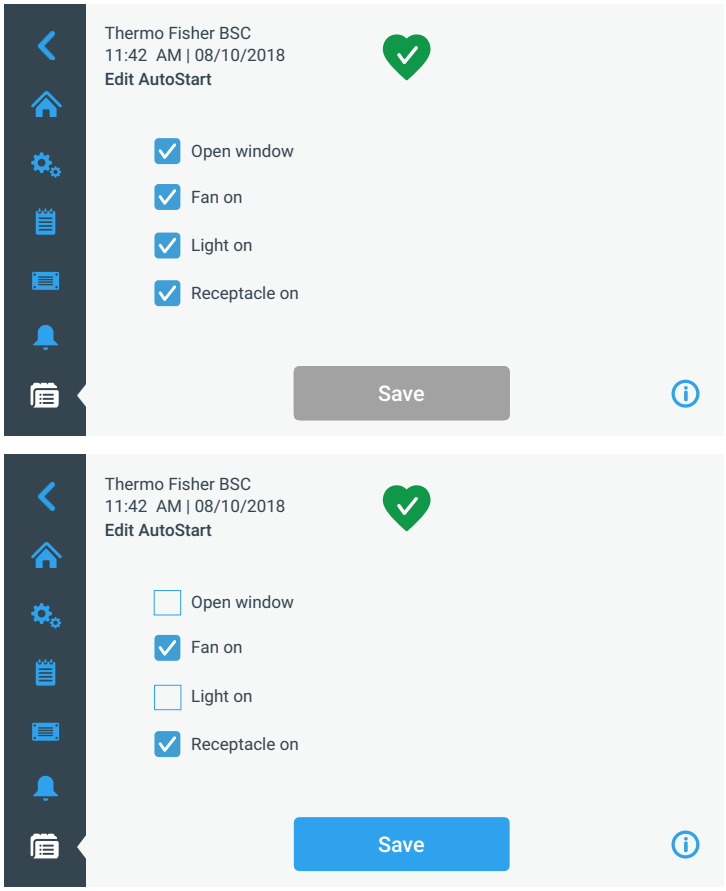


Figure 83 “Programs” Screen: “Edit AutoStart” Screen

3. Tap to select or deselect the option checkboxes as required:
   - “Open window” will automatically open the window to the working position when the “AutoStart” button is pressed.
   - “Fan on” turns on the fans when the “AutoStart” button is pressed.
   - “Light on” turns on the sample chamber illumination when the “AutoStart” button is pressed.
   - “Receptacle on” applies electrical power to the power outlets in the sample chamber when the “AutoStart” button is pressed.

   If you have made any changes, the “Save” button appears at the bottom of the screen, as shown in the bottom image in Figure 83.
4. When you are done choosing AutoStart options, tap the “Save” button.
5. To commit the changes, tap the “OK” button in the pop-up window that appears (see “Saving Changes” on page 101).

   You will be returned to the “Settings” screen.

Setting up AutoStop

Proceed as follows to set up the biological safety cabinet for AutoStop:

1. Tap the “Settings” icon on the Main Navigation Bar, followed by the “Programs” button on the “Settings” screen.

   Alternatively, you can also tap the “Programs” icon on the Main Navigation Bar.

2. Tap the “Edit AutoStop” button on the “Programs” screen.

   Doing so will open up the “Edit AutoStop” screen shown in Figure 84 below. By default, the “Edit AutoStop” screen comes up with the “Fan off after UV” option and all remaining checkboxes selected (top image in Figure 84).

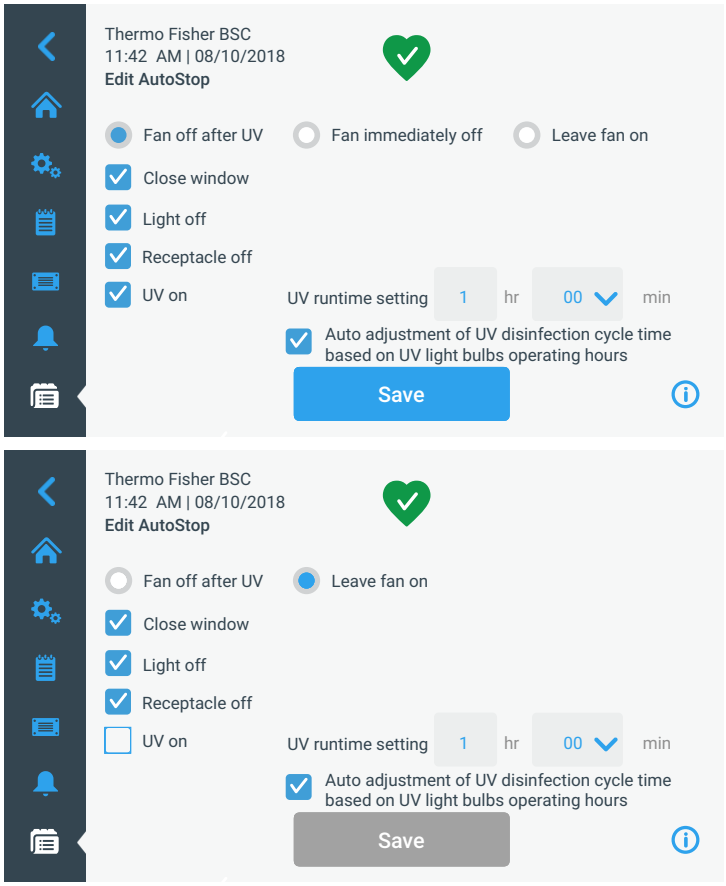


Figure 84 “Programs” Screen: “Edit AutoStop” Screen

3. Tap to select one of three radio buttons to determine whether and when the fans should be turned off after the “AutoStop” button has been pressed:

   - “Fan off after UV” selects the “UV on” option to have the biological safety cabinet run UV disinfection after AutoStop.
   - **“Fan immediately off”**
   - **“Leave fan on”**

4. Tap to select or deselect any of the four checkboxes as required:

   - *"Close window"* will automatically close the window.

NOTE If the window is set to close as part of AutoStop, you must press and hold the "AutoStop" button while the window is closing. This is a safety feature.

   - *"Light off"* turns off the sample chamber illumination when the "AutoStop" button is pressed.
   - *"Receptacle off"* shuts off electrical power to the power outlets in the sample chamber when the "AutoStop" button is pressed.
   - *"UV on"* starts the UV disinfection cycle when the "AutoStop" button is pressed.

     The *"UV on"* setting has additional parameters. You may set:

     - Time to run UV in hours (1-24 hours) and minutes (00, 15, 30, 45 minutes). You may change the hours by tapping in the hour field and entering a number from 1 to 24 in the calculator style keypad. You may change the minutes by selecting any of these four options from a dropdown list: 00, 15, 30, 45.
     - You may also want to keep the fans running after the UV cycle is complete by checking the *"Leave fan on"* option explained further above. Default is unchecked.

   If you have made any changes, the "Save" button appears at the bottom of the screen.

5. When you are done choosing AutoStop options, tap the "Save" button (bottom image in **Figure 84**.

6. To commit the changes, tap the "OK" button in the pop-up window that appears (see "Saving Changes" on page 101).

   You will be returned to the "Settings" screen.

Alarms and Alerts

Tapping the "Alarms and Alerts" button on the "Settings" screen takes you to the "Alarms and Alerts" screen, shown in Figure 85 below.

From the "Alarms and Alerts" screen, you may change the volume, tone, and timing of several audible alarms and alerts emitted by the biological safety cabinet.

Selections are made by tapping dropdown lists on the screen. You may change one, several, or all of the dropdown lists before committing your selections with the “Save” button.

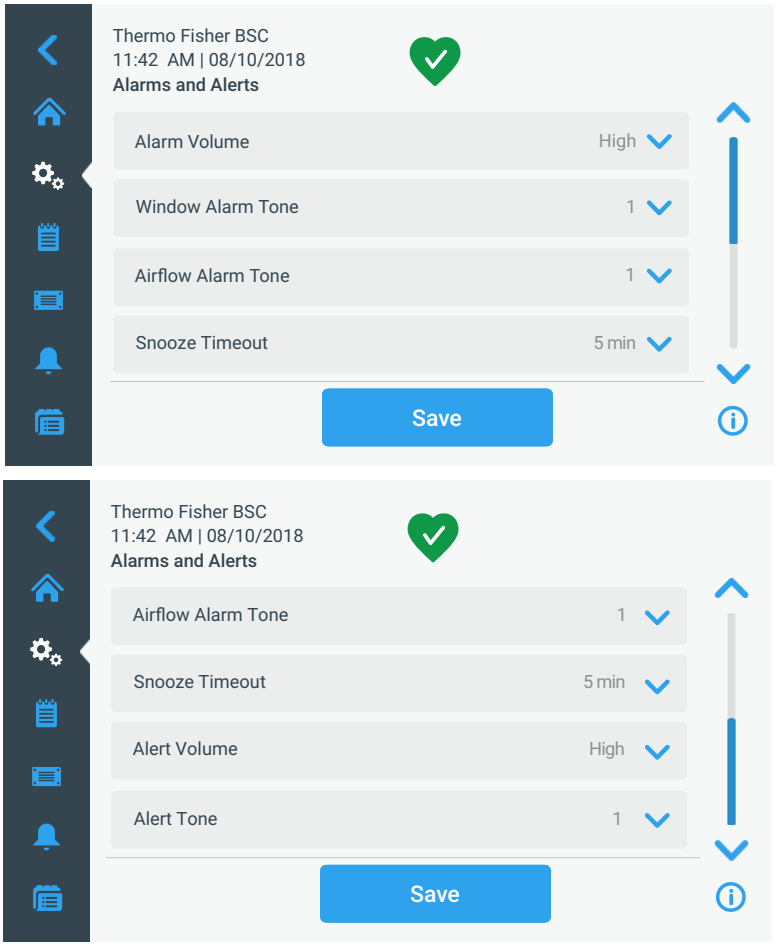


Figure 85 “Alarms and Alerts” Screen

Alarm Volume

You may change the volume of the alarm tone directly on the main “Alarms and Alerts” screen by just tapping on the dropdown list labeled “Alarm Volume” (see Figure 86 below) and selecting one of the four “Off”, “Low”, “Medium”, or “High” options.

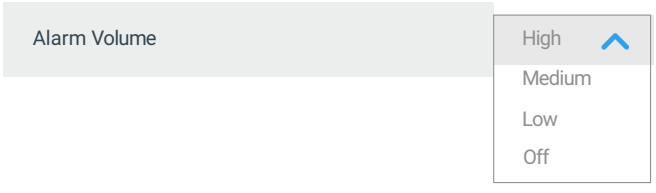


Figure 86 “Alarms and Alerts” Screen: “Alarm Volume” Options

WARNING

The alarm volume should be adjusted in the “Alarms and Alerts” screen according to the sound level of the environment lab.

Proceed as follows to change the alarm volume:

1. Tap the “Settings” icon on the Main Navigation Bar.
2. Tap the “Alarms and Alerts” button on the “Settings” screen.

   Alternatively, you can also tap the “Alarms and Alerts” icon on the Main Navigation Bar to open the “Alarms and Alerts” screen.
3. Tap the “Alarm Volume” dropdown menu and choose an option.
4. Save your changes as explained in the section “Saving Changes” on page 101, or change any other desired option on the “Alarms and Alerts” screen.

Window Alarm Tone

You may change the alarm tone for the front window directly on the main “Alarms and Alerts” screen by just tapping on the dropdown list labeled “Window Alarm Tone” (see Figure 87 below) and selecting one of the three options.

NOTE The naming of the options may differ in each country.

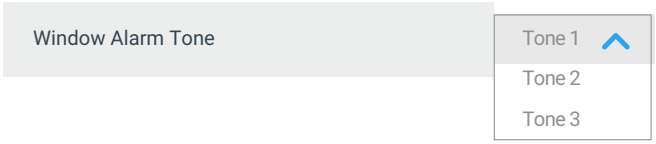


Figure 87 “Alarms and Alerts” Screen: Window Alarm Tone Options

Proceed as follows to change the window alarm tone:

1. Tap the “Settings” icon on the Main Navigation Bar.
2. Tap the “Alarms and Alerts” button on the “Settings” screen.

   Alternatively, you can also tap the “Alarms and Alerts” icon on the Main Navigation Bar to open the “Alarms and Alerts” screen.
3. Tap the “Window Alarm Tone” dropdown menu and choose an option.
4. Save your changes as explained in the section “Saving Changes” on page 101, or change any other desired option on the “Alarms and Alerts” screen.

Airflow Alarm Tone

You may change the alarm tone for low or high airflow conditions directly on the main “Alarms and Alerts” screen by just tapping on the dropdown list labeled “Airflow Alarm Tone” (see Figure 87 below) and selecting one of the three options.

NOTE The options may be named differently, depending on the country.

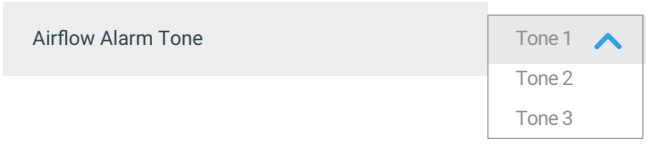


Figure 88 "Alarms and Alerts" Screen: Airflow Alarm Tone Options

Proceed as follows to change the airflow alarm tone:

1. Tap the "Settings" icon on the Main Navigation Bar.
2. Tap the "Alarms and Alerts" button on the "Settings" screen.

   Alternatively, you can tap the "Alarms and Alerts" icon on the Main Navigation Bar to open the "Alarms and Alerts" screen.
3. Tap the "Airflow Alarm Tone" dropdown menu and choose an option.
4. Save your changes as explained in the section "Saving Changes" on page 101, or change any other desired option on the "Alarms and Alerts" screen.

Snooze Timeout

You may set the timeout period during which an alarm is temporarily silenced when you press the "Snooze" button directly on the main "Alarms and Alerts" screen. This is done by tapping on the dropdown list labeled "Snooze Timeout" (see Figure 89 below) and selecting one of the periods.

NOTE Applicable BSC standards in effect may not allow temporary muting of audible alarm.

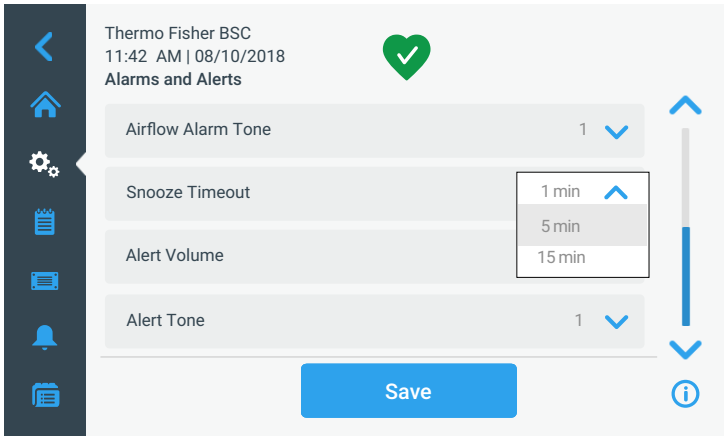


Figure 89 "Alarms and Alerts" Screen with Snooze Timeout Options expanded

Proceed as follows to change the snooze timeout period:

1. Tap the "Settings" icon on the Main Navigation Bar.
2. Tap the "Alarms and Alerts" button on the "Settings" screen.

   Alternatively, you can tap the "Alarms and Alerts" icon on the Main Navigation Bar to open the "Alarms and Alerts" screen.

3. Tap the “Snooze Timeout” dropdown menu and choose an option.

NOTE The default option is 5 min.

The time period in the “Snooze Timeout” dropdown will change to the new setting.

4. Save your changes as explained in the section “Saving Changes” on page 101, or change any other desired option on the “Alarms and Alerts” screen.

Alert Volume

You may change the volume of the alert tone directly on the main “Alarms and Alerts” screen by just tapping on the dropdown list labeled “Alert Volume” (see Figure 90 below) and selecting one of the Low, Medium, or High options.

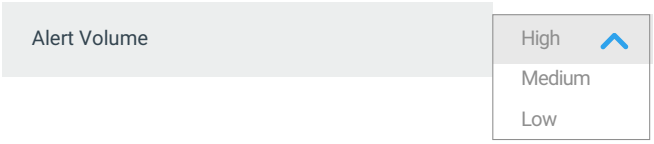


Figure 90 “Alarms and Alerts” Screen: Alert Volume Options

Proceed as follows to change the alert volume:

1. Tap the “Settings” icon on the Main Navigation Bar.
2. Tap the “Alarms and Alerts” button on the “Settings” screen.

   Alternatively, you can tap the “Alarms and Alerts” icon on the Main Navigation Bar to open the “Alarms and Alerts” screen.

3. Tap the “Alert Volume” dropdown menu and choose an option.
4. Save your changes as explained in the section “Saving Changes” on page 101, or change any other desired option on the “Alarms and Alerts” screen.

Alert Tone

You may choose an alert tone directly on the main “Alarms and Alerts” screen by just tapping on the dropdown list labeled “Alert Tone” (see Figure 91 below) and selecting one of the three options.

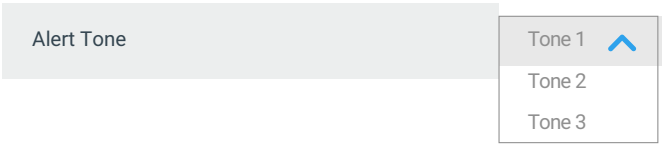


Figure 91 “Alarms and Alerts” Screen: Alert Tone Options

Proceed as follows to change the alert tone:

1. Tap the “Settings” icon on the Main Navigation Bar.
2. Tap the “Alarms and Alerts” button on the “Settings” screen.

   Alternatively, you can tap the “Alarms and Alerts” icon on the Main Navigation Bar to open the “Alarms and Alerts” screen.
3. Tap the “Alert Tone” dropdown menu and choose an option.
4. Save your changes as explained in the section “Saving Changes” on page 101, or change any other desired option on the “Alarms and Alerts” screen.

Saving Changes

The “Save” button at the bottom of the screen lets you commit any changes you have made to the setup. The “Save” button will appear as soon as you make any changes to any of the dropdowns on the screen.

1. When you are done making settings, tap the “Save” button.

   A pop-up window appears, stating that *“Your settings have been saved.”*. **A header in the top left corner states:** *“Settings saved”*.

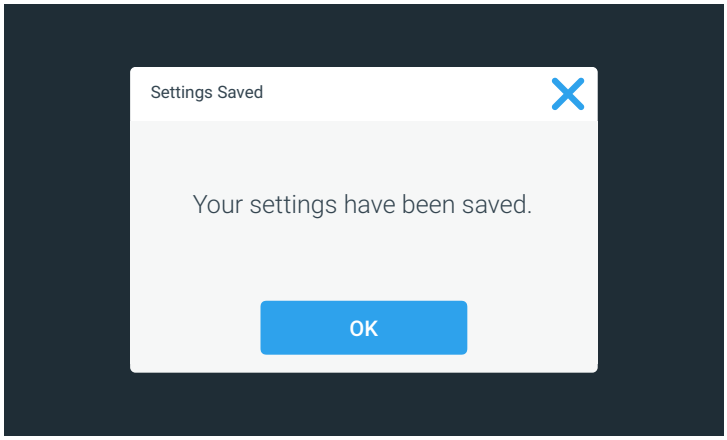


Figure 92 “Settings Saved” Screen

2. Tap the “OK” button to apply the changes and close the window.

NOTE The window will close automatically after 5 seconds if you do not tap the “OK” button.

3. If you wish to cancel saving, tap the X icon in the top right corner of the pop-up window.

   Another pop-up window appears, asking whether you are sure about exiting. You may then choose to tap the “Discard Changes” button and cancel saving for good, or tap the “Save Changes” button and continue saving.

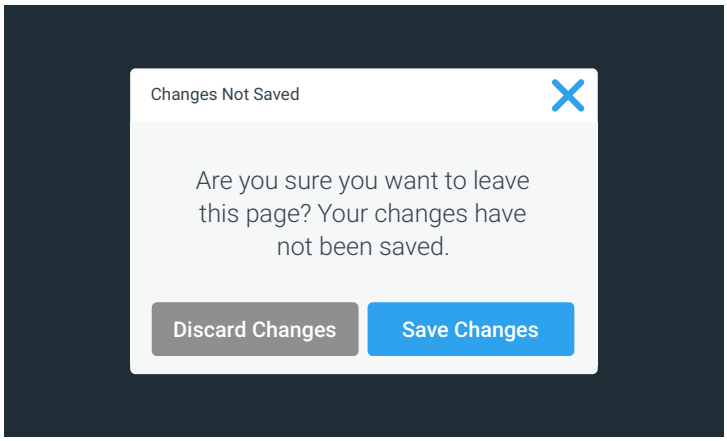


Figure 93 “Changes not Saved” Message

You will be returned to the “Settings” screen.

Data Plate

Tapping the “Data Plate” icon on the Main Navigation Bar takes you to the “Data Plate” screen shown in Figure 94. The “Data Plate” screen displays pertinent information about the biological safety cabinet, including:

- Serial no.
- Order no.
- Release
- Firmware release
- Addon board release

All information on the first-level “Data Plate” screen is read-only and cannot be edited.

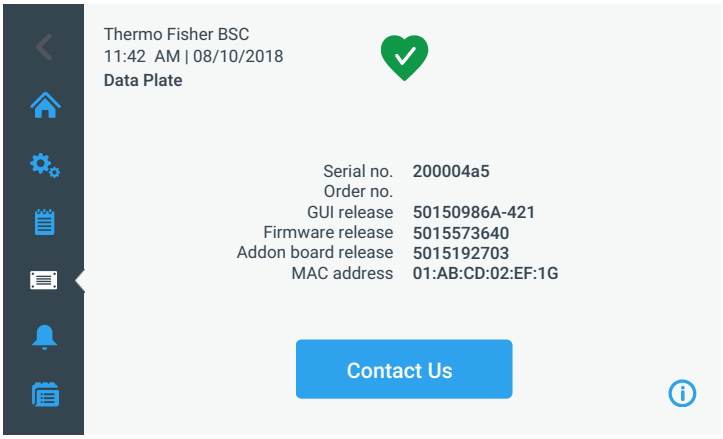


Figure 94 “Data Plate” Screen

Viewing and Editing Contact Information

Tapping the “Contact Us” button on the “Data Plate” screen takes the user to the “Contact Us” screen shown in Figure 95. The “Contact Us” screen lists addresses and telephone numbers of Thermo Scientific service organizations. You may view and/or edit contact information for Thermo Fisher Scientific to keep the contact information in the unit up-to-date.

The page is divided into three separate boxes with headers for: US, Europe, and Asia.

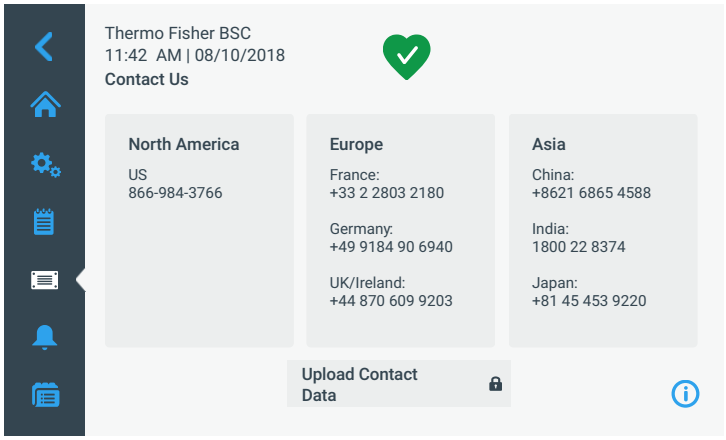


Figure 95 “Data Plate” Screen: “Contact Us” Screen

You may tap into the three fields to edit or add text. A keyboard (see Figure 96) appears when the user taps into any of the boxes.

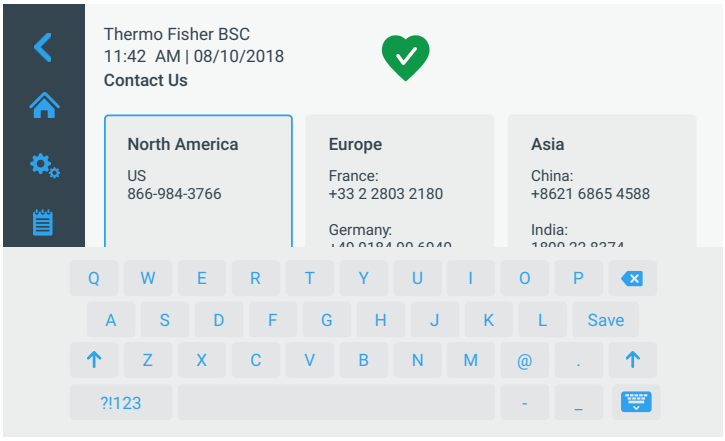


Figure 96 “Data Plate” Screen: Editing the “Contact Us” Screen

The headers are not editable. You can use the up/down arrows to scroll through the box if there is more content than can be seen on one screen, or use a swiping gesture to scroll the box.

Connectivity

Connectivity requirements

There are two requirements that must be observed to take full advantage of your Herasafe/Maxisafe 2030i's connectivity options:

1. The Herasafe/Maxisafe 2030i is designed to connect to the Thermo Fisher Cloud exclusively through a WiFi (wireless) network. The lowest acceptable signal strength is 75 dBm.
    a. Consult with your IT department about the correct wireless network and password to use
    b. To safeguard your data against unauthorized access, make sure you use a WiFi Protected Access network with state-of-the-art data encryption, as outlined further below under “WiFi Network Specifications”
    c. Make sure that your safety cabinet is within the coverage area of the WiFi network, that there is sufficient WiFi signal strength at the location of your safety cabinet and that there is no radio interference from adjacent communications equipment to your WiFi network
    d. Ensure that the date and time settings of your safety cabinet are in sync with the current date and time at your location
    e. If your Herasafe/Maxisafe 2030i is unable to establish the WiFi connection, check whether you are using the correct WiFi network and password, then repeat the connection attempt

2. A Thermo Fisher Cloud account.
   a. It must be ensured that the customer's IT network does not block ports 443, 22, 1023 and ICMP Ping. These ports are necessary to establish a cloud connection.
   b. If you do not already have a Thermo Fisher Cloud account open the URL below using a web browser:

      https://www.thermofisher.com/cloud

   c. Choose the “create an account” option.

WiFi Network Specifications

Parameter	Specification
WiFi protocol	802.11b/g/n
WiFi Security	WEP, WPA PSK, WPA2 PSK
WiFi band	2.4 GHz
Firewall Ports that must open	443, 22, 1023 and ICMP Ping

NOTE
Thermo Fisher Cloud-connected devices do not support the use of proxy servers and enterprise networks which require identity/username for internet access. The entry of username/password via a Web browser is not supported either.

NOTE Connectivity with WiFi option
The connectivity option is only available in the EU, US and CAN regions. WiFi figures are only displayed if the region set in the “Region” screen (see “Initial Setup” on page 39) is allowed.
If the customer uses WiFi stick other than the one supplied with de device or sold by Thermo as a spare part, the device will lose its approval. Use only original parts.
For the WiFi setup connection to Thermo Fisher Cloud, the customer's IT department should be consulted.

Tapping the “Connectivity” button in the “Settings” screen takes you to the “Connectivity” screen shown in Figure 97. If the unit includes a WiFi module, but the unit has not been connected to a WiFi (wireless) network, the following “Connectivity” screen is displayed.

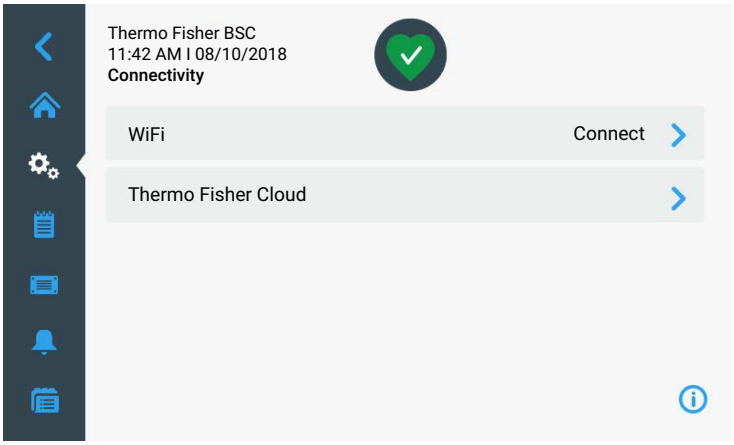


Figure 97 “Connectivity” Screen

If the unit is actively connected to a WiFi network the name of the network is displayed as in the following screen:

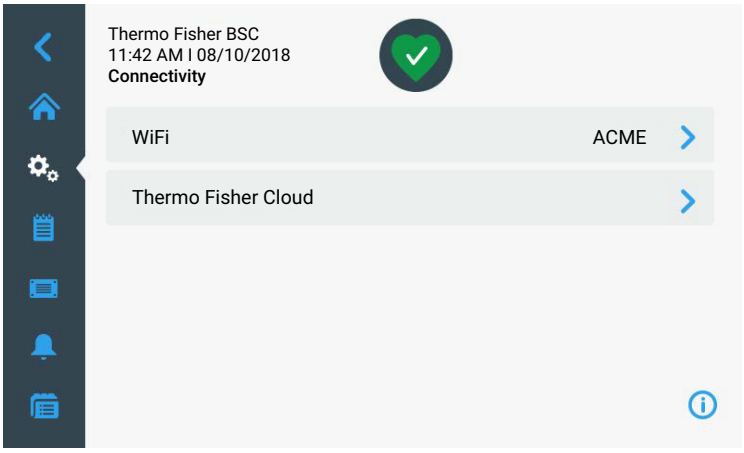


Figure 98 “Connectivity” Screen with Network Name Displayed

New WiFi Connection

If you are not actively connected to a WiFi network because you haven‘t set up a network, the following screen is displayed when you tap on the “WiFi” Connect button:

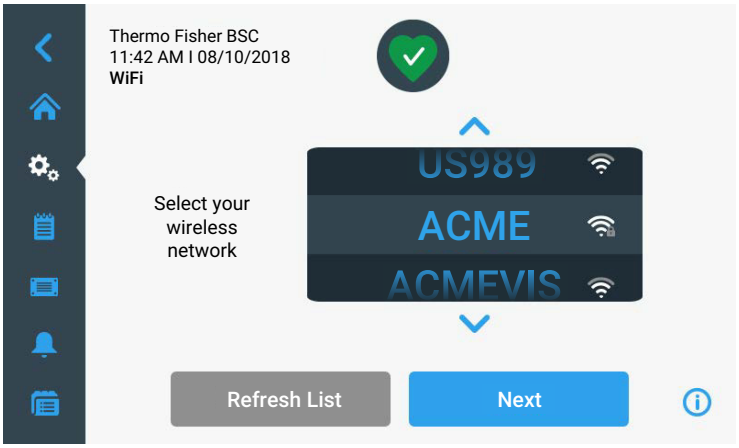


Figure 99 “WiFi” Screen

From this screen, all available networks are shown in the wheel picker format. They are shown along with their signal strength and whether the network is secured requiring a password.

You may tap on the “Refresh List” button to refresh the list, if your network isn‘t displayed. You can use either the arrows above the wheel picker or the wheel picker itself to scroll through the available networks. Once you have highlighted the network you would like to join, tap the “Next” button.

Note, there can only be max. 24 characters for the WiFi wheel picker. An ellipsis (counts as one character) is displayed if the entry is longer than 24 characters.

If the network does not require a password and the connection is successful, the following pop-up window message is displayed:

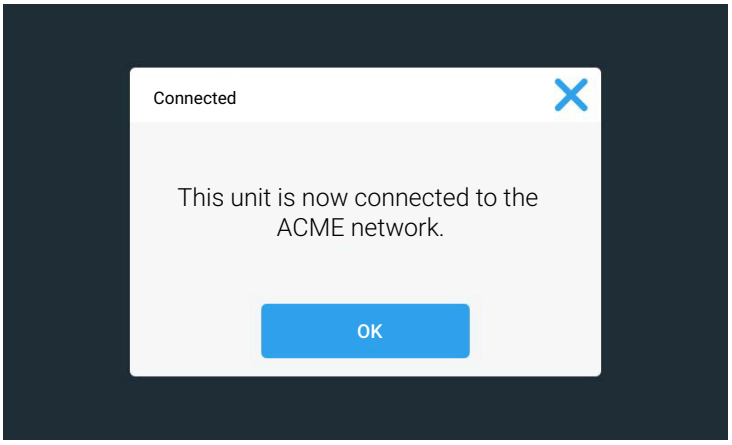


Figure 100 Screen with Network Connection Message

If the unit requires a password to join, the following screen is displayed:

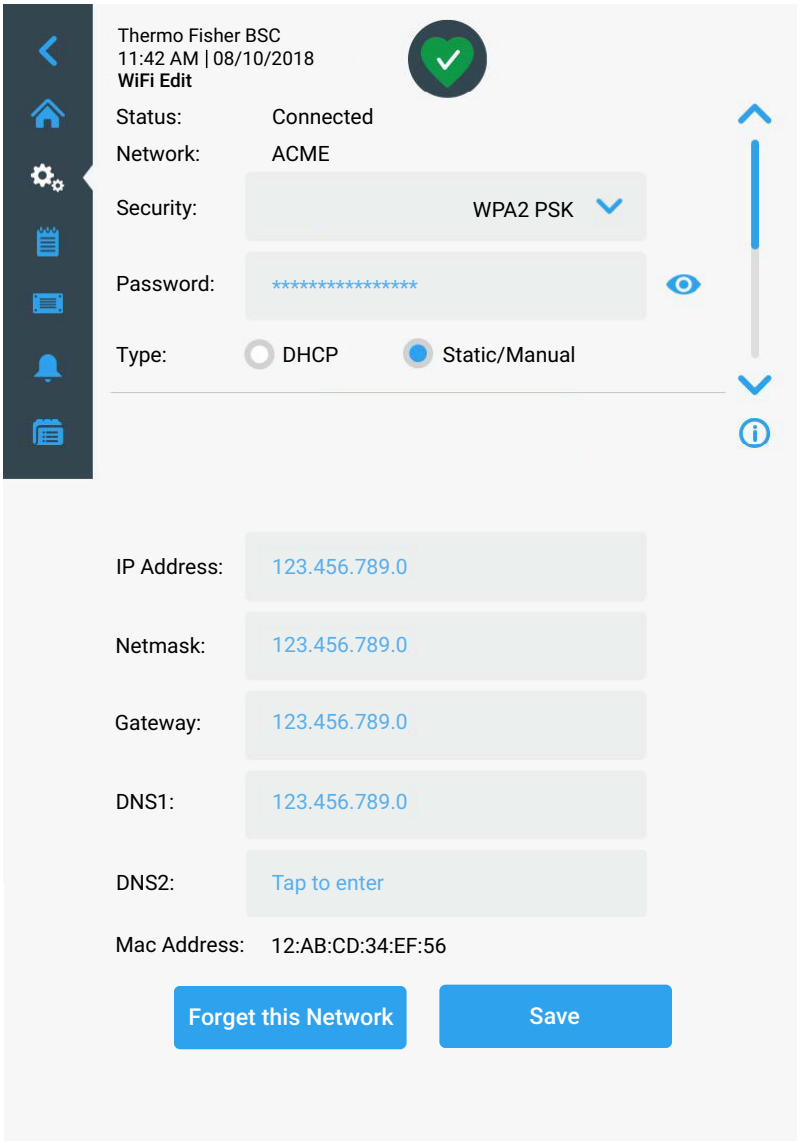


Figure 101 "WiFi" Screen with Password Required

You may use the "Back" button to return to the screen with the wheel picker to select another network, or you may enter the network password and tap the "Join" button to join the network.

Select DHCP to get the address from the DHCP server.

Tapping the eye icon next to the password field will toggle the password view from asterisks (default) to actual text if you have a complicated password and you would like to confirm you have entered it correctly.

If the password is accepted and the unit is able to join the network, the following pop-up window is displayed:

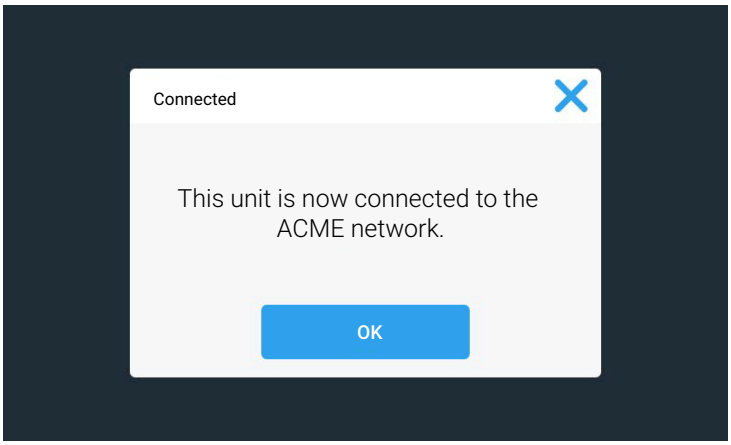


Figure 102 Network Connection Message

Tapping the “OK” button or the X icon in the top right corner will close the pop-up window and the display returns to the “Connectivity” screen. The “Connectivity” screen displays the WiFi network name in the WiFi button.

When unsuccessful, an error message appears on the screen of the device, detailing the nature of the problem. Use this information for troubleshooting the connection problem, then try again.

Joining a Different Type of WiFi Network

If the network you would like to join is not displayed in the wheel-picker list, you may choose “Join Other” and tap the “Next” at the bottom of the screen. If the network cannot be seen, this may also be due to the signal strength being too weak:

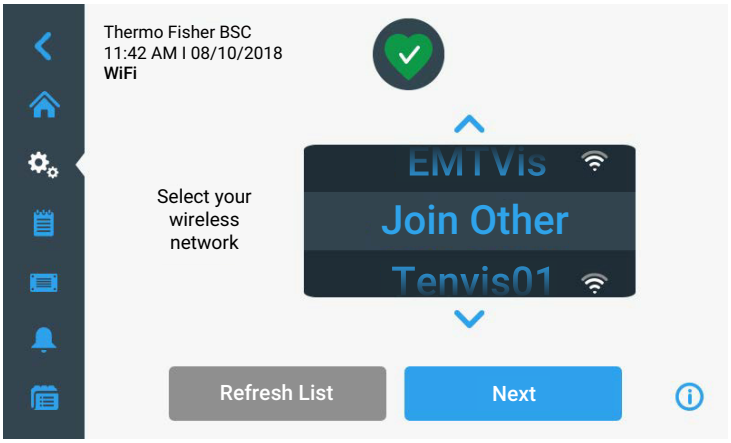
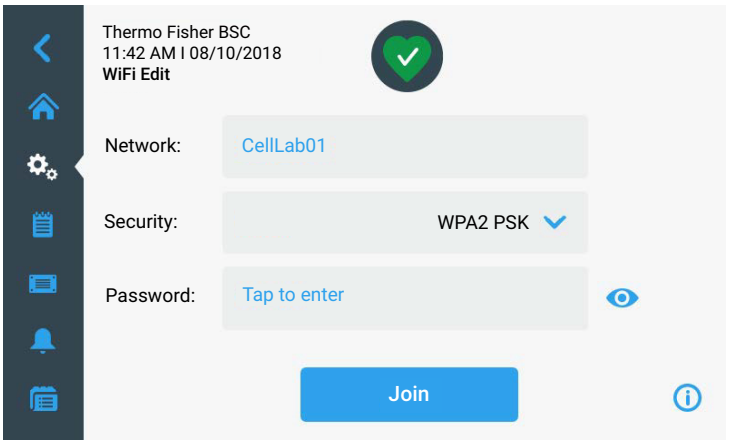
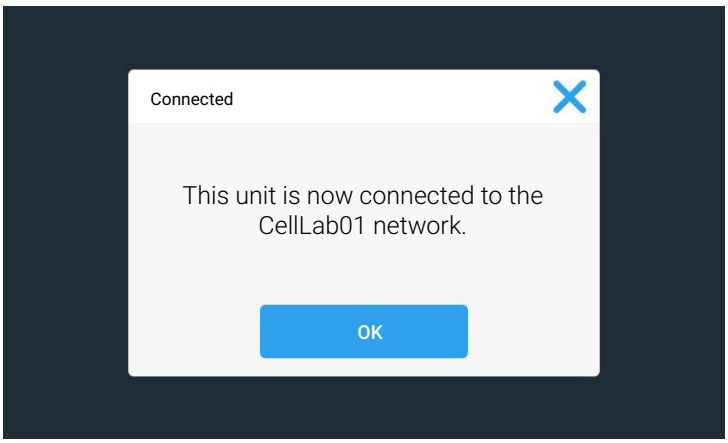


Figure 103 “WiFi” Screen - Join Other

On the following screen, you will be prompted to enter the Network name, choose the type of security from the drop-down menu, and enter the password for the Network (if a secure network requiring a password):



Once all fields have been entered, you must tap the “Join” button. If the unit successfully joined the network, the following pop-up window message is displayed:

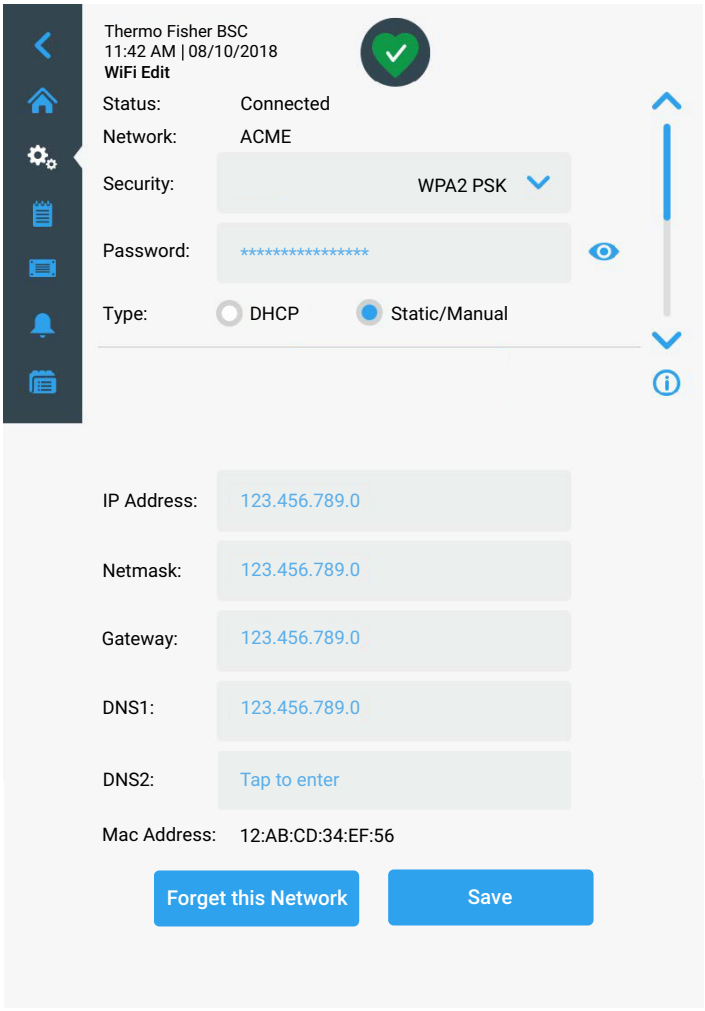


Note the “CellLab01” would be the name of the network. Tapping the “OK” button or the X icon in the top right corner will close the pop-up window and the display returns to the “Connectivity” screen. The “Connectivity” screen displays the WiFi network name in the WiFi button.

When unsuccessful, an error message appears on the screen of the device, detailing the nature of the problem. Use this information for troubleshooting the connection problem, then try again.

Editing a WiFi Network

If you are connected to a WiFi network and you would like to view or edit the connection, the following visual screen is displayed when you tap on the “WiFi” button:

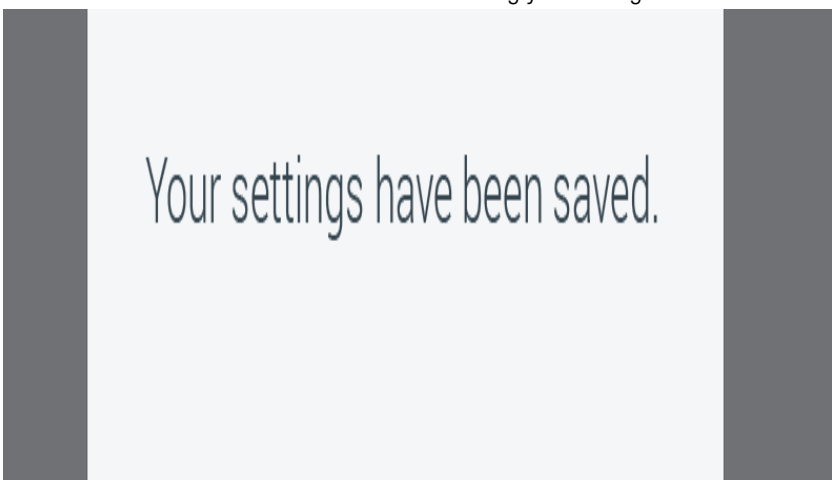


If the unit is actively connected, the status displays “Connected”. If the unit is not actively connected, the status displays “Disconnected”.

You may tap into the “IP Address” field to manually change the IP Address. If you would like to remove the unit from the selected network, you may tap the “Forget this Network” button. Tapping this button will bring you back to the “Connectivity“ screen.

If you make a change to this screen, you must tap the “Save” button.

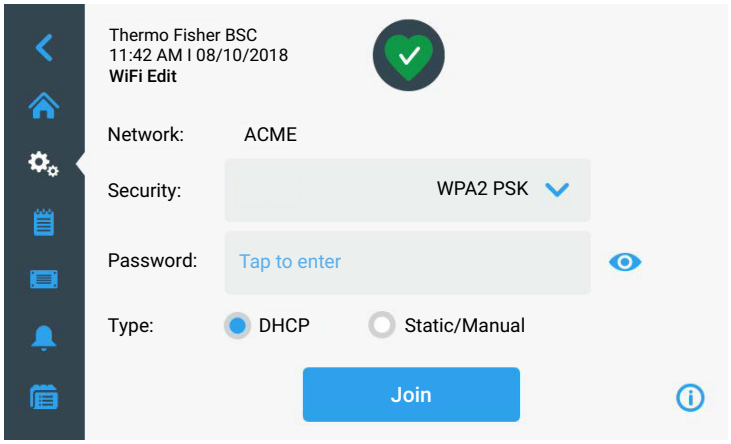
You are shown a Save confirmation screen stating your changes have been saved:

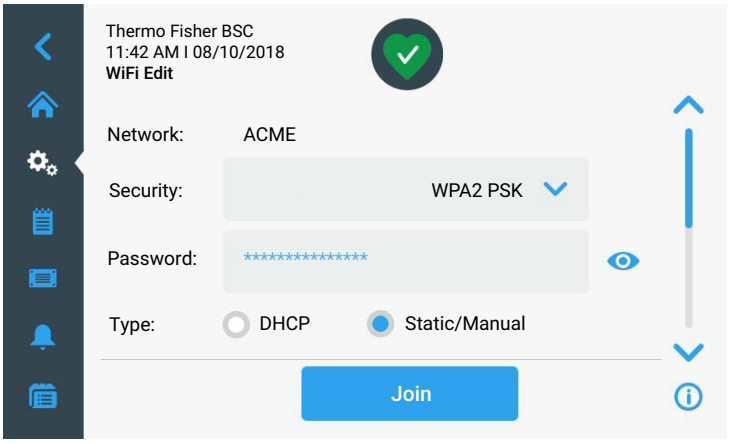


You may tap the “OK” button or the X icon in the top right corner to close this window and return to the “Connectivity” screen.

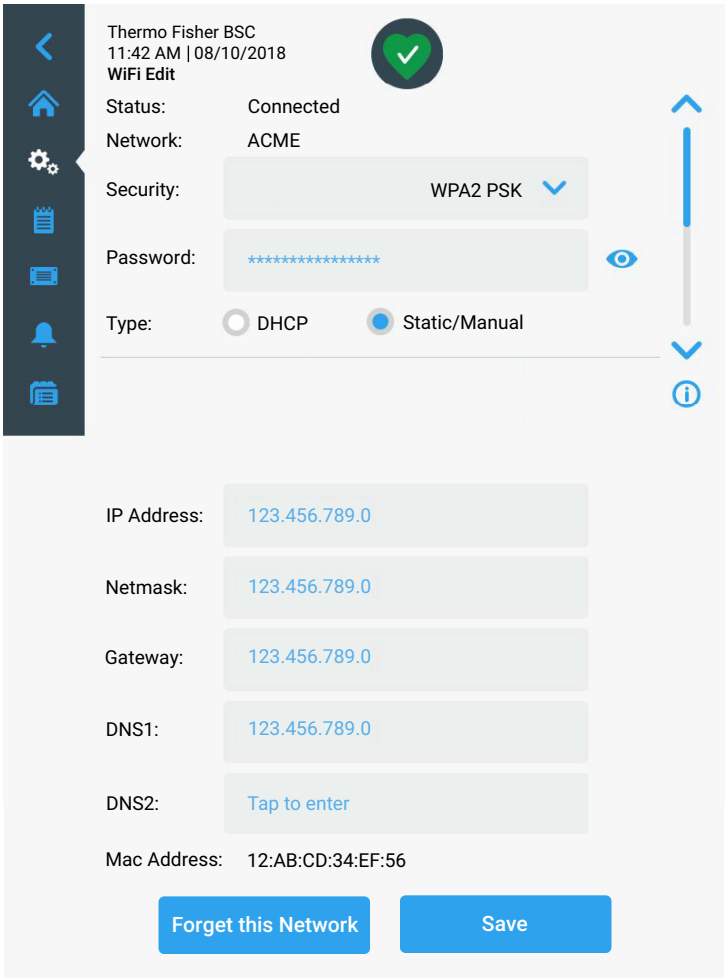
DHCP and Static/Manual Settings

If required by the network additional fields for DCHP and Static/Manual settings can be shown as in these examples:





Example showing content below the main screen (scroll to view):



Connecting to the Thermo Fisher Cloud

When the unit has been connected to the WiFi network and you do have an account set up, you may connect your unit to the Thermo Fisher Cloud. Figure 104 shows the “Thermo Fisher Cloud” screen with its three cloud connectivity option boxes. The Cloud icon at the top left of the Main screen must be displayed to perform these actions. This signals that the TFS Cloud is accessible:

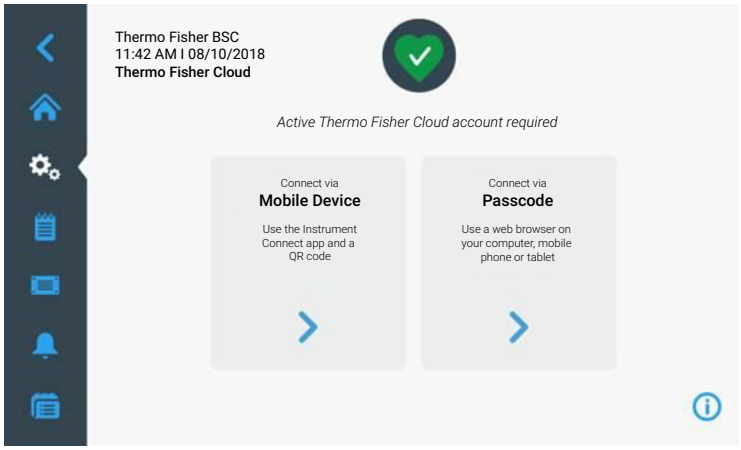
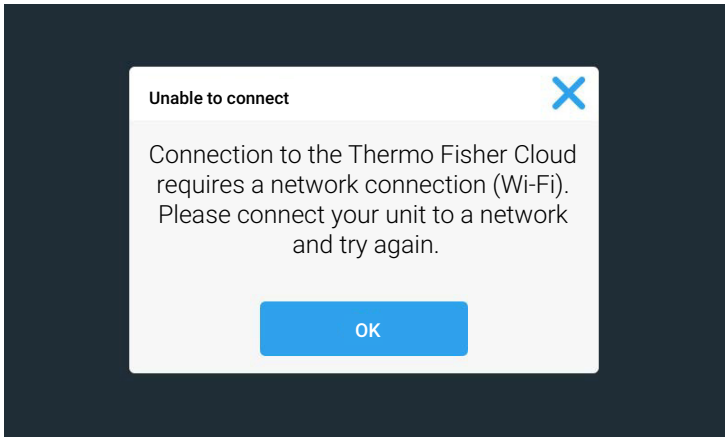


Figure 104 “Thermo Fisher Cloud” Screen

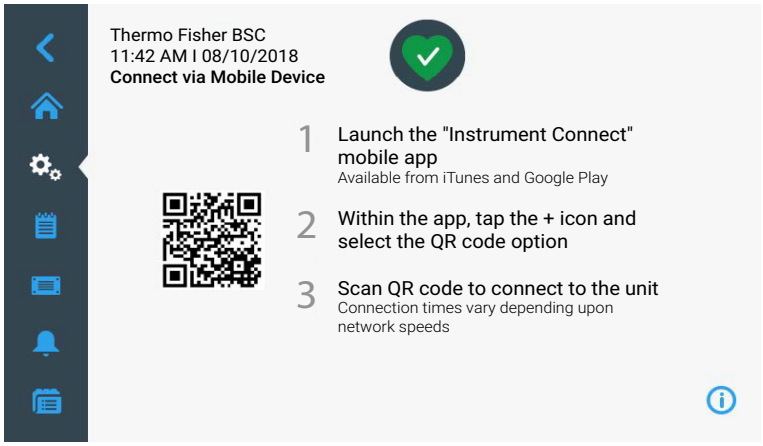
You must have an active Thermo Fisher Cloud account before you can use one of the three methods listed above to connect the unit.

If the unit is not actively connected to a WiFi network, the following screen is displayed:



Connect via Mobile Device

If you tap on the “Connect via Mobile Device” box from the “Thermo Fisher Cloud” screen, the following screen is displayed:



A QR code is generated by the system and displayed on the left side of the screen with text in the right column detailing the steps required by the user to successfully connect the unit to the cloud.

NOTE
The mobile app has limited functionality compared to the web application (URL). For example, it is not possible to implement user management or remove devices from the cloud.

Once you complete the steps successfully and the unit has connected, the following confirmation screen is displayed:

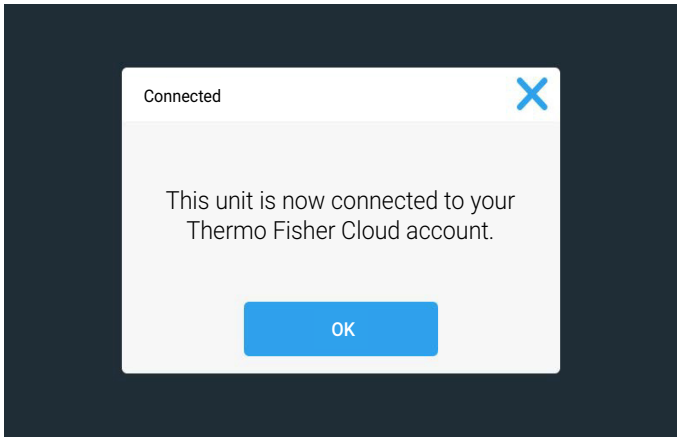


Figure 105 Thermo Fisher Cloud Connection Successful Message

You may tap the “OK” button or the X icon in the top right corner to close this window and return to the “Connectivity” screen.

When unsuccessful, an error message appears on the screen of the device, detailing the nature of the problem. Use this information for troubleshooting the connection problem, then try again.

Connect via Passcode

This procedure uses a passcode that is generated by the system when you open the “Connect via Passcode” screen shown in Figure 106.

Proceed as follows to connect using a passcode:

1. Create a Thermo Fisher Scientific account,
2. Tap the “Settings” icon on the Main Navigation Bar.
3. Tap the “Connectivity” button on the “Settings” screen.

The “Connectivity” screen shown in Figure 97 further above appears.

4. Tap the “Thermo Fisher Cloud” button.
5. Tap the “Connect via Passcode” box on the “Thermo Fisher Cloud” screen.

The system generates a passcode and displays it on the “Connect via Passcode” screen shown in Figure 106:

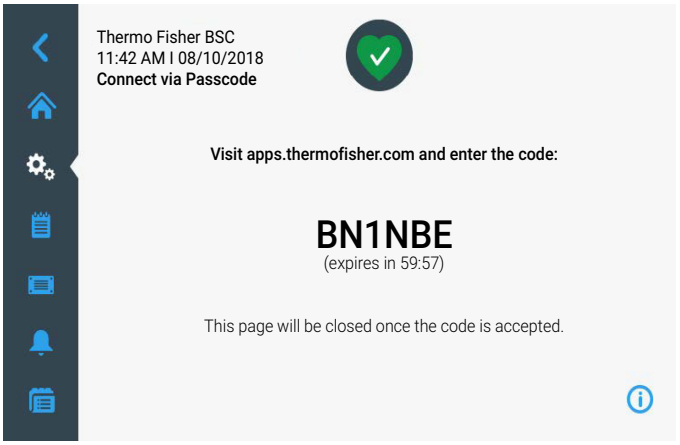
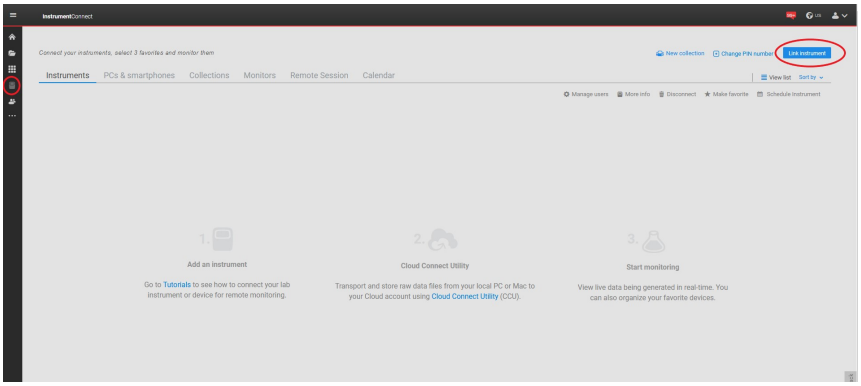


Figure 106 “Connect via Passcode” Screen

A unique code is generated by the system and displayed on the screen with additional text detailing the steps required by you to successfully connect the unit to the cloud. Follow the instructions on the website apps.thermofisher.com. When successful, the confirmation message shown in Figure 105 appears on the screen of the device.



1. Enter the 6-digit code.

When unsuccessful, an error message appears on the screen of the device, detailing the nature of the problem. Use this information for troubleshooting the connection problem, then try again.

Managing Thermo Fisher Cloud Access

At this time, there is no method to view/edit a list of linked Thermo Fisher Cloud accounts from the unit itself. Viewing, editing, and deleting accounts linked to the unit is done from the respective Thermo Fisher Cloud accounts using a web browser.

Displaying WiFi and Cloud Connectivity

Connecting the device via one of the three methods (via mobile device, passcode, username) is only possible, if the device has successfully established a connection to the cloud. This is indicated by the cloud icon that appears in the top left corner of the main screen. This icon indicates an existing connection to the cloud. It does not indicate that the device is already logged into the cloud, though.

If the unit is actively connected to a WiFi network and/or the Thermo Fisher Cloud, the corresponding icons are displayed in the top left corner of the main screen:



WIFI Connection Error

In the event of a defective WiFi connection, e.g. if the connection to the DHCP server cannot be established, the following menu is displayed with an „exclamation mark“ in the WiFi symbol:



Figure 107 „WIFI Connection Error“ Screen

Problem-solving measures:

1. Check DHCP server and restart if necessary.
2. Restart the safety cabinet.

Firmware Update

From time to time you will be informed about new software updates. Proceed as follows to update the firmware of your device:

1. Save two files to a USB memory stick:
   a. the update file -*.update
   b. the signature file - *.sign
2. Insert the USB memory stick into the USB port of your device.
3. Tap the “Settings” icon on the Main Navigation Bar.
4. Tap the “Firmware” button on the “Settings” screen.

Follow the instructions on the screen and wait for the update to be completed.

Access Control

Tapping the “Access Control” button in the “Settings” screen takes you to the “Login” screen shown in Figure 42. After entering the passcode the “Access Control” screen Figure 108 is shown. The “Access Control” screen allows you to activate “Secure” mode, in which a passcode will be requested from all users who want to change its settings.

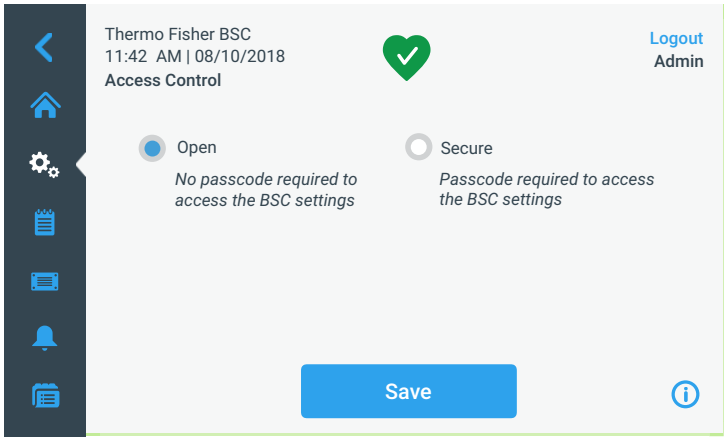


Figure 108 “Access Control” Screen in “Open” Mode

By default, the biological safety cabinet is in “Open” mode, that is, you do not need to enter a passcode to access and operate the unit.

NOTE The Admin passcode is 0418. The “Factory Settings” and “Field Certification” screens require specific passcodes, which are different from the Admin passcode. These screens are reserved for Thermo Scientific field service.

With a new login the mode can be changed again. Changing the access mode from “Open” to “Secure” requires the Admin passcode.

After the mode has been changed from “Open” to “Secure” by tapping the “Secure” radio button, the “Save” button turns blue to indicate that you may save your changes now.

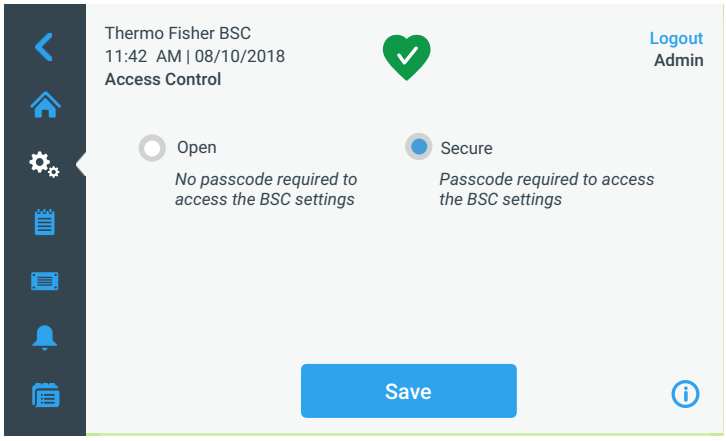


Figure 109 “Access Control” Screen in “Secure” Mode

You will be returned to the “Access Control” screen. The “Access Control” screen now has a “Logout” command and user name readout in the upper right corner.

Factory Settings

Tapping the “Factory Settings” button in the “Settings” screen takes you to the “Factory Settings” screen. Access to the “Factory Settings” screen is reserved to Thermo Scientific Field Service and requires a special passcode (which differs from the Admin passcode).

Field Certification

Tapping the “Field Certification” button in the “Settings” screen takes you to the field certification screen. Access to the “Field Certification” screen is reserved to Thermo Scientific Field Service and requires a special passcode (which differs from the Admin passcode).

Event Log

Tapping the “Event Log” icon in the “Settings” screen takes you to the “Event Log” screen shown in Figure 110. The “Event Log” screen displays a complete and continuous list of events and alarms from the last 24 hours. For events > 24 hours the data log must be downloaded to a USB stick.

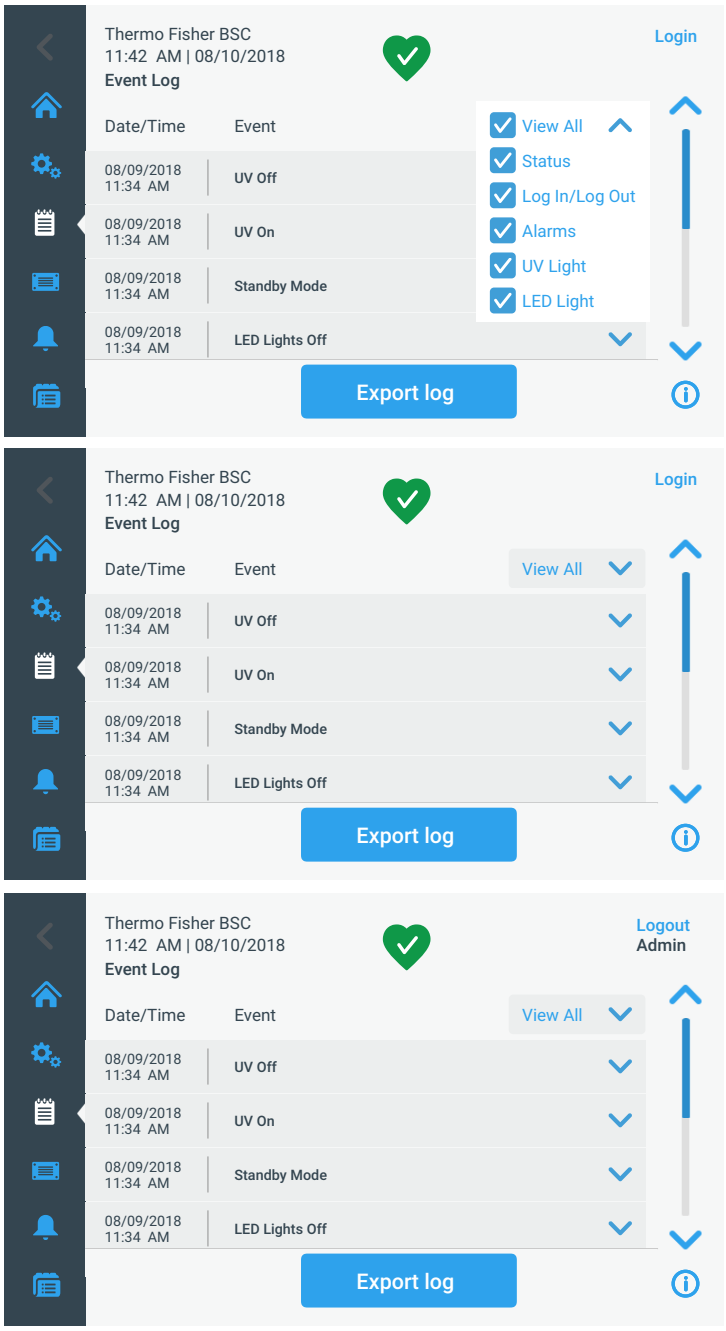


Figure 110 “Event Log” Screen

The “Event Log” screen displays the following information:

- Periodic status, as captured in 1 minute increments by default.
- Events, including alarms and alerts as well as changes to settings:

- For each alarm the time activated and the time deactivated is recorded. Alarms include:
  - inflow alarm low
  - inflow alarm high
  - downflow alarm low
  - downflow alarm high
  - window too low
  - window too high
  - external exhaust alarm, if applicable
- For each alert, the time activated is recorded. Alerts include:
  - 5% filter life remaining
  - 5% UV light life remaining
  - GFI tripped (US versions only)
  - annual field certification due
- Changes to settings include:
  - changes to the language, date, or time
  - changes to login/logout and/or associated passcode
  - reset of UV bulb, filters, or field certification timers
- Status of fans (on, off, reduced mode)
- Status of sample chamber illumination (on/off)
- Status of UV (on/disinfection cycle/off)
- Status of internal receptacle (on/off)
- Status of GFI (tripped/not tripped), if applicable

Viewing the Event Log

Proceed as follows to view the event log:

1. Tap the “Event Log” icon  on the Main Navigation Bar.

The “Event Log” screen shown in Figure 111 appears.

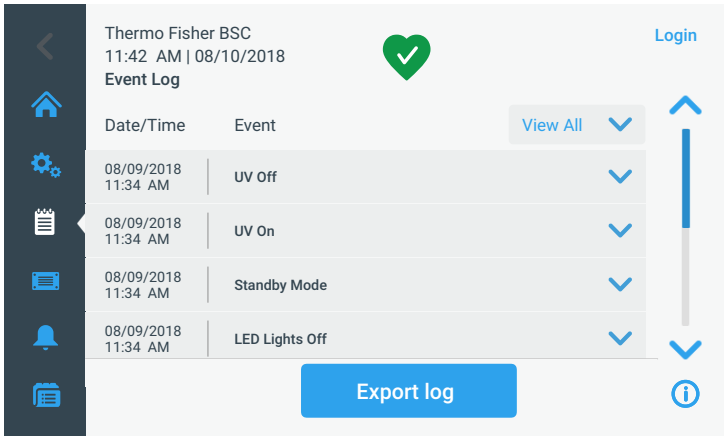


Figure 111 “Event Log” Screen: Standby Mode expanded

2. Tap the up and down arrows to the right of the event list to scroll.
3. Tap on any list item in the event log to expand it and view more detailed information, as shown for the Standby mode item in Figure 111.

Filtering the Event Log

The dropdown menu labeled “View All” on top of the event list allows the user to customize the content displayed in the “Event Log”. By default, the dropdown list is pre-set to “View All”, that is, the event list is unfiltered and shows the full content of the event log. You can expand the dropdown list and exclude or include whole classes of events to make the event list easier to read.

Proceed as follows to filter the event list:

1. Tap the dropdown menu labeled “View All” in the “Event Log” screen.

   The dropdown list is expanded, displaying the filtering options shown in Figure 112.

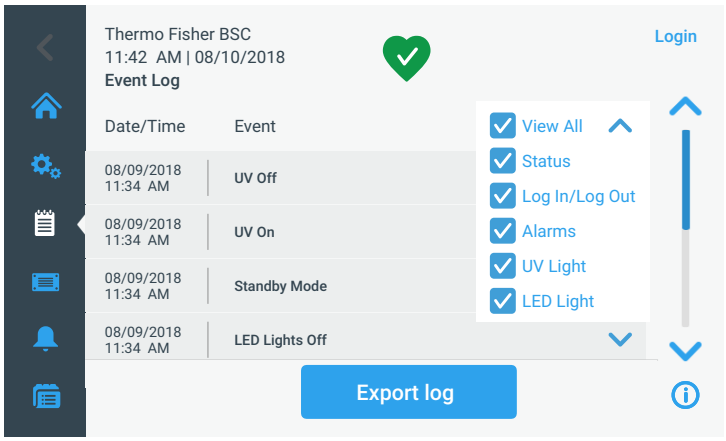


Figure 112 Filtering the “Event Log”

2. Uncheck the classes of events you wish to exclude from the event list.

   The list in the event log is refreshed, displaying only the items you have left checked. The “View All” option is unchecked.

3. To undo filtering, check “View All”.

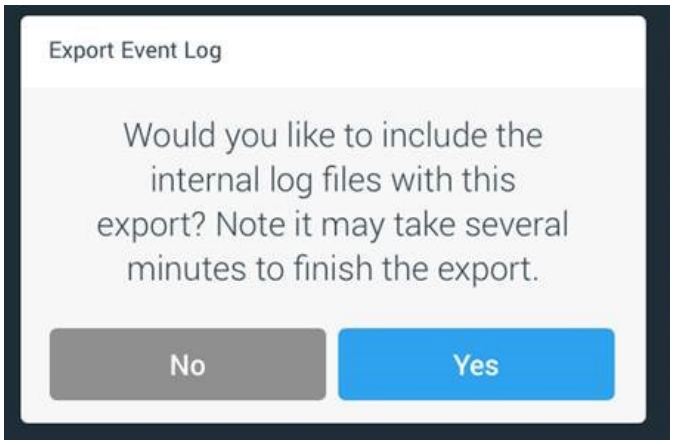
   All options are checked again, and the full event list display is restored.

NOTE Unchecking options for onscreen viewing is only for the current session. If you navigate away from the event log screen and then return, you will find View All highlighted again.

Exporting the Event Log

The Event Log can be exported in Comma Separated Values (CSV) format, writing up to six months of event data. You must insert a USB drive to download the file to into the USB port of the unit.

Various internal log files are exported along with the event data. Before exporting the event log, the following dialog is displayed:



Proceed as follows to export the event log:

1. Insert a USB drive into the USB port, which is located in a small bay next to the display window.
2. Tap the “Export Log” button in the “Event Log” screen.
3. If you have not inserted a USB drive yet, the pop-up window shown in Figure 113 appears, asking you to insert a USB drive to export the log to. The window will close automatically when you insert a valid USB drive, and the export process will start.

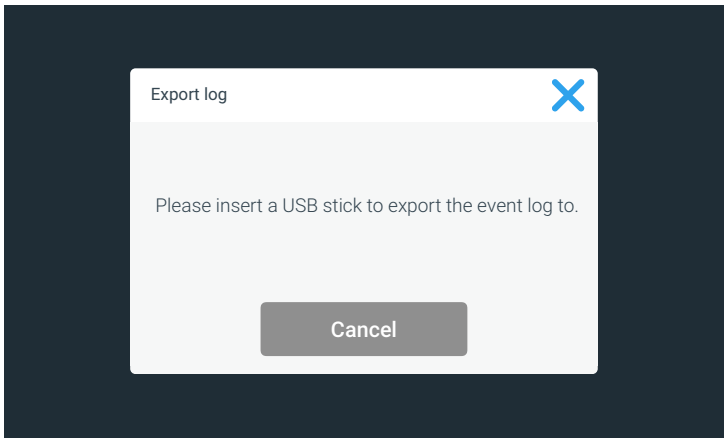


Figure 113 “Export log” Screen: Missing USB Drive Alert

a. If you have inserted a USB drive that is not writable or readable, the pop-up window shown in Figure 114 appears, stating the drive is not readable and asking you to insert a different USB drive.

If you have inserted a valid USB drive, the export will start immediately. The pop-up window shown in Figure 114 appears, cautioning you no to remove the USB drive until the transfer is complete.

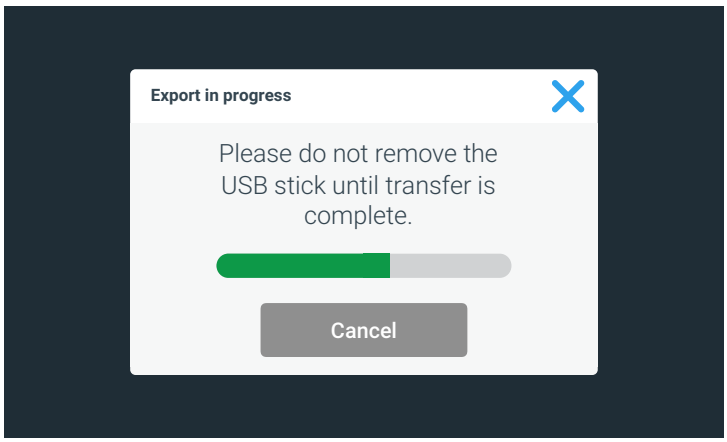


Figure 114 “Export in progress” Screen

4. If you wish to exit, you may tap the “Cancel” button or the **“X”** icon to close this window and return to the event log.

5. When the export process has been completed, the final pop-up window shown in Figure 115 appears, anouncing that you may remove the USB drive now.

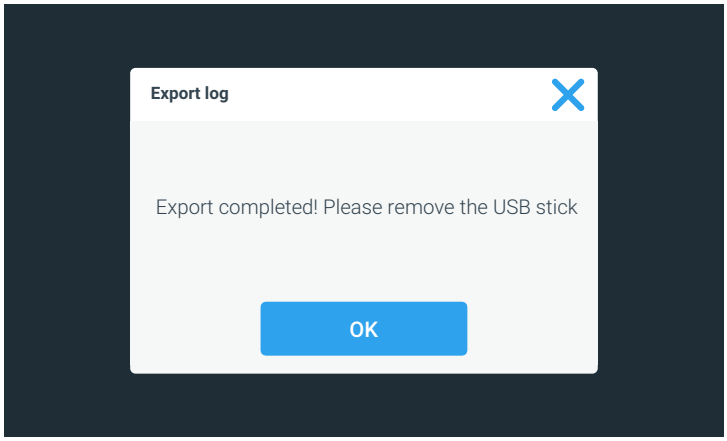


Figure 115 “Export log” Screen: Export completed

Preparation

Hygiene Preparations for the Sample Chamber

The sample chamber surfaces and the accessories required for the work process must be disinfected and cleaned in accordance with the hygiene guidelines set forth for the application.

Preparing the Sample Chamber

Installing the accessories:

1. Lower the front window completely.
2. Open the front cover or move the front window into the maximum opening position.
3. Position the accessories in the working area of the workplate.
4. Close the front cover.
5. Move the front window to its working position and wait until the airflow has stabilized.



Operational safety!
The personal and material protection is ensured only if the airflow system of the device is working properly. If the alarm system issues failure messages when the front window is in the working position, stop all applications that may release harmful aerosols!

NOTE Cytostatics applications
Use only the low-profile, one-piece workplate for cytostatics applications.

6. Then place samples into the chamber.
7. To interrupt the work process or for extensive experiment cycles without manual interference, switch the device to standby mode. When the working opening is completely closed, the safety cabinet is sealed aerosol-tight.

Response to Failure Messages

Failure messages are displayed on the touchscreen display as outlined in the sections “Alarms” on page 70 and “Alerts” on page 73 . If one of these messages is displayed, contact the Technical Service immediately.
To isolate the cause of the failure, the operating personnel must perform only the following tests and measures:

- Check to see if the exhaust air opening on top of the cabinet is blocked.
- Ensure that the on-site exhaust air system is activated.
- Close doors and windows in the laboratory to prevent drafts.
- Switch off devices in the vicinity of the safety cabinet that cause air turbulence or emit excessive heat.
- Open flames in the sample chamber may impair airflow conditions.
- Restart the cabinet to check if failure messages persist.

Work Rules

The observance of work rules ensures a minimum of operational safety when handling the safety cabinet.

Before starting an operation:

- Take off jewelry.
- Put on required personal protective gear, e.g. hand, face, or body protection.
- Clean and disinfect sample chamber surfaces at regular intervals.

During an operation:

- Place samples only within the defined work area of the workplate.
- Do not place unnecessary items into the sample chamber.
- Use only disinfected and cleaned accessories for the work process.
- Do not cause air turbulence, by quick hand, arm or body movement in the sample chamber or in front of the work opening.
- Do not place accessories into the sample chamber that cause air turbulence or emit excessive heat.
- Do not block air circulation at the ventilation slots of the workplate.

Sitting posture during work:

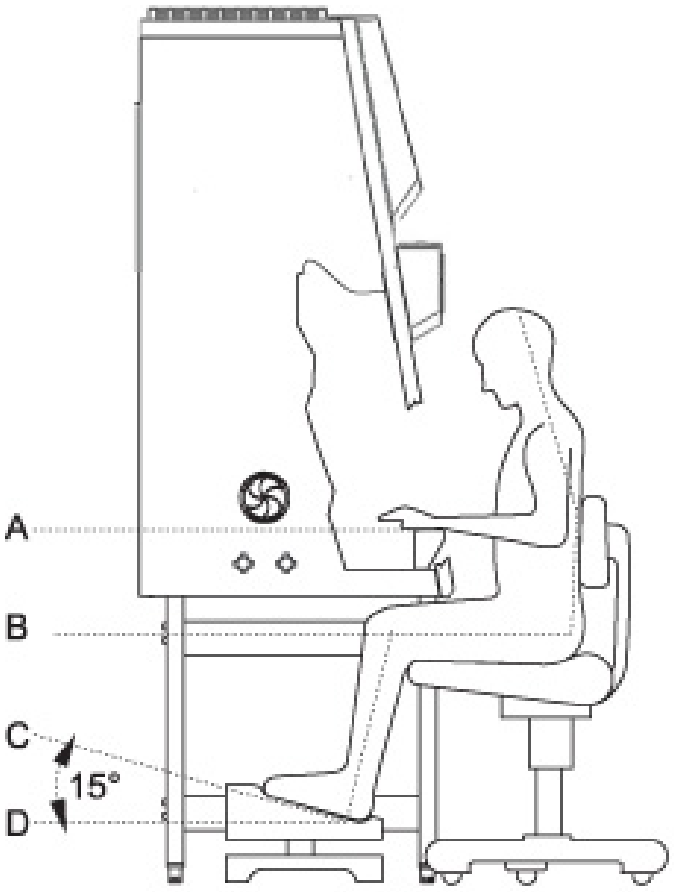


Figure 116 Sitting Posture

To prevent risks to health, a height-adjustable working chair with an adjustable seat back should be used during extended work periods at the safety cabinet.

A When the forearm rests on the armrest, is should be in an almost horizontal position.

B When the thigh is in a horizontal position, the angle between thigh and lower leg should exceed 90°.

To ensure a compensation between floor and sitting height, a footrest (DIN 4556) should be used. The minimal effective surface of the footrest should be 45 x 35 cm.

C The slope should be adjustable within a range of 5° to 15°.

D The adjustable height should extend to a minimum of 11 cm above the floor.

After finishing an operation:

- Remove samples from the sample chamber and store them properly.
- Clean and disinfect the sample chamber surfaces, including the workplate and the drain pan. Clean and disinfect all accessories.

Installation Test / Repeat Test

Classification of the Safety Cabinet

For application in the EU, the device has been rated as a Class II microbiological safety cabinet in accordance with EN 12469.

For application in the USA and in Canada, the device has been laid out as a Class II safety cabinet, Type A2, in accordance with NSF Standard 49.

For operation as a device of said classifications, an installation test or repeat test in accordance with NSF Standard 49 or EN 12469 must be conducted:

- After the final installation before the safety cabinet is operated.
- During the annual inspection.
- After any replacement of the downflow filter.
- After any replacement of the exhaust filter.
- After any repairs to the air distribution system.
- After any relocation of the device to a new location.

When working with safety-critical materials (toxic or slightly radio-active substances), the on-site tests should be conducted at shorter intervals (every three or six months).

Test Terms:

Nominal value:
Default value as specified by Thermo Electron LED.

Measured value:
Value measured at the location of the safety cabinet.

Tolerance:
Acceptable deviation from the nominal value.

Average value:
The sum of the measuring values divided by the number of tests. The average value is compared to the nominal value.

Set point:
Acceptable operating value for the inflow and downflow velocities.

Inflow velocity (m/s, ft/min):
Velocity of the air entering the sample chamber opening.

Downflow velocity (m/s, ft/min):
Velocity of the displacement flow circulating through the work chamber.

Exhaust velocity (m/s, ft/min):
Velocity of the airflow discharged through the exhaust filter opening.

Exhaust airflow volume (m^3/s, cft/min):
Velocity of the exhaust airflow volume discharged through the exhaust filter.

Extent of the Tests

The tests cover all essential safety functions of the device as all values measured at the location of the device are compared to the nominal values. If required, device settings must be changed or the safety cabinet must be modified for the compliance with the nominal value tolerances. Possible measures are listed under Troubleshooting at the end of each section.

The tests should be conducted in the following sequence:

- Electrical safety test in accordance with applicable national regulations
- HEPA filter leakage test
- Inflow velocity test
- Downflow velocity test
- Exhaust airflow volume test
- Airflow pattern test
- Noise level test (type test)
- Lighting intensity test (type test)
- Vibration test (type test)
- UV intensity test (type test)
- Monitoring device test
- Front window functional test

NOTE Test report
All tests require a test report in duplicate. The operator must receive one copy of the report. A sample test report is attached at the end of this section.

Testing Equipment

For the conduction of the tests, Thermo Fisher Scientific recommend testing equipment of the manufacturers listed below.

Manufacturers in USA

Testing equipment	Manufacturer	Application
Smoke tubes	MSA Pittsburgh, Pennsylvania, 15230	Airflow pattern test
Thermo-anemometer	TSI Shoreview, Minnesota 55126	Downflow velocity test
Anemometer	TSI Shoreview, Minnesota 55126	Inflow velocity test
Digital Safety Inspector	Ohmic Instruments Co. Easton, Maryland 21601	Electrical leakage and ground resistance tests
GFI Circuit Tester	Leviton Manufacturing Little Neck, New York, 11362	Electrical leakage, ground resistance, and polarity tests
Photometer	Air Techniques Owing Mills, Maryland, 21117	Filter leak test
Aerosol Generator	Air Techniques Owing Mills, Maryland, 21117	Generation of aerosol mist
Vibration Meter	Quest Technologies Oconomowoc, Wisconsin, 53066	Vibration test
Flow Hood Airdata Multimeter	Shortridge Instruments. Inc. Scottsdale, Arizona, 85260	Inflow air volume test

Manufacturers in Europe

Testing equipment	Manufacturer	Application
Smoke tubes	Dräger GmbH Lübeck, Germany	Airflow pattern test
Thermoanemometer	TSI / Technetics Freiburg, Germany	Downflow velocity test
Anemometer	TSI / Technetics Freiburg, Germany	Inflow velocity test
Multimeter	Gossen-Metrawatt Nürnberg, Germany	Electrical leakage and ground resistance tests
Laser particle counter	KM-Optoelectronik Leonberg, Germany	Filter leakage test
Aerosol Generator	KM-Optoelectronik Leonberg, Germany	Generation of aerosol mist
Dilution range	KM-Optoelectronik Leonberg, Germany	Diluting of aerosol mist
UV meter	UV-Elektronik GmbH Ettlingen, Germany	Measuring of aerosol mist
Luxmeter	LMT Lichtmesstechnik GmbH Berlin, Germany	Lighting intensity test
Vibration meter	Airflow Lufttechnik GmbH Rheinhausen, Germany	Vibration intensity test
Formaldehyde vaporiser	Foramaflow Ltd Windlesham, England	Disinfection with gas, vaporization of formaldehyde solution and aqua ammonia

Electrical Safety Test

Purpose of the test

This test is conducted to check the electrical safety after the cabinet has been installed and during the annual safety inspection. The following is tested:

Application in USA/Canada (NSF 49)

- PE conductor resistance test
- Leakage current test
- Polarity test

Application in EU (EN 12469)

- PE conductor resistance test
- Insulation resistance test
- Equivalent leakage current test

Test conditions

The test is conducted in accordance with the following guidelines:

Application in USA/Canada

- UL 61010A-1
- CAN/CSA-C22.2 No.61010.1

Application in EU: IEC 61010-1 or EN 61010-1

All other applications in accordance with applicable national regulations.

Testing equipment

Application in USA/Canada (NSF 49)

- Electrical safety analyzer (ESA) with 1 kW input impedance and two leads,
- 1 k Ohm one lead with a sharp point,
- one lead with a probe,
- circuit tester.

Application in EU (EN 12469 / DIN 12980)

- Testing equipment in accordance with IEC 1010-1 or EN 61010-1 or in accordance with applicable national regulations.
- Safety inspection device Gossen Metrawatt Tester 5 with inspection socket

Accessories

Adapter with 3-hole electrical receptacle on one end and 2-prong plug on the other end.

Calibration of the testing equipment

Calibration performed by manufacturer.

Electrical Safety Test (NSF 49)

A. Testing for Electrical Leakage

1. Switch the device to OFF mode, de-energize the illumination and the internal power supply.
2. Plug the ESA power plug into the outlet of the power supply.
3. Connect the safety cabinet power plug to the ESA ground circuit resistance adapter.
4. Turn the ESA function selector to microamp (mA) scale. Read and record the displayed value.
5. Switch the safety cabinet on, then read and record the displayed measured value.

B. Testing for Ground Circuit Resistance

1. Switch all electrical switches of the safety cabinet to position OFF.
2. Plug the ESA power plug into the outlet of the power supply.
3. Connect the safety cabinet power plug to the ESA ground circuit resistance adapter.
4. Read and record the displayed value.

C. Testing for Polarity and Ground Faults

1. Disconnect all accessories from the device-internal power supply.
2. Set the GFI tester to polarity and test each cabinet power outlet. If the polarity is correct, the two yellow lights will light equally. Any other combination of lights indicates a fault as identified on the tester.
3. On devices with ground fault interrupters, disconnect all accessories from the device-internal power supply. Plug the tester into the last connected receptacle in the GFI protected branch.
4. Turn the tester selector switch to the 1, 2, and 3 mA positions. If leakage is detected, the lights will go off indicating leakage in the safety cabinet.

Acceptable values for all applications (in accordance with IEC 61010 / UL 61010)

The measured electrical leakage must not exceed 3.5 mA, and the cabinet ground circuit resistance must not exceed 0.1 mOhm.

Electrical safety test (EN 12469 / DIN 12980)

According to IEC 61010-1, EN 61010-1 and DIN VDE 0701-1 repaired or modified electrical devices must provide users with the same protection against electrical energy as is offered by new devices. The following tests must be performed to this end, in the following order:

A. Visual inspection

B. Protective conductor resistance

C. Insulation resistance followed by

D. Protective conductor current or equivalent leakage current.

A. Visual inspection

The visual inspection of a cabinet tested is the first step in correct evaluation of its technical condition.

The scope of a visual inspection includes:

1. check the device identification plate
2. check the power supply cord and plug
3. operation of mechanical parts, switches, motors, interlocks
4. check gas pressure spring, bolts and front window seals
5. check grid filters for dust / blocking and remove if necessary
6. check all additional accessories, like exhaust system, solenoid valve and the surface of the work table tops
7. testing internal sockets, LED lights and UV lights inside the device and plug.

Connecting the device being tested to the inspection device (Gossen Metrawatt tester).

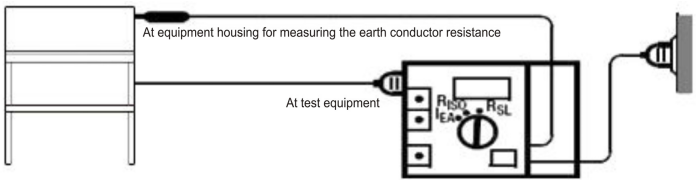


Figure 117 Inspection Device Connection

To measure grounding conductor resistance, insulation resistance and replacement leakage current, the device being tested must be connected to the inspection socket or to the sockets or clamps lying parallel to the inspection socket. The connection is connected with the short-circuited outer conductor sockets and the connection with the safety contact of the inspection socket.

B. Testing Grounding Conductor Resistance

1. Switch all electrical switches of the safety cabinet to position OFF.
2. Insert the power cable of the inspection device into the electrical plug of the power supply.
3. Connect the power cable of the safety work bench with the inspection socket of the inspection device.
4. Set the measurement range of the inspection device to the lowest unit, RSL 20 Ohm.
5. Read and note the measurement reading in Ohm.
6. Measure the grounding conductor resistance at the following points using the cone point on all accessible, conductive parts or test at the following points:

- Housing
- Light covering

- Safety contact of the electrical plug in the work room
- Safety contact of the UV radiator plug in the work room (if present)
- Safety contact of the power supply failure alarm (Alarm 1)
- Safety contact of the Monitor connection (Alarm 2)

Reliable Values for the Grounding Conductor Resistance (in accordance with EN 61010)

The value of the grounding conductor resistance may not exceed <0.3 Ohm.

Troubleshooting

- Leakage detected: Check the cables and terminal clamps of the device-internal power supply and of the safety cabinet.
- Ground resistance not correct: Check the power supply lines at the location of the device.
- Ground faults detected: Check the device grounding and the power supply lines at the location of the safety cabinet.

C. Testing Insulation Resistance

1. Insert the power cable of the inspection device into the electrical plug of the power supply.
2. Connect the power cable of the safety work bench with the inspection socket of the inspection device.
3. Set the measurement range of the inspection device to the highest unit, RISO 20 MOhm.
4. Read and note the measurement reading in MOhm.

Reliable Values for the Insulation Resistance (in accordance with EN 61010)

The value of the grounding conductor resistance may not be below > 2 MOhm.

D. Equivalent leakage current test

The equivalent leakage current test must be performed after insulation testing has been passed.

1. Insert the power cable of the inspection device into the electrical plug of the power supply.
2. Connect the power cable of the safety work bench with the inspection socket of the inspection device.
3. Set the measurement range of the inspection device to the lowest unit IEA 20 mA.

4. The measured electrical leakage must not exceed < 3.5 mA (EN 61010).

NOTE Electrical measurement tools
The safety cabinets of the series HERAsafe 2030i / MAXISAFE 2030i have a two-pole electrical cut-off and symmetrical Y-capacitive circuit on the main board. Therefore a 50 % reduction of the actual measuring equivalent leakage current is allowed.

Summary of the equivalent leakage current:

- Only together with insulation resistance
- Not applicable for multiphase devices
- Limit value 3.5 mA
- For devices with any all-pole, electrically actuated switches and symmetrical capacitive circuit a 50 % reduction of the actual measuring current

NOTE
Correct calculation inside the service test protocols.

NOTE
Electrical safety devices, which are used as working tools, should be tested and periodical according the standards.



Do not touch the instrument's terminal contacts during equivalent leakage current measurements!

Troubleshooting

- Leakage detected: Check the cables and terminal clamps of the device internal power supply and of the safety cabinet.
- Ground resistance not correct: Check the power supply lines at the location of the device.
- Ground faults detected: Check the device grounding and the power supply lines at the location of the safety cabinet.

HEPA Filter Leakage Test

Purpose of the test

This test is conducted to check the HEPA downflow and exhaust filters, the filter housings, and the mounting frames for possible leakage.

Testing equipment

Particle counter with a dilution range (1:100) or Aerosol photometer with linear or extended logarithmic scale and internal measurement capacity of 1cf.

Calibration of the testing equipment

Calibration in accordance with the manufacturer's instructions or in accordance with the requirements of IES-RP-CC-013-86T (Institute of Environmental Sciences, Mt. Prospect, Illinois).

Measuring accuracy of the testing equipment

Application in USA/Canada (NSF 49):

- Aerosol photometer with an upper measuring threshold of 10 µg/l-100 µg/l at a measurement range of no fewer than 5 logarithmic concentration levels.
- The measuring accuracy must ensure that an aerosol concentration of 10 mg/L DEHS or PAO detects exactly 100% of the inflowing particles. The resulting light-scattering intensity is used for a comparison measurement.The adjustment of the device must ensure that the value 100 can be read on the 100% scale.
- The photometer must have a minimum air sample capacity of 0.025 m³/s (0.081 cfm). The sample image must not exceed 2.5 cm (1 in.).

Application in EU (EN 12469)

- Particle counter for individual particles with a dilution range capable of detecting a penetration of 0.01% or less of particles exceeding 0.3 µm or
- Aerosol photometer with an upper measuring threshold of 10 µg/l-100 µg/l at a measurement range of no fewer than 5 logarithmic concentration levels.

Accessories

Aerosol generator / Dilution range.

Test conditions

- The windows and doors of the operating room must be closed (no draft).
- The sample chamber of the safety cabinet must be completely empty.
- The front window has been moved to the maximal opening height.
- The airflow system operates with the specified values for airflow velocity (see “Technical Data” on page 199).

Method with Aerosol photometer (NSF 49)

1. Filters that can be accessed and scanned
   Allow the cabinet to operate for approximately 20 minutes.
2. Remove the work tray and protective covers, as appropriate.
3. Introduce the aerosol from the generator in the center rear of the work area, using a tee fitting to evenly distribute the aerosol.
4. If desired, and if the cabinet has not been used with hazardous materials since an effective decontamination, the upstream concentration can be measured.

If desired, connect the photometer sample hose to the appropriate (supply or exhaust) test hose connection (exhaust test hose - right side / supply test hose - left side) from under the work tray.

5. Using either the appropriate upstream challenge measurement or calculated challenge value, set the photometer accordingly.
6. Scan the downstream side and perimeter of the filter as prescribed in NSF/ANSI 49-2004, Annex F.

Acceptance:

- Filters scanned – 0.01% of upstream concentration at any point

Filters that cannot be accessed or scanned

Method:

1. Set up as in steps 1 through 5 above
2. In the duct, downstream of the filter, sample in accordance with NSF/ANSI Standard 49, 2004.

Acceptance:

- Filters not scanned – 0.005% of upstream concentration

HEPA Filter Leakage Test (NSF49)

Testing the Downflow Filter (NSF49)

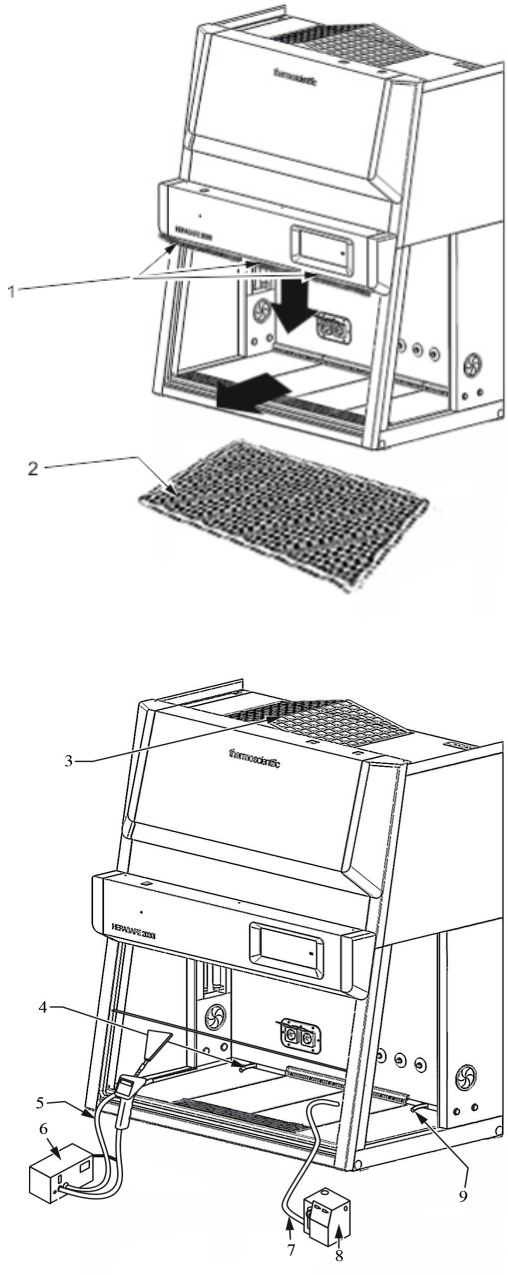


Figure 118 HEPA Filter Leakage Test Downflow Filter

1. Figure 118: Remove the perforated plate [2]: Remove the 3 lock screw at position [1], then tilt the plate forward and remove it from the work chamber.
2. Route the hose [5] of the aerosol generator [6] so that the aerosols are supplied to the downflow upward airflow.
3. First connect the supply testing hose [2] on the left side of the device of the circulation unit with the upstream and the down stream hose on the photometer.

NOTE
Suppressing the alarm monitoring + Exhaust air blower regulation

Select service level S01 or S02 and press ON (when using the keyboard foil).

Exit the service level without saving.

4. Switch the aerosol generator on.
5. First establish the 100% baseline using the aerosol sample as a reference.
6. Turn the selector valve knob to the upstream position. Observe that the % Leakage display immediately begins to show the concentration of the upstream challenge aerosol in % of the 100% baseline.
7. The photometer is comparing the concentration of the upstream challenge now to the concentration of this same source when it was previously used to establish the 100% baseline benchmark in its memory!
8. Measure the apparent air concentration (P_{max}).
   Using the testing equipment [4], measure the aerosol concentration and check to see if the light-scattering intensity corresponds with the comparison measurement:
   - 10 mg /L DEHS or PAO / NSF 49, Annex F
9. Scan the flow-off side of the circulation filter at a distance of 1 inch (2.5 cm) from the filter surface in slightly overlapping measuring tracks (trace). The sampling speed for this should not exceed 5 cm/sec.

NOTE
If a filter's challenge concentration is known, follow the operating instructions of the photometer to establish a correct sensitivity setting. If the challenge concentration has been calculated, set the internal reference for the calculated amount. The photometer will automatically adjust its sensitivity to this quantity as the 100% baseline.

Acceptable values

Application in USA/Canada (NSF 49)

The escaping quantity of aerosols of the aerosol-generated air concentration may not exceed 0.01% of the maximum permissible discharge P_{max} (average integrated measurement of the aerosol-generated air concentration).

Troubleshooting

- Replace downflow filter

HEPA Filter Leakage Test (EN 12469)

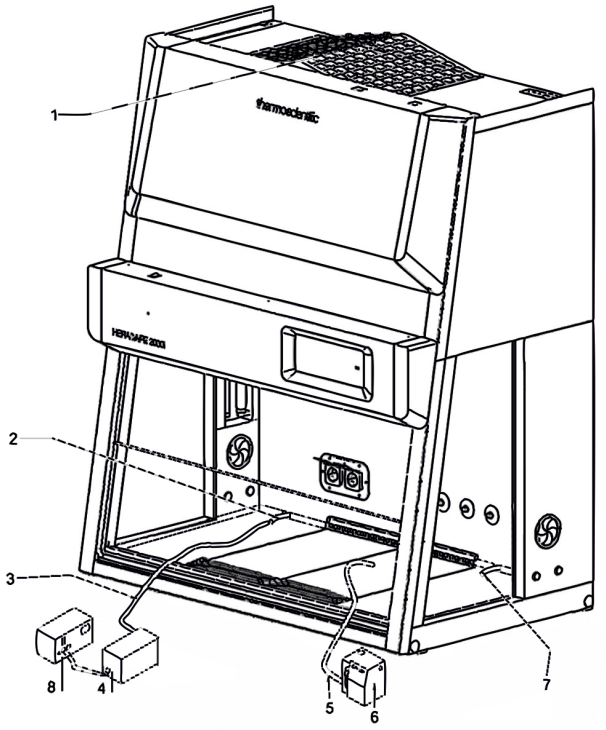


Figure 119 Testing Downflow Filter

Method with particle counter (EN 12469)

NOTE
EN12469 requires only a HEPA filter leakage test of the installed HEPA filter. A classification of the adsorption rate according to EN1822 is not possible. The filter class and the adsorption rate are already tested by the filter producer with each filter documented by means of a filter certificate according to EN1822.

This test serves to demonstrate proper installation of the filter system or to confirm that no leakage has occurred during operation. This test consists of a measurement of the installed filter system, aimed at detecting small leakages and other damage to the filter medium and the frame seal.

1. Allow the cabinet to operate for approximately 20 minutes.
2. Remove the work tray and protective covers, as appropriate.
3. Introduce the aerosol from the generator in the center rear of the work area, using a tee fitting to evenly distribute the aerosol.

Acceptance:

If a discrete particle counter is used, the local penetration of a HEPA H14 filter with 0.005% integral penetration or the local penetration of a HEPA H13 filter with 0.05% integral penetration should be not more than 0.05%.

For additional security Thermo has defined a filter leakage limit lower than that required by the EN12469 standard. The permissible integral penetration has been reduced about of factor 3.

None of the penetration rates shall exceed three times as the specific nominal value of the penetration rate of the filter according to EN12469.

Acceptance values	Penetration	H13 Filter	H14 Filter
Limit value according standard	Integral penetration	0.05%	0.005%
Specific nominal value	Integral penetration	0.0165%	0.00165%
Limit value according standard	Local penetration	0.05%	0.05%

Test requirements:

It is to be guaranteed that the load of the aerosol concentration on the upstream side of the HEPA filter is uniformly.

The installation of the aerosol sources and sampling locations should ensure that the mean value of the aerosol concentration upstream of the filter will not vary by more than +25% over time.

In the case of several filters the determination of the particle concentration must be performed at least twice (before and after measurements) if proof was established that the aerosol distribution was uniform. Therefore an average aerosol concentration has to be measured and calculated.

- Determine traverse scan rate, sample acquisition time and the actual particle counts which characterize a leak.
- Assuming a constant scanning speed of 0.05 m/s and a sampling air volume flow of 28.3 l/min will result. Increasing or reducing the scanning speed requires a commensurate change of the test aerosol concentration. For the leakage test, the airflow velocity should be adjusted to the specified value +30%.
- Scan the filter, moving the probe over it in overlapping strokes. When doing so, the probe shall be held at a distance of no more than 3 cm from the downstream filter surface or the frame. For each filter, the scan should cover the entire clean-air side of the filter medium, the filter frame and the joints. The complete area of the laminator sheet (perforated plate) should be scanned. According to the EN12469 the laminator sheet stays inside during measurement. According to NSF49 the laminator sheet has to be removed.
- While scanning, each indication of at least the same magnitude as the limit for a nominal leak should cause the probe to be halted at the location of the leak. As the location of the leak, record that location where the particle counter indication is maximal.
- The recommended aerosol raw concentration for the Service should be at least 10 millions particles and not more how until now 30 Mio. particles!
- Distributive measurements: In the future the particles have to be determinate and measured only distributive (not more cumulative).

- Reference particle size is always 0.3 µm.
- Determination of the scanning time: A distinction should be made between the different isokinetic probe shapes when calculating the scanning time. The scanning time depends on the size of the probe shapes and filter sizes. In a probe diameter of app. 36 mm following scanning times will be necessary:

Filter size	0.9 m	1.2 m	1.5 m	1.8 m
Scanning rate	5 min	6 min	8 min	9 min

- Filter change
  The filter should only change if the limit value of the local penetration will be exceeded. If a escalate jump of particle climbing is observed during the scan, then the leakage have to be found and individual tested.
- Expression of results
  In the test protocol according to EN12469 the results should be express as the upstream aerosol concentration, downstream aerosol concentration and the ratio of concentrations in percentage.

Testing the Downflow Filter (EN 12469)

1. The perforated plate stays inside the work chamber (Figure 120): Route the hose [5] of the aerosol generator [6] so that the aerosols are supplied to the downflow upward airflow.
2. First connect the supply testing hose [2] on the left side of the device of the circulation unit with the hose [3] of the dilution line [4] and then with the connection hose of the inspection device.

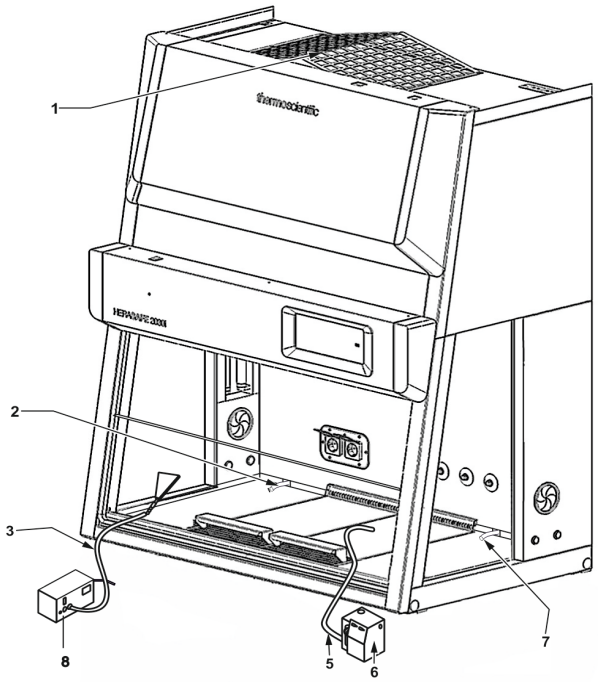


Figure 120 Downflow Filter Test

3. Switch the aerosol generator on.
4. With a dilution line [4] of 1:100 measure the aerosol-concentration (aerosol-generated air-concentration R1) in the circulation chamber for 1 min with the particle counter [8].
5. Figure 120: Then connect the connection hose [3] of the particle counter (without the dilution line) with the measuring probe.
6. Scan the flow-off side of the circulation filter at a distance of 2.5 cm from the filter surface in slightly overlapping measuring tracks (trace). The sampling speed for this should not exceed 5 cm/sec. The diffuser surface should be scanned from the rear wall to the front edge of the diffuser plate.
7. Figure 120: Reconnect the testing hose supply [2] of the circulation chamber with the dilution line hose [3] and then with the connection hose of the particle counter [8] and measure the aerosol-concentration (aerosol-generated air-concentration R2) in the circulation chamber for 1 min. once again.
8. Calculation of the averaged aerosol-generated air concentration R:
   R=(R1+R2)/2
9. Calculation of the max. permissible particle quantity (P_{max}):
   Pmax = Rx Nominal limit value for integral penetration

Nominal limit value for integral penetration of a H-14 filter: 0.0000165.

Acceptable values

Application in EU (EN 12469):

The escaping quantity of aerosols of the aerosol-generated air concentration may not exceed 0.005% of the maximum permissible discharge P_{max} (average integrated measurand of the aerosol-generated air concentration).

If this value is exceeded, the local discharge P loc (Penetration) of the HEPA-filters may not exceed 0.05%.

Troubleshooting

Replace downflow filter.

Testing the Exhaust Filter (NSF49)

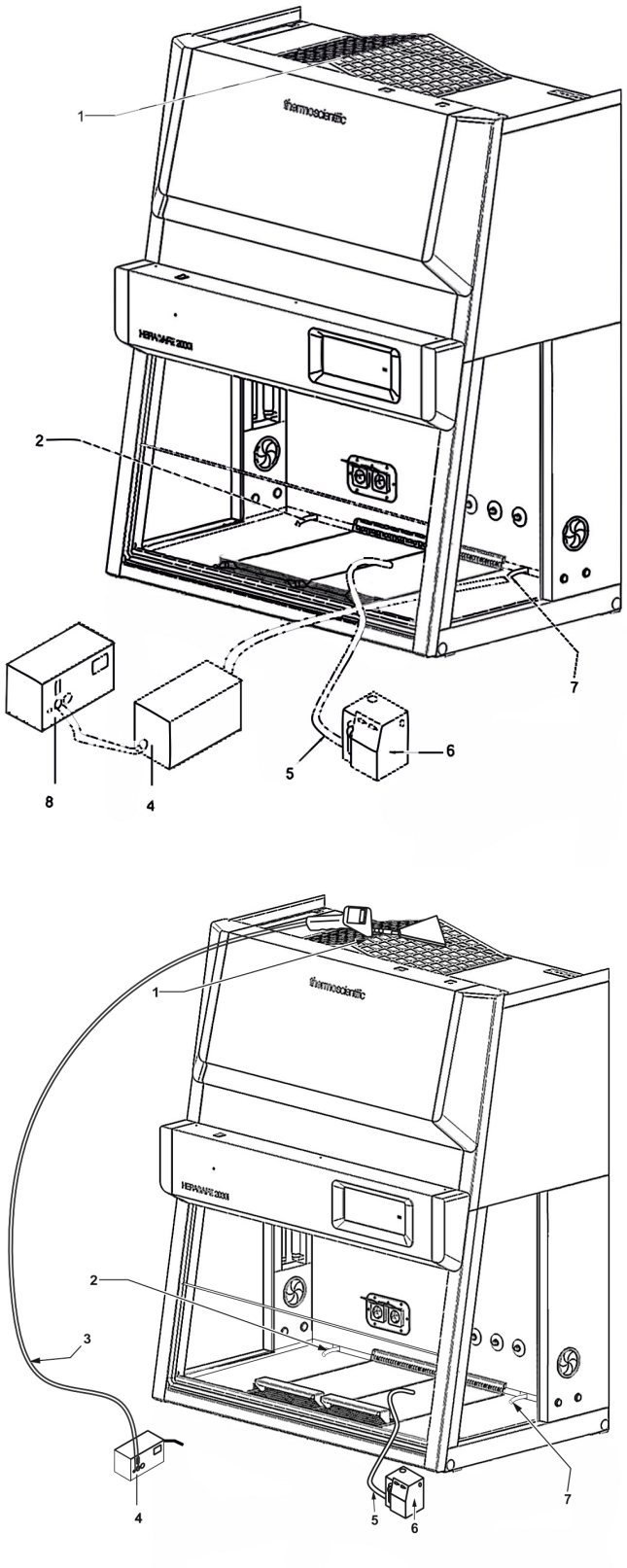


Figure 121 Testing the Exhaust HEPA Filter (NSF49)

Testing the Exhaust Filter (NSF49)

1. Figure 121: Route the hose [5] of the aerosol generator [6] so that the aerosols are supplied to the downflow upward airflow.
2. Connect the Exhaust test hose [7] to the exhaust air chamber on the right side of the device with the hose [3] of the dilution line (only for measurement with particle counter) and then with the connection hose of the inspection device [8].

NOTE
Alarm monitor suppression + Exhaust air blower regulation
Call up Service Level S01 or S02 and press ON (when using the key-film). After the test, leave the Service Level without calling up the storage function.

NOTE
Measurement procedure and acceptance values like see testing circulation filter (down flow filter).

3. Switch the aerosol generator on.
4. First establish the 100% baseline using the aerosol sample as a reference.
5. Turn the selector valve knob to the upstream position. Observe that the % Leakage display immediately begins to show the concentration of the upstream challenge aerosol in % of the 100% baseline.
6. The photometer is comparing the concentration of the upstream challenge now to the concentration of this same source when it was previously used to establish the 100% baseline benchmark in its memory!
7. Measure the apparent air concentration (P_{max}).
8. Using the testing equipment [4] with a dilution range of 1:100 or 1:1000, measure the aerosol concentration and check to see if the light-scattering intensity corresponds with the comparison measurement:
   - 10 mg/L DEHS or PAO / NSF 49, Annex F
9. Scan the flow-off side of the exhaust air filter at a distance of 1 inch (2.5 cm) from the filter surface in slightly overlapping measuring tracks (trace). The sampling speed for this should not exceed 5 cm/sec. The diffuser surface should be vacuumed from the rear wall to the front edge of the diffuser plate.

NOTE
If a filter's challenge concentration is known, follow the operating instructions of the photometer to establish a correct sensitivity setting. If the challenge concentration has been calculated, set the internal reference for the calculated amount. The photometer will automatically adjust its sensitivity to this quantity as the 100% baseline.

Acceptable values

Application in USA/Canada (NSF49)

- The escaping quantity of aerosols of the aerosol-generated air concentration may not exceed 0.01% of the maximal permissible discharge P_{max} (average integrated measurement of the aerosol-generated air concentration).

Troubleshooting

- Replace exhaust filter

Testing the Exhaust Filter (EN12469)

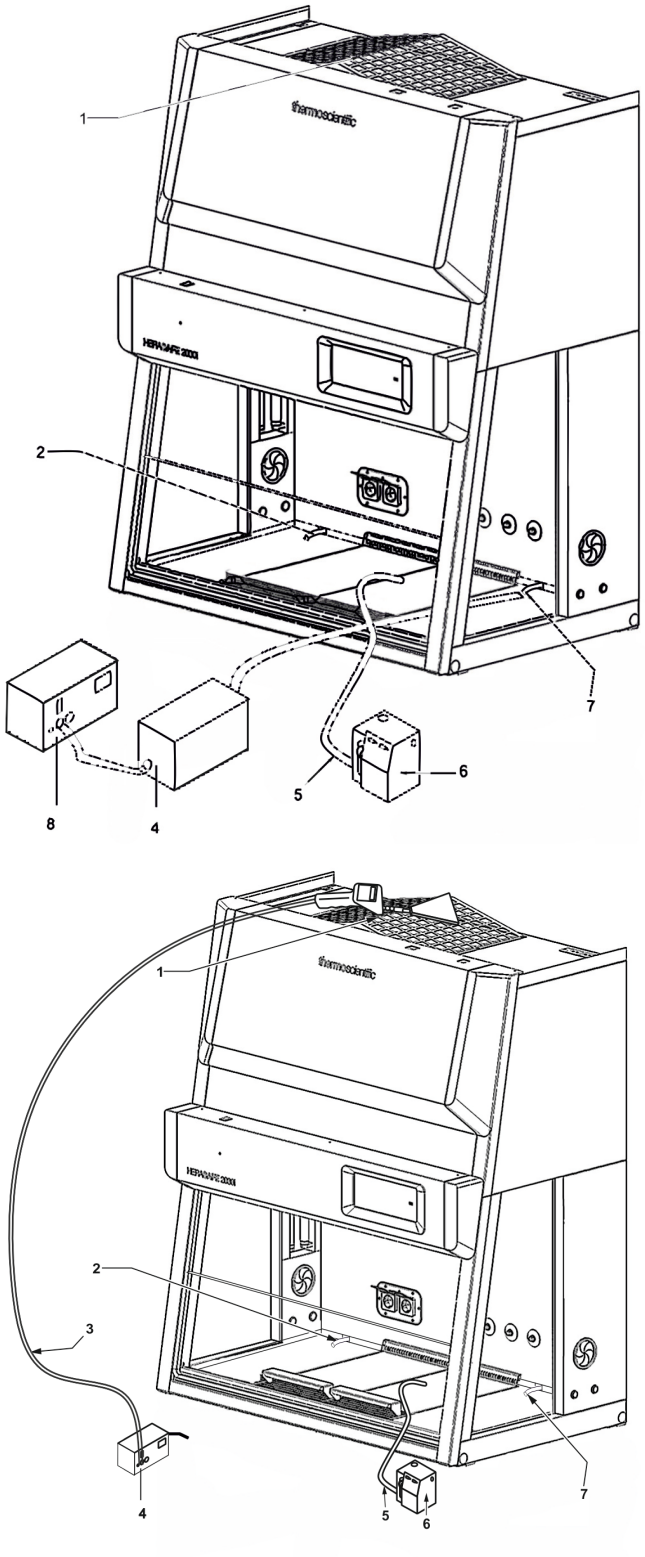


Figure 122 Testing Exhaust Filter

1. The perforated plate stays inside the work chamber (Figure 121). Route the hose [5] of the aerosol generator [6] so that the aerosols are supplied to the downflow upward airflow.
2. First connect the supply testing hose [2] on the left side of the device of the circulation unit with the hose [3] of the dilution line [4] and then with the connection hose of the inspection device.
3. Switch the aerosol generator on.
4. With a dilution line [4] of 1:100 measure the aerosol-concentration (aerosol-generated air-concentration R1) in the circulation chamber for 1 min. with the particle counter [8].
5. Figure 121: Then connect the connection hose [3] of the particle counter (without the dilution line) with the measuring probe.
6. Scan the flow-off side of the circulation filter at a distance of 2.5 cm from the filter surface in slightly overlapping measuring tracks (trace). The sampling speed for this should not exceed 5 cm/sec. The diffuser surface should be scanned from the rear wall to the front edge of the diffuser plate.
7. Figure 120: Reconnect the testing hose supply [2] of the circulation chamber with the dilution line hose [3] and then with the connection hose of the particle counter [8] and measure the aerosol- concentration (aerosol-generated air-concentration R2) in the circulation chamber for 1 min once again.
8. Calculation of the averaged aerosol-generated air concentration R:
   R=(R1+R2)/2
9. Calculation of the max. permissible particle quantity (P_{max}):
   P_{max} = Rx Nominal limit value for integral penetration
   Nominal limit value for integral penetration of a H-14 filter: 0.0000165.

Acceptable values

Application in EU (EN 12469):

The escaping quantity of aerosols of the aerosol-generated air concentration may not exceed 0.005% of the maximum permissible discharge P_{max} (average integrated measurement of the aerosol-generated air concentration).

If this value is exceeded, the local discharge P loc (Penetration) of the HEPA-filters may not exceed 0.05%.

Troubleshooting

- Replace exhaust air filter.

Inflow Velocity Tests

Inflow Velocity Test (EN 12469)

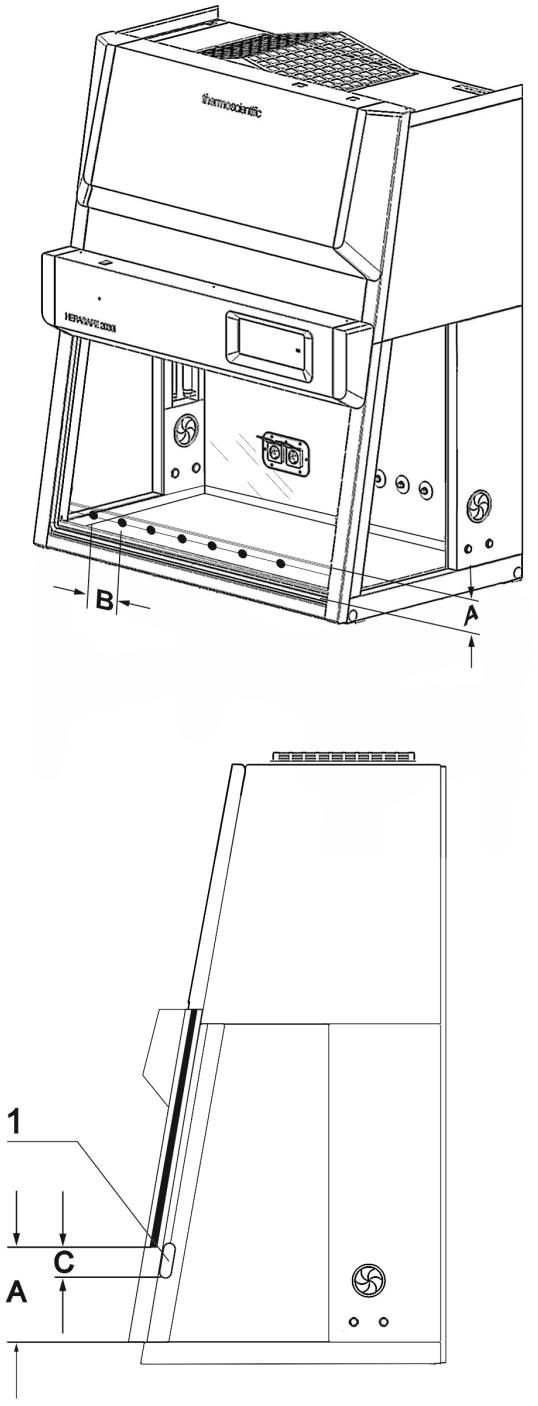


Figure 123 Measuring Grid Inflow Velocity Test

Purpose of the test

This test is conducted to determine the nominal value of the inflow velocity. The average airspeeds of air entry and the measuring points with the lowest or highest inflow velocity must be ascertained with an anemometer.

Value to be determined

Inflow velocity, V1.

Direct Measurement of the Inflow Velocity in the Work Aperture (EN12469)

Figure 123: The inflow velocity is measured at several measuring points in the work aperture. For this purpose:
for 4 ft. cabinet:

- Lower the sash to an access opening of 3"
- Attach the hotwire anemometer to the inside of the sash with the sensor in the middle of the restricted opening (1.5" in height)
- Take 8 readings at a distance of 5.2" from the sides and apart from each other.

for 6 ft. cabinet:

- Lower the sash to an access opening of 3"
- Attach the hotwire anemometer to the inside of the sash with the sensor in the middle of the restricted opening (1.5" in height)
- Take 12 readings in a distance of 5.4" from the sides and apart from each other

Testing equipment

Anemometer, freestanding fixture or equivalent, or laboratory stand with clamp free adjustable angle or tape.

Calibration of the testing equipment

The anemometer must be calibrated in accordance with the manufacturer's instructions or in wind tunnel tests.

Test measurement

1. Install the testing equipment.
2. **Move the front window to the measurement position and operate the air system blower for approx 20 minutes.**
3. **Perform the measurements. Conduct measurement per measuring point for a duration of at least 1 min. and note the average values.**
4. **Evaluate the individual measurements.**

Calculating the average value for inflow velocity V1.

Average = Sum of measurement readings/number of measuring points x M

M: Multiplication factor:

M = Front window in reduced position / Front window in working position:

200 mm: 65 mm/200 mm = 0.325

250 mm: 80 mm/250 mm = 0,320

Acceptable values

Application in EU (EN 12469):

- The nominal value is 0.45 m/s.
- The average value of the inflow velocity (V1) must be within ±0.01 m/s of the nominal value.

Troubleshooting

- Adjust the exhaust blower speed by changing the inflow speed.
- Check the exhaust blower control voltage at master board. The control voltage in the value range of 0-10 V changes with the settings in S02. The control voltage of the exhaust blower must be coordinated with the settings in the field certifier screen.
- Replace the exhaust filter.
- Check the installed exhaust system for correct function. If installed, change the size of the draft interrupter or check the exhaust plenum (air door) for correct function.

Indirect Measurement of the Exhaust Airspeed

Indirect Measuring Method for the Measurement of the Exhaust Airspeed and Mathematical Ascertainment of the Air Entry Speed (EN 12469 / DIN 12980)

The average value of the directly measured exhaust airspeed (V2) and the ratio of the exhaust surface to the entry surface provides the mathematical calculation of the average air entry speed (V1).

Default values

Default values are the discharge surface of the exhaust filter A1 and the actual device-specific air inflow surface A2, (work aperture surface).:

Herasafe 2030i 0.9	Exhaust filter discharge surface	A1 = 0.181 m²
	Actual air inflow surface	A2 = 0.178 m²
Herasafe 2030i 1.2	Exhaust filter discharge surface	A1 = 0.249 m²
	Actual air inflow surface	A2 = 0.238 m²
Herasafe 2030i 1.5	Exhaust filter discharge surface	A1 = 0.249 m²
	Actual air inflow surface	A2 = 0.298 m²
Herasafe 2030i 1.8	Exhaust filter discharge surface	A1 = 0.376 m²
	Actual air inflow surface	A2 = 0.358 m²

Values to be measured

Direct exhaust velocity measured at nine measuring points.

Values to be calculated

Average value for exhaust velocity V2

Exhaust airflow volume R1

Average value for inflow velocity V1

Test grid above the exhaust aperture

Figure 124: The direct exhaust velocity (V3) is measured using an anemometer at distance H of 10 cm above the exhaust aperture.

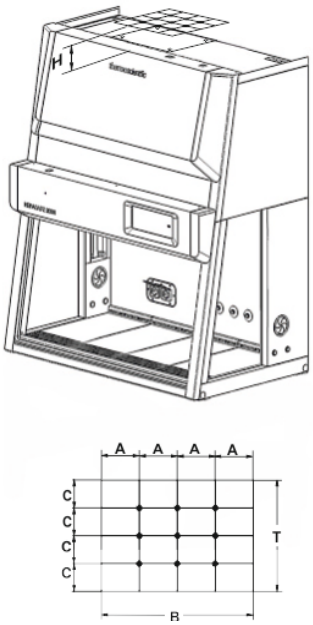


Figure 124 Test Grid above the Exhaust Aperture

The dimensions of the exhaust aperture are:

Herasafe 2030i	0.9	42.5 x 42,5 cm
Herasafe 2030i	1.2/1.5	42.5 x 58.5 cm
Herasafe 2030i	1.8	42.5 x 88.5 cm

Along the width, the measuring points are located at an even distance of A to each other and to the lateral edges of the exhaust aperture.

Herasafe 2030i	0.9	10.6 cm
Herasafe 2030i	1.2/1.5	14.6 cm
Herasafe 2030i	1.8	22.1 cm

The measuring points along the depth are located at an even distance of C = 10.7 cm to each other and to the lateral edges of the exhaust aperture.

Test measurement

1. Install the testing equipment to the test grid.
2. Move the front window to the measuring position and operate the air system blowers for approx 20 minutes.
3. Perform measurement at all nine measuring points above the exhaust aperture for a minimum of one minute for each measuring point.
4. Evaluate the individual measurements.

Calculating the average value for the exhaust velocity V2

Average value (V2) = Sum measured readings/number measured points)

Calculating the average value for the inflow velocity V1 (m/s)

V1 x A1 = V2 x A2

Acceptable values

Application in EU (EN 12469 / DIN 12980):

- The nominal value is 0.45 m/s.
- The average value for the inflow velocity (V1) must be within +/- 0.01 m/s of the nominal value.

Troubleshooting

- Adjust the exhaust blower speed by changing value S02.
- Check the exhaust blower control voltage at master board. The control voltage in the value range of 0-10 V changes with the settings in field certifier screen. The control voltage of the exhaust blower must be coordinated with the settings in S02.
- Replace the exhaust filter.
- Check the installed exhaust system for correct function. If installed, change the size of the draft interrupter or check the exhaust plenum (air door) for correct function.

Exhaust airflow volume test

To calculate the exhaust airflow volume, multiply the average value for the exhaust velocity (V2) with the actual discharge area of the exhaust filter (A2).

Calculating the exhaust airflow volume R1 (m3/h)

R1 = V2 x A2

Acceptable values

Application in USA/Canada (NSF 49):

Herasafe 2030i	1.2	340 ft3/min
Herasafe 2030i	1.8	500 ft3/min

Application in EU (EN 12469 / DIN 12980):

Herasafe 2030i	0.9	370 m3/h
Herasafe 2030i	1.2	500 m3/h
Herasafe 2030i	1.5	620 m3/h
Herasafe 2030i	1.8	740 m3/h

Troubleshooting

Adjust the exhaust blower speed by changing value S02.

NOTE Alarm limit settings
If the values in S01 and/or S02 are changed, the alarm limits in S03 and S05 must be set accordingly.

Test methods (NSF 49)

Application in USA/Canada (NSF 49):

- The inflow velocity (V1) is measured directly at the work aperture.
- The inflow air volume (V2) is measured at a flow hood in the work aperture (DIM or short-ridge method).
- Calculating the inflow velocity over exhaust flow.

Inflow Velocity – DIM Method (primary)

Figure 125: The inflow air volume is measured in the work aperture.

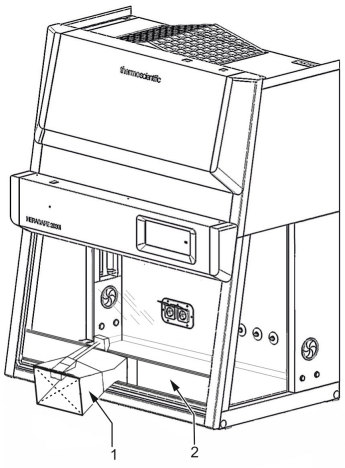


Figure 125 Inflow velocity - DIM Method (primary)

The flow hood [1] is installed in the work aperture [2], and the testing equipment is installed immediately at the flow hood discharge opening.

Testing equipment

Short-ridge ADM-870, or equivalent

Flow hood Series 8400, or equivalent

Calibration of the testing equipment

The equipment must be calibrated in accordance with the manufacturer's instructions or in wind tunnel tests.

Default value

The default value is the actual device-specific inflow area A2 (10" access opening).

Herasafe 2030i version:

0.9	Actual inflow area A2=	0.229 m² (2.465 sq ft)
1.2	Actual inflow area A2=	0.305 m² (3.285 sq ft)
1.5	Actual inflow area A2=	0.381 m² (4.101 sq ft)
1.8	Actual inflow area A2=	0.457 m² (4.919 sq ft)

Test measurement

1. Move the front window to the working position (Herasafe 2030i: 254 mm/10 in).
2. **Attach the flow hood [1] in the work aperture [2] and seal the remaining opening surfaces.**
3. **Operate the system blowers for approx 20 min.**
4. **Record at least 5 measurements for a minimum of 1 min.**
5. **Average those readings and calculate the inflow velocity (V1) as described below.**

Calculating the inflow velocity V1

$$\text{Average} = \frac{\text{Sum of measured values}}{\text{Number of measuring points}}$$

Acceptable values

Application in USA/Canada (NSF 49, Annex F):

- The nominal value is: Herasafe 2030i: 0.53 m/s (105 fpm).
- The inflow velocity must be within ± 0.025 m/s (5 ft/min) of the nominal value.

Troubleshooting

- Adjust the exhaust blower speed by changing value S02.
- Check the exhaust blower control voltage at master board.

- The control voltage in the value range of 0-10 V changes with the settings in S02. The control voltage of the exhaust blower must be coordinated with the settings in S02.
- Replace the downflow filter and/or exhaust filter.
- Check the installed exhaust system for correct function. If installed, change the size of the draft interrupter or check the exhaust plenum (air door) for correct function.

Inflow Velocity – Constricted Window Method (Secondary)

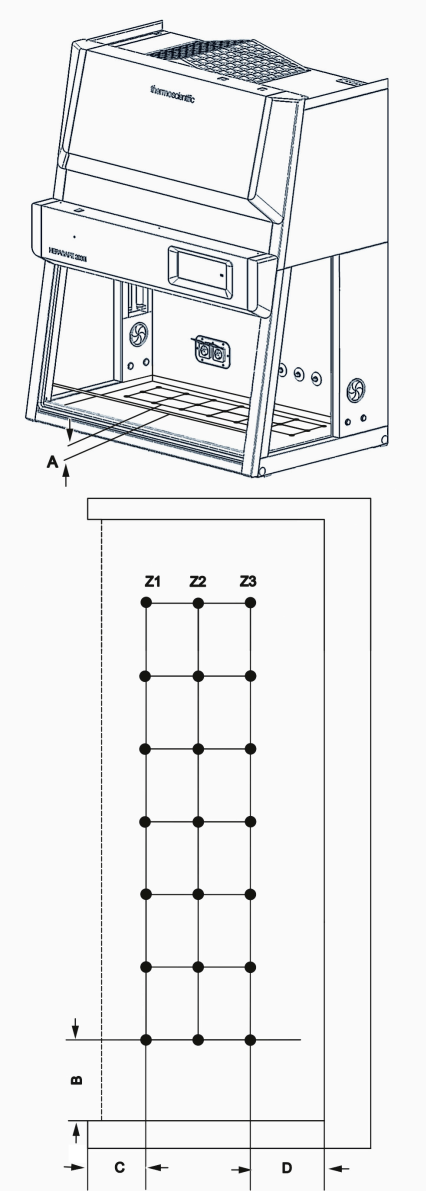


Figure 126 Inflow Velocity Test Arrangement

The inflow velocity is measured at several measuring points in the work aperture. For this purpose, the front window is moved up to height $A = 7.6$ cm (3 in.). The anemometer is installed directly to the inside of the work aperture front window.

The measuring points are located at distance C of 3.8 cm (1.5 in.) immediately at the inside of the front window lower edge and at distance B of 10 cm (3.9 in.) to each other. The lateral distance to the work aperture edges is also 10 cm (3.9 in.).

Testing equipment

Thermal Anemometer, or equivalent (hotwire)

- Anemometer Probe Holder, part number 1911325

Calibration of the testing equipment

The anemometer must be calibrated in accordance with the manufacturer's instructions or in wind tunnel tests.

Accuracy of the testing equipment

Accuracy of ± 0.01 m/s (± 2 ft/min) or a maximal deviation of 3% from the indicated airflow velocity.

Method:

1. Lower the front window to a height of 3 in. (7.6 cm).
2. Operate the system blowers for approximately 20 minutes.
3. Insert the thermal anemometer probe into the probe holder. Place the probe holder at the window opening work surface, ensuring it is seated properly. Adjust the probe so the air passing through probe is centered in the window opening (1.5 in. [3.8 cm]).
4. Beginning 5.9 inches in from the left inside wall, record successive readings every 5.9 inches (5 readings for 3 foot models, 7 readings for 4 foot models, 9 readings for 5 foot models and 11 readings for 6 foot models).
5. Average those readings and calculate the inflow velocity (V1) as described below.

Calculating the average value for inflow velocity V1

Average	(Sum of the measurement readings/number of measuring points) x M x C
M	Multiplication factor
8“ working position	M= 2.6 /8.0 = 0.325
10“ working position	M= 3.0/10.0 = 0.300
C	Correction factor: listed on the device nameplate.

Acceptable values

Application in USA/Canada (NSF 49):

- The nominal value is: Herasafe 2030i 0.53 m/s (105 fpm).
- The average value must be within ±0.025 m/s (5 ft/min) of the nominal value.

NOTE
The thermo anemometer probe must be positioned at a 10° angle from front vertical and located on the same plane as the inside of the window glass. Multiply the K factor by the average velocity reading (V1).
3 foot units:

3" access opening of 0.736 sq ft
10" access opening 2.465 sq ft

4 foot units:

3" access opening of 0.982 sq ft
10" access opening 3.285 sq ft

5 foot units:

3" access opening of 1.227 sq ft
10" access opening 4.101 sq ft

6 foot units:

3" access opening of 1.475 sq ft
10" access opening 4.919 sq ft
Refer to the data plate on the lower right corner of the unit face.

Troubleshooting

- Adjust the exhaust blower speed by changing value S02.
- Check the exhaust blower control voltage at master board.

The control voltage in the value range of 0-10 V changes with the settings in S02. The control voltage of the exhaust blower must be coordinated with the settings in S02.

- Replace the exhaust filter.

Check the installed exhaust system for correct function. If installed, change the size of the draft interrupter or check the exhaust plenum (air door) for correct function.

Calculating the Inflow Velocity over Exhaust Flow (NSF49)

The average inflow velocity (V1) is calculated using the average value (V2) of the directly measured exhaust velocity and the proportion of discharge surface and inflow surface.

Default values

Default values are the discharge surface of the downflow filter A1 and the actual device-specific air inflow surface A2 (work aperture surface).

Herasafe 2030i:

0.9	Exhaust filter discharge area A1	0.18 m² (1.938 sq ft)
	Actual inflow area A2	0.229 m² (2.465 sq ft)
1.2	Exhaust filter discharge area A1	0.246 m² (2.648 sq ft)
	Actual inflow area A2	0.305 m² (3.285 sq ft)
1.5	Exhaust filter discharge area A1	0.246 m² (2.648 sq ft)
	Actual inflow area A2	0.381 m² (4.101 sq ft)
1.8	Exhaust filter discharge area A1	0.375 m² (4.036 sq ft)
	Actual inflow area A2	0.457 m² (4.919 sq ft)

Values to be measured

Direct exhaust velocity measured at nine measuring points.

Values to be calculated

Average value for exhaust velocity V2

Exhaust airflow volume R1

Average value for inflow velocity V1

Test grid above the exhaust aperture

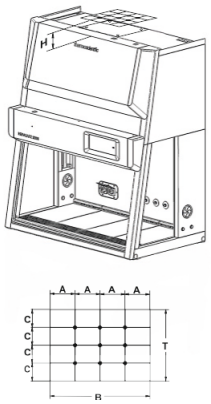


Figure 127 Test Grid above the Exhaust Aperture

Figure 127: The direct exhaust velocity (V3) is measured using an anemometer at distance H of 10 cm (4 in) above the exhaust aperture. The B x T of the exhaust aperture are:

Herasafe 2030i	0.9	42.5 x 42.5 cm (16.7 x 16.7 in = 1.95 sq ft)
Herasafe 2030i	1.2/1.5	57.8 x 42.5 cm (22.8 x 16.7 in = 2.64 sq ft)
Herasafe 2030i	1.8	88.3 x 42.5 cm (34.8 x 16.7 in = 4.04 sq ft)

Along the width, the measuring points are located at an even distance of A to each other and to the lateral edges of the exhaust aperture.

Herasafe 2030i	0.9	10.5 cm (4.1 in)
Herasafe 2030i	1.2/1.5	14.5 cm (5.7 in)
Herasafe 2030i	1.8	22.5 cm (8.9 in)

The measuring points along the depth are located at an even distance of C = 10 cm (4 in) to each other and to the lateral edges of the exhaust aperture.

Test measurement

1. Install the testing equipment to the test grid.
2. **Move the front window to the measuring position and operate the air system blowers for approx 20 minutes.**
3. **Perform measurement at all nine measuring points above the exhaust aperture for a minimum of one minute for each measuring point.**
4. **Evaluate the individual measurements.**

Calculating the average value for the exhaust velocity V2

$$\text{Average} = \frac{\text{Sum of measured values}}{\text{Number of measuring points}}$$

Calculating the average value for the inflow velocity V1 (m/s)

$V1 \times A1 = V2 \times A2$

Acceptable values

Application in USA/Canada (NSF 49)

- The nominal value for Herasafe 2030i is 0.53 m/s (105 ft/min).
- The average value must be within ± 0.025 m/s (5 ft/min) of the nominal value.

Troubleshooting

- Raise the exhaust blower speed by changing value S02.
- Check the exhaust blower control voltage at master board. The control voltage in the value range of 0-10 V changes with the settings in S02. The control voltage of the exhaust blower must be coordinated with the settings in S02.
- Replace the exhaust filter.
- Check the installed exhaust system for correct function. If installed, change the size of the draft interrupter or check the exhaust plenum (air door) for correct function.

Exhaust Airflow Volume Test

To calculate the exhaust airflow volume (R1), multiply the average value for the exhaust velocity (V2) with the actual discharge area of the exhaust filter (A2).

Calculating the exhaust airflow volume R1 (m³/h)

R1 = V2 x A2

Acceptable values

- Application in the USA/Canada for Herasafe 2030i models (NSF49):

		m³/h / cfm
Herasafe 2030i	0.9	434 / 255
Herasafe 2030i	1.2	580 / 342
Herasafe 2030i	1.5	727 / 428
Herasafe 2030i	1.8	873 / 514

Troubleshooting

- Adjust the exhaust blower speed by changing value S02.
- Check the exhaust blower control voltage at master board. The control voltage in the value range of 0-10 V changes with the settings in S02. The control voltage of the exhaust blower must be coordinated with the settings in S02.

Downflow Velocity Tests

Purpose of the test

This test is conducted to check the nominal value of the downflow velocity (displacement airflow) in the work area of the safety cabinet.

Testing equipment

- Thermal Anemometer, or equivalent (hotwire)
- Freestanding Fixture, or equivalent

Calibration of the testing equipment

Thermistor anemometer calibrated in accordance with the manufacturer specifications or in wind tunnel tests.

Accuracy of the testing equipment

Accuracy of ± 0.01 m/s (± 1.98 ft/min) or a maximal deviation of 3% from the indicated airflow velocity.

Test conditions

The sample chamber of the safety cabinet must be completely empty, windows and doors of the operating room must be closed (no draft).

The thermo-anemometer measuring head must be secured tightly at the measuring point to allow accurate measurements. The distances between the measuring points must be correct, the grid must not be distorted.

Uniform Cabinet Test According EN12469

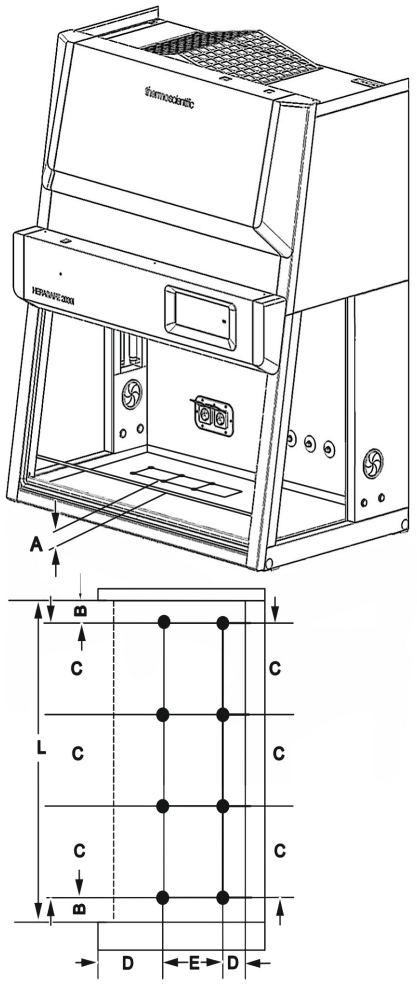


Figure 128 Downflow Velocity Test Arrangement according EN14469

Figure 128: The device is operated with a uniform displacement airflow. Therefore, the measured values at the individual measuring points must be within 20% of the average value. The test area above the work surface consists of a rectangular grid that encloses a minimum of 2 measuring rows with 4 measuring points per row:

A = Test area position. The front window is moved to the safe working position. The test area is positioned horizontally at distance A above the front window lower edge.

EN 12469: A = 10 cm Herasafe 2030i)

L: Sample chamber width, depending on version:

Herasafe 2030i	0.9 = 90 cm
Herasafe 2030i	1.2 = 120 cm
Herasafe 2030i	1.5 = 150 cm
Herasafe 2030i	1.8 = 180 cm

The values of distances B and C are calculated from the individual sample chamber width.

B = 1/8 x L: Distance between test area and sample chamber sidewalls.

C = 2/8 x L: Distance between test area and front window.

D = 15.75 cm: Distance between test area and work aperture / device rear panel.

E = 31.50 cm: Distance between grid rows.

Test measurement:

1. Switch the device on.
2. Move the front window to the working position. The lead time for the first measurement is 20 min.
3. Install the measuring head to the first measuring point.
4. Perform the measurement at each measuring point for a minimum time of one minute and record the values.
5. Calculate the average value for the downflow velocity.

Calculating the average value:

$$\text{Average} = \frac{\text{Sum of measured values}}{\text{Number of measuring points}}$$

Acceptable values

Application in EU (EN 12469):

- The average value must be within 0.01 m/s of the nominal value (see “Technical Data” on page 199).
- The nominal value for Herasafe 2030i: 0.32 m/s.
- The measured values of the individual measuring points must be within 20% of the average downflow velocity.

Troubleshooting:

- Set the downflow blower speed by changing value S01. The control voltage in the value range of 0-10 V changes with the settings in S01. The control voltage of the downflow blower must be coordinated with the settings in S01.

NOTE Alarm limit settings
If the values in S01 and/or S02 are changed, the alarm limits in S03 and S05 must be set accordingly.

- Check the downflow blower voltage at the main PCB.
- Replace the downflow filter.

Uniform Cabinet Test According NSF 49

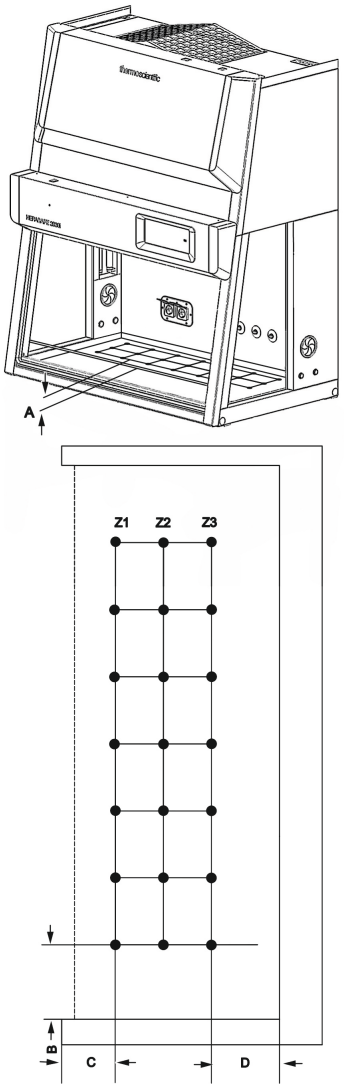


Figure 129 Downflow Velocity Test Arrangement according NSF49, Annex A

Figure 129: The test area above the work surface consists of a rectangular grid that encloses a minimum of 3 measuring rows (zones Z1 - Z3) with 7 measuring points per row. The grid shall be rectangular with spacings as close but not greater than 15 x 15 cm (6 x 6 in.):

A = 10 cm (4 in): The front window is moved to the safe working position. The test area is positioned horizontally at distance A above the front window lower edge.

B = 15 cm (6 in.): Lateral distance between test area and sample chamber sidewalls.

C = 15 cm (6 in.): Distance between test area and front window.

D = 15 cm (6 in.): Distance between test area and device rear panel.

Test measurement

1. Switch the device on.
2. **Operate the unit in the work position for approximately 20 minutes.**
3. **Insert the anemometer probe into the probe stand, adjusting for a height of 4 inches (10 cm) above the bottom edge of the window opening while in the work position.**
4. **Record the readings on a horizontal plane 4 inches (10 cm) above the bottom edge of the window opening while in the work position, in a grid pattern not to exceed 6 inches (15 cm) x 6 inches (15 cm).**
5. **Calculate the average value for the downflow velocity.**

Calculating the average value for the downflow velocity:

$$\text{Average} = \frac{\text{Sum of measured values}}{\text{Number of measuring points}}$$

- Average downflow velocity = Sum of all measurements / Number of readings

Correction measures:

- Enter the service level and activate S1, change S1 until the desired velocity is reached and save the new value.
- If the velocity can't be adjusted due to clogging of the filters, change the supply filter.
- If the filter is in order, change the supply blower.

Acceptable values

Application in USA/Canada (NSF 49)

> NOTE Nominal values
> The nominal values for the individual device types are listed on the nameplate.

The unit is examined as a uniform safety cabinet:

The average value must be within ±0.025 m/s (5 ft/min) of the nominal value. The measured values of each individual measuring point must not deviate more than 25% or 16 ft/min (0.081 m/s) from the average downflow velocity.

The unit is examined as a non-uniform (zoned) safety cabinet:

The average value must be within ±0.025 m/s (5 ft/min) of the nominal value. The measured values of the individual measuring rows (zones) must not deviate more than 25% or 16 ft/min (0.081 m/s) from the average downflow velocity of each zone.

Troubleshooting:

- Set the downflow blower speed by changing value S01. The control voltage in the value range of 0-10 V changes with the settings in S01. The control voltage of the downflow blower must be coordinated with the settings in S01.

NOTE Alarm limit setting
If the values in S01 and/or S02 are changed, the alarm limits in S03 and S05 must be set accordingly.

- Check the downflow blower voltage at the main PCB.
- Replace the downflow filter.

Airflow Pattern Test

Purpose of the test

This test is conducted to check the behavior of the airflows in the sample chamber. Check to see if the displacement airflow passes along the entire work area, if the vertical passage is correct, and if air escapes through joints or seals of the housing and of the front window.

Testing equipment

Smoke tubes.

NOTE Airflow set points
The individual test sections for airflow patterns can only be performed when the inflow and the downflow velocities are at set point.

Downflow Direction Test

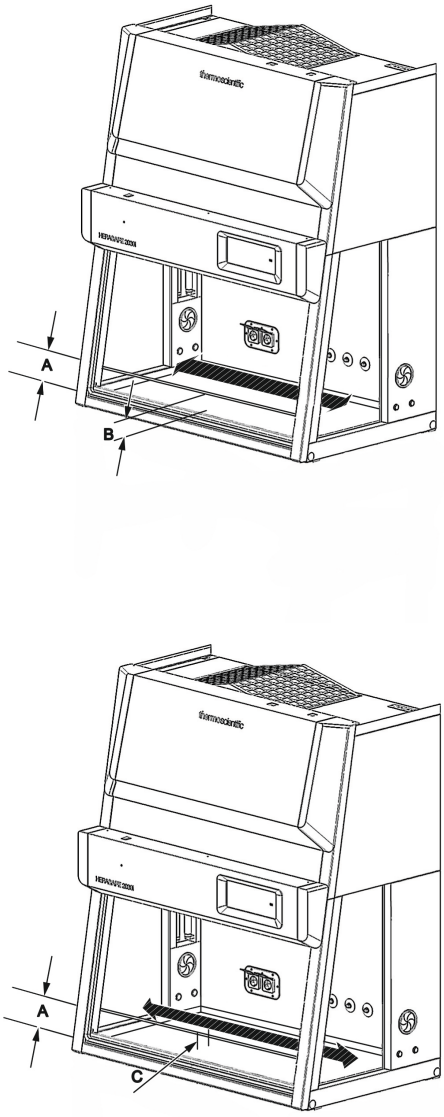


Figure 130 Airflow Pattern I

1. Figure 130: Move the front window to the safe working position A
2. **Using a smoke tube, scan the work area along its centerline from one end to the other. Pass smoke across the centerline of the work surface, 4 inches (10 cm) above the work opening.**

Acceptable airflow behavior

Application in EU (EN12469) and in USA/Canada (NSF 49)

- The smoke does not move upwards but is removed downward.
- No smoke escapes through the work aperture.

Impermeability Test for the Front Window

1. Figure 130: Move the front window to the safe working position A.
2. **Using a smoke tube, scan the work area at distance C of approx 2.5 cm (1 in.) to the front window from one end to the other. Hold the smoke tube so that its tip is approx 15 cm(6 in.) above the work aperture.**

Acceptable airflow behavior

Application in EU (EN12469) and in USA/Canada (NSF 49)

- The smoke shows smooth downward flow with no dead spots or reflux.
- No smoke escapes through the work aperture.

Work Opening Edge Retention

1. Figure 131: Move the front window to the safe working position A.
2. **Pass smoke around the entire outside work opening, approximately 1.5 inches (3.8 cm) away from the cabinet.**

Acceptable airflow behavior

Application in EU (EN 12469) and in USA/Canada (NSF 49)

- There is no smoke formation above the work surface, nor is smoke drawn to the work surface.

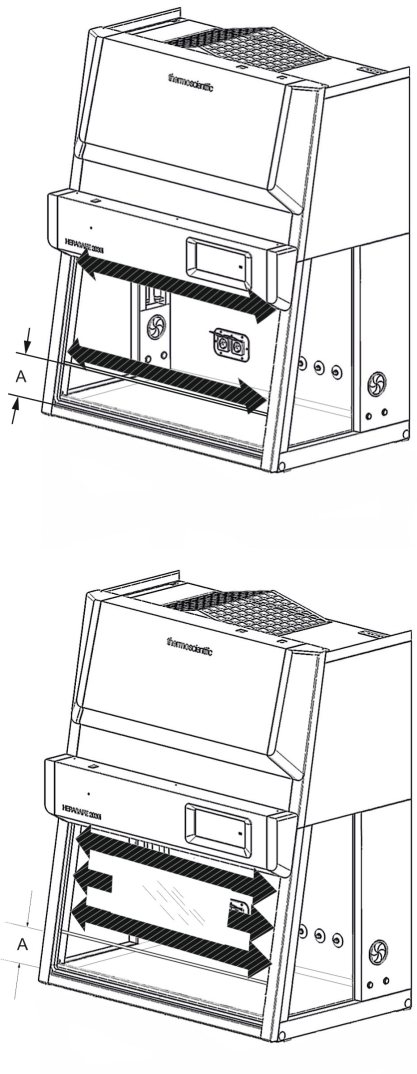


Figure 131 Airflow Pattern II

Window Seal Test:

1. Figure 131: Move the front window to the safe working position A.
2. **Pass smoke up both sides and across the top of the window opening from inside the work area, approximately 2 inches (5 cm) from the edges.**

Acceptable airflow behavior

Application in USA/Canada (NSF 49)

- Smoke does not escape from the safety cabinet.
- There is no upward vortexting.

Troubleshooting

- If vortexing or dead points occur, check the inflow and downflow set points.

UV Intensity Test

Purpose of the test

The power of the UV lamps will be considerably reduced after 1500 operating hours so that an effective UV disinfection is no longer ensured. Conduct this test only at the customer's request.

Test procedure

1. Read the UV operating time value from service level S9.
2. If the value is just below or over 1500 h, replace all UV lamps.
3. After the UV lamps have been replaced, reset the UV operating time value at service level S9 to zero.

Noise Level Test

Purpose of the test (only for application in USA/Canada in accordance with NSF 49)

This test determines the noise level produced by an operating safety cabinet as an aid in minimizing cabinet operator’s fatigue. Conduct this test only at the customer's request.

Only informative for application in EU (EN 12469):

Required for type testing only at manufacturer's side in special noise reduced test room.

Testing equipment

Noise level meter with a range of 50-100 db and an “A” weighing scale.

Calibrator for the noise level meter.

Calibration of the testing equipment

The testing equipment must be calibrated in accordance with the manufacturer’s instructions.

Test Point

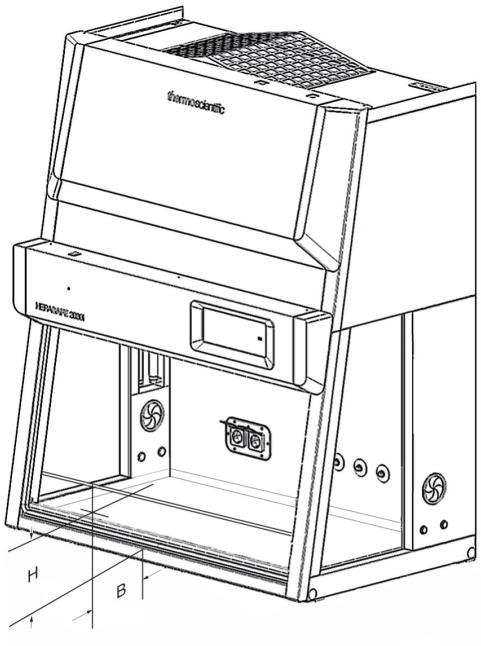


Figure 132 Noise Level Test

Application in EU (EN 12469)

Figure 132: Place the microphone outside the safety cabinet at distance B of 100 cm (39 in.) to the work aperture above the work surface at the center of the work aperture.

Application in USA/Canada (NSF 49)

Figure 132: Place the microphone outside the safety cabinet at distance B of 30 cm (12 in.) to the work aperture and at a height H of 38 cm (15 in.) above the work surface at the center of the work aperture.

Test conditions

Normal conditions at the location of the safety cabinet.

Test measurement

1. With the cabinet switched off, perform the measurement and record the value.
2. Switch on the cabinet and the cabinet lighting, determine the noise level, and record the value.

Acceptable values

Application in EU (EN 12469):

- The ambient noise level must not exceed 55 dB (A). With the cabinet operating, the noise level must not exceed 65 dB (A).

Application in USA/Canada (NSF 49):

- The ambient noise level must not exceed 57 dB (A). With the cabinet operating, the noise level must not exceed 67 dB (A).

Lighting Intensity Test

Purpose of the test (only for application in USA/Canada in accordance with NSF 49)

Checking the illumination in the sample chamber under ergonomic aspects. Conduct this test only at the customer's request.

Only informative for application in EU (EN 12469):

Required for type testing only at manufacturer's side.

Testing equipment

Illumination meter in accordance with the requirements of the IES (Illuminating Engineering Society).

Calibration of the testing equipment

The illumination meter must be calibrated in accordance with the manufacturers' instructions.

Test Area at the Work Surface

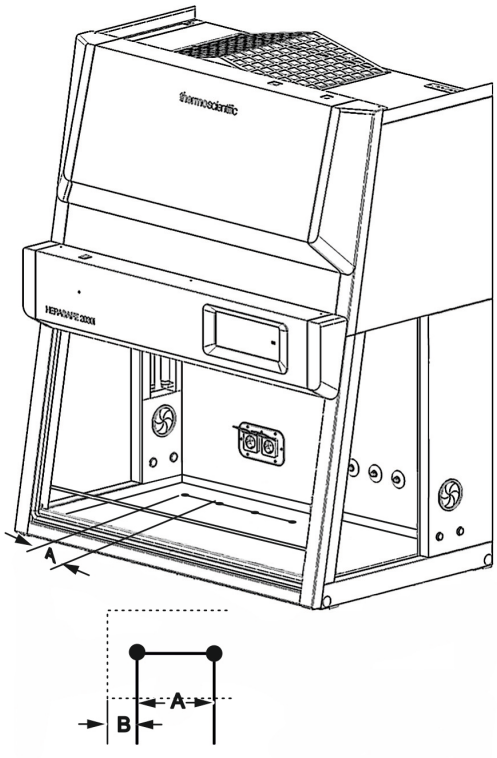


Figure 133 Lighting Intensity Test

Figure 133: Test line in the center of the work surface parallel to the front window. Beginning with distance B of 15 cm (6 in.) to the sidewalls, measure the lighting intensity at distance A of 30 cm (12 in.).

Test conditions

Normal lighting at the location of the safety cabinet.

Test measurement

1. Install the testing equipment.
2. Turn on the lighting of the safety cabinet. The lead time for the measurement is at least 30 minutes.
3. Switch the blower on.
4. Perform the measurements at the test points and record the values.
5. Repeat the measurements with the cabinet lights off.

Calculating the average value

$$\text{Average} = \frac{\text{Sum of measured values}}{\text{Number of measuring points}}$$

Acceptable values

Application in EU(EN 12469):

The average light intensity must not exceed 750 lx.

Application in USA/Canada (NSF 49):

With a background lighting (lighting at the place of location) of 110 lx (± 50 lx), the average lighting intensity at the work surface must exceed 650 lx.

- Individual values must not fall below 430 lx.

Troubleshooting

- Check LED tubes and replace tubes, if required.

Vibration Test

Purpose of the test (only for application in USA/Canada in accordance with NSF 49).

This test determines the amount of vibration with the blowers on.

Conduct this test only at the customer's request.

Only informative for application in EU (EN 12469):

Required for type testing only at manufacturer's side.

Testing equipment

Vibration analyzer with a minimum sensitivity of 2.5 µm rms (0.0001 in rms). Calibrator for the vibration analyzer.

Calibration of the testing equipment

The testing equipment must be calibrated in accordance with the manufacturer's instructions.

Test conditions

Normal conditions at the place of location. The rack must be aligned horizontally. Inflow and downflow velocities must be at set point.

Test measurement

NOTE Multi-modules work-plate:
If more than 3 work-plate modules are installed, two measurements should be performed at the centerline between the two inner modules.

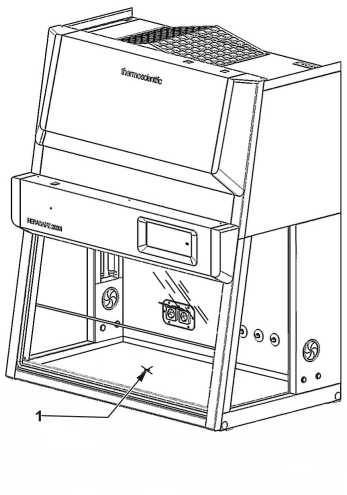


Figure 134 Vibration Test

1. Figure 134: Secure the sensor of the vibration analyzer firmly to the center [1] of the workplate using double-faced adhesive tape.
2. **Determine the background vibration amplitude with the cabinet switched off and record the value.**
3. **Switch on the cabinet and the cabinet lighting, determine the vibration value, and record the value.**

Determining the vibration value

Vibration value = operating value - background value

Acceptable values

Application in EU (EN14269):

- The deviation must not exceed more than 5 x 10-6 m or 2 x 10-4 inch at 20 Hz - 20 kHz

Application in USA/Canada (NSF 49):

- The deviation must not exceed more than 5 x 10-6 m or 2 x 10-4 inch at 10 Hz - 10 kHz

Troubleshooting

- Check the work-plate seating.
- Check the rack for secure stand.
- In case of excessive values, check the radial blower for imbalance.

Setting the Airflow Alarms

The settings are made on the service level using parameters S03 and S05.

Description:

- Verify the airflow alarms will activate within 15 seconds when there is a 20% loss.

Setting the values for the blower and alarm limits should always be done together and in the following order:

1. S2
2. S1
3. S3
4. S5

Afterwards do a second cycle and store the same values again without changing.

The exhaust air blower S2 automatically adjusts its settings if the circulation blower S1 is changed. For this reason, always begin the settings with S2! Experience demonstrates that the values of the alarm limits S3 and S5 are approximately 20% lower than the working points for blowers S1 and S2.

Purpose of the setting

Setting of the sensor response characteristics for downflow velocity and inflow velocity. The alarm values are set so that the visual and audible warnings are issued when the corresponding airflow velocity falls below the lower limit or exceeds the upper limit.

Testing equipment

- Thermal Anemometer or equivalent (hotwire)
- Anemometer probe holder, part 1911325
- Shortridge ADM-870 or equivalent
- Flowhood series 8400 or equivalent

Test conditions

The sample chamber of the safety cabinet must be completely empty, windows and doors of the operating room must be closed (no draft).

Reference values

The nominal values of the control voltage for the downflow and exhaust blowers from service levels S01 and S02 of the device control are used as reference values for setting the alarm values.

If the values in S01 or S02 are changed, the alarm limits in S03 and S05 must be adapted in accordance with EN 12469 / DIN 12980 / NSF 49.

Inflow Velocity Alarm Values

Application in EU (EN14269):

The nominal value for Herasafe 2030i: 0.45 m/s.

- The average value must be within 0.01 m/s of the nominal value.
- The average inflow air velocity must be > 0.40 m/s.

Application in USA/Canada (NSF 49):

- The nominal value for Herasafe 2030i: 0.53 m/s (105 fpm).
- The average value must be within +/- 5 ft/min (0.025 m/s) of the nominal value.

The average airflow velocity must have been determined using an anemometer or a flow hood.

Setting of the Inflow velocity alarm points:

1. Switch the safety cabinet on. The lead time for the setting is approx 20 min.
2. **Determine the average inflow velocity (see** Inflow Velocity Tests**).**

The alarm must be triggered as soon as the average inflow velocity exceeds or falls below the limit.

1. Go to service level S05. In S05, lower the blower overall output so that the value is approx. 10% (EN 12469) and approx. 20% (NSF) below the average value of S2. Note the value of S5.
2. **Store the value input:**

Wait until “SEt” appears on the display and press the “SEt” key.

NOTE Max. Alarm Limit
The min. alarm limit (Inflow Low Alarm) set in S5 is automatically reflected by the program/software and this value is then stored as the max. alarm limit (Inflow High Alarm).

Testing the Alarm Limits inflow velocity

Application in EU (EN14269):

The measurement readings of the individual measuring points may not deviate more than ±10% from the average value:

Low Alarm min. limit = Average value –10%
High Alarm max. limit = Average value +10%
Permissible values according to the manufacturer's specifications:
Nominal value Average inflow air speed: 0.45 m/s
Low Alarm (–10%): 0.40 m/s
High Alarm (+10%): 0.49 m/s

Test the min. alarm limit (Inflow Low Alarm):

1. Slowly reduce the overall performance of the exhaust air blower with S2 until the blower alarm (LED) changes from greed to red and measure the inflow velocity.
2. **The measurement reading must correspond with the value of the lowest permissible average inflow velocity.**
3. **Exit the Service Level without storing the value.**

Test the max. alarm limit (Inflow High Alarm):

1. Slowly increase the overall performance of the exhaust air blower with S2 until the blower alarm (LED) changes from green to red and measure the inflow velocity.
2. **The measurement reading must correspond with the value of the highest permissible average inflow velocity.**
3. **Exit the Service Level without storing the value.**

Downflow Velocity Alarm Values

Acceptable values

Application in EU (EN 14269):

- The nominal value for Herasafe 2030i: 0.32 m/s.
- The average value must be within 0.01 m/s of the nominal value.

Application in USA/Canada (NSF 49):

NOTE Nominal values
The nominal values for the individual device types are listed on the nameplate.

Setting of the downflow velocity alarm points

1. Switch the safety cabinet on. The lead time for the setting is approx 20 min.
2. **Determine the average inflow velocity (see Downflow Velocity Tests).**

The alarm must be triggered as soon as an individual value exceeds or falls below the limit.

1. Go to service level S03. In S03, lower the blower overall output so that the value is approx. 10% (EN 12469) and 20% (NSF) below the average value of S1. Note the value of S3.

2. Store the value input:
   Wait until “Set” appears on the display and press the “SEt” key

Application in EU (EN 14269):

The alarm must be triggered as soon as an individual value exceeds or falls below the limit.

Ascertain the measuring points with the lowest or highest circulation speed.

At the measuring point with the previously measured lowest airspeed, the calculated min. limit (average value 20%) may not be fallen below.

At the measuring point with the previously measured highest airspeed, the calculated max. limit (average value 20%) may not be exceeded.

Table2	Nominal average downflow	Low Alarm	High Alarm
Herasafe 2030i	0.36 m/s	0.29 m/s	0.43 m/s

Application in USA/Canada (NSF 49):

The unit is examined as a uniform safety cabinet:

The average value must be within ±0.025 m/s (5 ft/min) of the nominal value. The measured values of each individual measuring point must not deviate more than 25% or 16 ft/min (0.081 m/s) from the average downflow velocity.

The unit is examined as a non-uniform (zoned) safety cabinet:

The average value must be within ±0.025 m/s (5 ft/min) of the nominal value. The measured values of the individual measuring rows (zones) must not deviate more than 25% or 16 ft/min (0.081 m/s) from the average downflow velocity of each zone.

Setting the Alarm Point:

1. Switch on the blowers. The lead time for the setting takes approximately 20 min.
2. Determine the average value of the downflow velocity (see Downflow Velocity Tests).

The alarm must be triggered as soon as an individual value exceeds or falls below the limit.

3. Go to service level S03. In S03, lower the blower overall output so that the value is approx. 20% below the average value of S1. Note the value of S3.
4. Store the value input:
   Wait until “Set” appears on the display and press the “Set” key
5. Ascertain the measuring points with the lowest or highest downflow velocity.
   At the measuring point with the previously measured lowest air velocity, the calculated min. limit may not be fallen below.
   At the measuring point with the previously measured highest air velocity, the calculated max. limit may not be exceeded.
6. Ascertain the smallest difference between the maximum permissible deviation and the lowest or highest measured downflow velocity.

7. Set the anemometer at the measuring point with the lowest measured downflow velocity. Call up the downflow alarm limit S3 and set the value so that the measured downflow velocity is reduced no more than by the smallest difference.
   Note the value of S3.
8. Store the value input:
   Wait until “Set” appears on the display and press the set key.

NOTE Max. Alarm Limit
The min. alarm limit (downflow Low) set in S3 is automatically reflected by the program/software and this value is then stored as the max. alarm limit (downflow High).

Testing the downflow velocity Alarm Limits

Test the min. alarm limit (downflow Low Alarm):

1. Set the anemometer at the measuring point with the lowest measured downflow velocity. Slowly reduce the overall performance of the downflow blowers with S1 until the air velocity display (LED) changes from green to red.
2. The measurement reading must correspond with the value of the lowest permissible downflow velocity.
3. Exit the Service Level without storing the value.

Test the max. alarm limit (downflow High Alarm):

1. Set the anemometer at the measuring point with the highest measured downflow velocity. Slowly increase the overall performance of the downflow blower with S1 until the air velocity display (LED) changes from green to red.
2. The measurement reading must correspond with the value of the highest permissible downflow velocity.
3. Exit the Service Level without storing the value.

Alternative testing of the min. alarm limit (downflow Low Alarm):

1. Set the anemometer at the measuring point with the highest measured downflow velocity.
2. Cover 1/2 of the air intervention openings on the work plates with paper and observe the anemometer display. The downflow velocity is slowly reduced.
3. The alarm must then be triggered when the min. alarm limit is reached.

Performance Factor Test

At start-up, the performance factor can also serve in testing the device in regard to whether the blowers and alarm limits of the safety work are set correctly. If the performance factor deviates significantly from 100% performance or fluctuates heavily, then the setting is incorrect and the values for the blowers (S2, S1) and alarm limits (S3, S5) must be reset.

Exhaust System Performance

Description:

- Verify the exhaust system is functioning properly

Canopy /Thimble duct connections Equipment:

- Cold smoke (titanium tetrachloride)

Method:

- Pass smoke around the air gap, to ensure negative pressure exists

Acceptance:

- No smoke refluxes back into the room once drawn into the canopy

Direct connections Equipment:

- Manometer, or equivalent

Method:

- Measure static pressure in the duct between the unit and balancing dampers.

Acceptance:

- Negative pressure exists

NOTE Standard
For additional and detailed information regarding these tests, refer to NSF/ANSI Standard 49.

NOTE
See chapter recommendations for exhaust system.

Shut-down

Interrupting an Operation

To interrupt a work process, the blowers can be switched off.

1. Remove all samples from the safety cabinet and store them properly.
2. Remove accessories from the sample chamber and clean and disinfect them.
3. Clean and disinfect the sample chamber surfaces, the workplate, and the drain pan.
4. Switch the blowers off.

Shutting the Unit Down

If the unit is not to be used or stored for an extended period of time, it must be completely decontaminated.



Decontamination measures!
To shut the device down, the sample chamber must be disinfected completely and the plenum, including the filters, must be sterilized using formaldehyde.

1. After the device has been decontaminated, close the front window completely.
2. Disconnect the device from the power supply system.

Cleaning and Decontamination

CAUTION Before cleaning and UV disinfection the covers of the UV lamps must be removed and afterwards installed.

Decontamination Procedure

Several procedures can be applied for decontaminating the safety cabinet. Which procedure is selected, depends on:

- the potential risk imminent in the agents,
- the degree of purity required by an experiment or by a work process.

Possible decontamination procedures:
Wipe/spray disinfection: is the standard disinfection procedure for cabinets used for microbiological experiments.

UV disinfection: is particularly suited as an intensifying additional disinfection after a wipe/spray disinfection.

Sterilization with steam: can be used for treating the removable stainless steel components. Examples of autoclavable components are the bezels of the UV lamps, the workplate or workplate segments and the armrests.

Disinfection with formaldehyde: can be performed if a sterile sample chamber is required for the work process. This sterilization procedure is mandatory:

- when filters are replaced,
- when the device is shut down,
- when the device is discarded.

Wipe/Spray Disinfection

The wipe/spray disinfection is performed in three stages:

- Predisinfection,
- cleaning,
- final disinfection.

Recommended disinfectants:

CAUTION

Compatibility
Chloride-containing disinfectants may damage some surfaces; use only chloride-free disinfectants or a disinfectant with a low enough chloride content to have been proved harmless for stainless steel finishes! Disinfectants with an alcohol content of more than 70 % may cause embrittlement of plastic components after extended exposure. Use only disinfectants with a low alcohol content. When using a disinfectant with an alcohol content of more than 70 %, the release limit of 200 g within 2 hours must not be exceeded. Also suited are disinfectants based on quaternary ammonium compounds.

Predisinfection:

1. Remove all samples from the sample chamber and store them properly.
2. Remove accessories from the safety cabinet and disinfect them using the disinfection procedure recommended by the manufacturer.
3. The workplate and stainless steel components can be removed from the sample chamber and disinfected separately.
4. For predisinfection, spray disinfectant on all sample chamber surfaces or wipe the surfaces using disinfectant.
5. Do not remove the optional UV lamps from the sockets; wipe them thoroughly using a damp cloth.
6. Switch the device to work mode, move front window to the working position.
7. Allow disinfectant to react as recommended by manufacturer, then operate the safety cabinet for at least 15 to 20 minutes in the work mode so that released aerosols can be absorbed by the filters.

Cleaning:

1. Thoroughly remove dirt residues and deposits using a solution of tepid water and dishwashing agent.
2. Wipe the surfaces clean using a clean cloth and plenty of clear water.
3. Remove the cleaning liquid from the drain pan and wipe all sample chamber surfaces dry.

Final disinfection:

1. Again, spray disinfectant on all sample chamber surfaces or wipe the surfaces clean with disinfectant.
2. Allow disinfectant to react as recommended by manufacturer.

UV Disinfection after a Wipe/Spray Disinfection

A UV disinfection can be performed either by using the optional integral UV lamps or by using a mobile UV device. The run time of the routine can be preset with the operating panel.

CAUTION

Before disinfection remove the UV side covers and replace them afterwards. Do not apply too much cleaning agent to the UV emitter box. The ground fault circuit interrupter may release.

UV Disinfection using the Integral UV Lamps

Running the UV disinfection routine, see “Running UV Disinfection” on page 64.

Changing the UV Disinfection Time

Setting the run time for the UV disinfection, see “Setting UV Disinfection Cycle Time” on page 80

Disinfection with Formaldehyde

CAUTION

Disinfection procedure
Disinfection with formaldehyde bears considerable risks, the procedure must only be performed by specially trained authorized service personnel and in accordance to national regulations.

A suitable disinfection procedure must be selected according to the scope of application of the safety cabinet.
One possible method based on EN 12469/2000 is described below.

To cover the spectrum of action A, B, C and D, it is necessary to use another method. Based on recommendations of the RKI (Robert Koch Institute), another disinfection procedure is described in the service manual.

Procedure in accordance to EN 12469 / 2000:
For gas disinfection, formaldehyde is evaporated in the sample chamber of the completely sealed cabinet. The quantity of the formaldehyde used depends on the sample chamber volume of the cabinet version to be disinfected (see “Technical Data” on page 199). Per cubic meter of sample chamber volume, at least 5 g formaldehyde must be evaporated with 20 ml water (corresponds with 25 ml of a 20 % formaldehyde solution). The formaldehyde evaporates immediately when its boiling point is reached. The required reaction time is at least 6 hours.

After the required reaction time, the formaldehyde should be neutralized by evaporating a 25 % ammonium solution (10 ml per cubic meter of sample chamber volume).

NOTE
After the neutralization reaction time with ammonia, carry out check measurements and ventilate. Ventilation until the MAK value is reached: Formaldehyde concentration <0.3 ppm (Occupational Exposure Limits).

Ambient conditions and accessories:
The temperature at the cabinet location should be approx 21 °C, the relative humidity should be between 60 and 85 %. To evaporate the solution, a heating device with a container is required.

Cleaning the Exterior Surfaces

Wipe the exterior surfaces of the device clean using a solution of tepid water and commercial dishwasher solution. Then, wipe exterior surfaces dry using a soft, clean cloth.

Cleaning the Front Window

For cleaning the front window (and for disinfecting it using wipe disinfection), the front window can be closed and hinged.

Cleaning the Drain Pan

Clean the drain pan using a solution of tepid water and commercial dishwasher.

1. Remove the working plates from the workspace.
2. Remove dirt residues and deposits thoroughly.
3. Wipe the drain pan clean using a clean cloth and plenty of clear water.
4. Remove the cleaning liquid from the drain pan and wipe the drain pan surfaces thoroughly clean.



Material residues
After cleaning, make sure that all cleaning materials have been removed completely from the drain pan.

5. Reinstall the working plates.

Maintenance

Inspection

The annual inspection comprises the following checks:

- Electrical safety in accordance with national regulations.
- Functional test of the device.
- Checking all components for possible damage.
- Checking the filter state.

NOTE Perforated plate
The Perforated plate at the blanket of the sample chamber serves for the protection of the downflow filter and prevents refluxing. While scanning the filter surface for leak test the perforated plate must be built-in.

- Checking the airflow conditions.
- Repeat test in accordance with applicable standard (EN 12469:2000, NSF/ANSI 49 or other.

Service

HEPA filters:
As the filter replacement is an interference with the safety system of the device, filters must only be replaced by Thermo Electron LED or by adequately trained and authorized service personnel.

NOTE Filter change
Before filters are replaced the disinfection with formaldehyde is mandatory. After the filter replacement, a repeat test must be performed in accordance with applicable standard (EN 12469:2000, NSF/ANSI 49 or other.

UV Lamps



Before replacing the UV lamps disconnect the unit from the power supply.

The UV lamps should be replaced after 8000 operating hours:

1. Remove cover from lamp housing. The cover is only pushed onto the lamp casing and may be pulled off easily.
2. Rotate the lamp in the socket so that the lamp contacts can be removed from the groove in the socket.
3. Insert the new lamp into the socket and rotate until the contacts engage.
4. Push the cover onto the lamp casing.

Sample Chamber Illumination

The tubes are installed in the front cover bezel.

1. Remove the bezel retaining screws and the bezel.
2. The luminescent tubes are retained by rotatable sockets. Rotate the tube carefully to the removal position and remove it from the socket.
3. Insert the replacement tube and rotate it to the working position.
4. Reinstall the bezel and secure it with the screws.

Replacing the Front Cover Seal

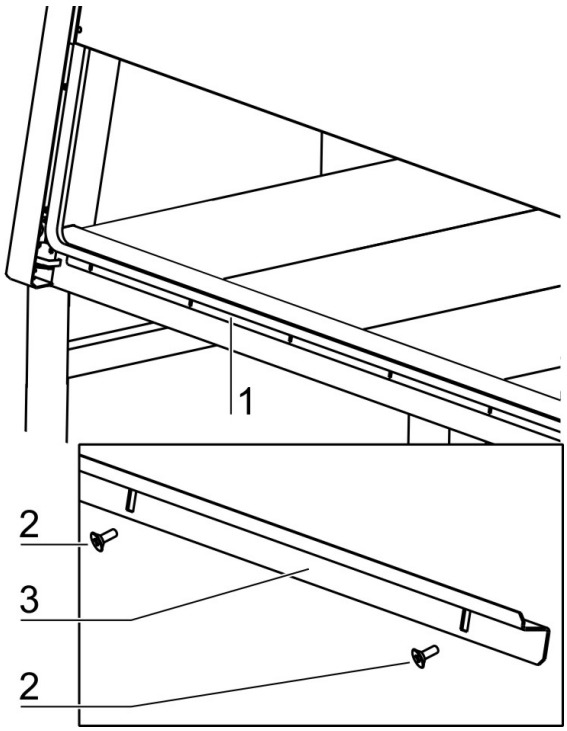


Figure 135 Replacing the Front Cover Seal

The seal is merely pushed onto the device frame and is secured additionally at the upper and lower side of the sample chamber opening by a retaining rail.

1. Remove the retaining screws [2] and remove the retaining rail [3].
2. Pull the seal [1] off the retaining lip at the device frame.
3. Push the groove of the replacement seal onto the retaining lip and press the seal on to ensure that it is positioned flush along the entire length of the contact surface.
4. Install the retaining rail.

NOTE
If the front door seal [1] shows visible signs of wear, the seal must be replaced by the service.

Exchanging SmartPorts

CAUTION

Contamination!
There is a risk of contamination for users and the product itself. In order to prevent contaminated particles escaping from the workspace, the unit must be switched on in order to exchange the SmartPorts.

The SmartPorts are removed inwards into the workspace. Prior to replacement, all work in the workspace must be finished.

1. Before replacing the SmartPorts, open the front window. Doing so will produce an alarm to indicate that there is a potentially unsafe operating condition.
2. Before replacing the SmartPorts, disinfect the workspace, front window, as well as the inner and outer compartment walls.
3. First remove the inner grommet of the SmartPort in the workspace inwards from the side panel opening.
4. Then remove the outer grommet of the SmartPort in the workspace inwards from the side panel opening.
5. Disinfect both grommets in the workspace and take them out of the workspace.
6. Disinfect the inner and outer compartment walls.
7. Insert new outer grommet in the side panel opening from the outside.
8. Insert new inner grommet in the side panel opening from the inside.

Retrofitting and Repairs

External communication systems, e.g. failure report systems or components for supplying media such as gas solenoid valves can be retrofitted and integrated into the device control.

CAUTION

Repairs
All retrofitting and repair work are interferences with the safety system of the unit. Particularly modifications to the filter system and resulting changes of the airflow may impair personal and material protection. Such work must be carried out only by authorized service personnel.

Disposal

Disposal Procedure

Discarded cabinets or unit components contain reusable materials. All components with the exception of the HEPA filters can be disposed of after having been thoroughly decontaminated. The HEPA filters must be disposed of in accordance with the applicable national and state regulations for special solid waste.

CAUTION

Contamination hazard!
As the device can be used for processing and treating infectious substances, it may be contaminated. Prior to disposal, the complete device with filters must be decontaminated by performing a formaldehyde sterilization!

Recyclable materials!

Component	Material
Thermal insulation components	Polystyrene foam, EPS/PPS compound
Printed circuit boards	Enclosed electrical components coated with various plastics, mounted on epoxy resin-bound boards.
Plastic components, general	Note material labeling
Exterior housing	Steel, painted
Device backpanel	Stainless steel/steel, painted
Front cover seal	EMPP
Front window, side windows	Multi-layer safety glass
Operating panel and indicator foil	Polyethylene, Polyester
Workplates	Stainless steel
UV bezels	Stainless steel
Armrests	Stainless steel
Rechargeable battery (safety feature: Lower Front Window)	Nickel/metal hydride

WEEE Conformity:

This product is required to comply with the European Union‘s Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EU. It is marked with the following symbol:



Thermo Electron has contracted with one or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on Thermo Fisher Scientific‘s compliance with these Directives.

The recyclers in your country, and information on Thermo Scientific products which may assist the detection of substances subject to the RoHS Directive are available at www.thermofisher.com.

Technical Data

Dimensions 120 V			
Herasafe 2030i / Maxisafe 2030i		1.2	1.8
Exterior dimensions			
Width	mm/in	1300/51.2	1900/74.8
Depth	mm/in	Herasafe 2030i 800/31.5 - Maxisafe 2030i 865/34.1	
Height	mm/in	1570/61.8 (NSF Version)	
Interior dimensions			
Width	mm/in	1200/47.2	1800/70.9
Depth	mm/in	627/24.7	
Height	mm/in	780/30.7	
Front window			
Working position	mm/in	Herasafe 2030i 200/7.9 + 250/9.8 - Maxisafe 2030i 250/9.8	
Max. opening	mm/in	780/ 30.7	
Working area height			
Seat position	mm/in	750/29.5	
Heightable	mm/in	750/29.5 - 950/37.4	
Stand height	mm/in	680/26.8 - 880/34.6	
Unit height with stand	mm/in	2216/87 / max. 2416/95	
Side wall feed throughs			
Diameter	mm/in	21.3/0.84	
Distance lower edge	mm/in	135/5.3	
Distance from the rear wall			
Bushing 1	mm/in	153.5/6	
Bushing 2	mm/in	243.5/9.6	
SmartPort	mm/in	198.5/7.8	

Optional media connections in the interior - rear wall			
Herasafe 2030i / Maxisafe 2030i		1.2	1.8
Diameter	inch	NPT 3/8	
Outer distance left			
Connection 1	mm/in	501/19.7	1050/41.3
Connection 2	mm/in	401/15.8	950/37.4
Connection 3	mm/in	301/11.8	850/33.5
Electrical Data 120 V			
Herasafe 2030i / Maxisafe 2030i		1.2	1.8
Voltage			
Rated voltage	V	1/N/PE AC - 50/60 Hz	
Blower voltage	V	48 V / DC	
Current			
Power consumption	A	9.0/9.6	12/12
Leakage current IEC 1010, EN 61010	mA	< 3.5	
Motherboard fusing	A	2 x T15A H	
Outlet fusing	A	2x T 5 A	
On-site fusing	A	Circuit breaker B 16 / Fuse T 16 A	
Power			
Power input max.	W	1050/1150	1360/1360
Protection			
Protection class		I	
Protection type		IP 20	
Overvoltage category (IEC 1010, EN 61010)		II	
Pollution degree (IEC 1010, EN 61010)		2	
Connection lines			
Connecting lines		cable (2.5 or 5 m/8.2 or 16.4 ft)	

Pressures			
Herasafe 2030i / Maxisafe 2030i		1.2	1.8
Pressure media valves	bar/psi	max. 6/87	
Volume, weights and loads 120 V			
Herasafe 2030i		1.2	1.8
Volume			
Device volume	m^3/cf	1.4/49	2.1/74
Floorpan	l/cf	40/1.4	60/2.1
Weights			
Cabinet	kg/lbs	200/441	280/617
Stand AFS 1	kg/lbs	26/57	27/60
Stand AFS 2	kg/lbs	30/66	31/68
Loads			
Max. load per working area module	kg/lbs	25/55	
Max. load on overall working area	kg/lbs	75/165	
Maxisafe 2030i		1.2	1.8
Volume			
Device volume	m^3/cf	1.7/60	2.7/95
Floorpan	l/cf	5/0.18	7.5/0.26
Weights			
Cabinet	kg/lbs	240/529	330/728
Stand AFS 2	kg/lbs	30/66	31/68
Loads			
Max. load per working area module	kg/lbs	25/55	
Max. load on overall working area	kg/lbs	75/165	

Airflow system			
Herasafe 2030i		120 V	
		1.2	1.8
Air speeds			
Inflow	m/s / fpm	0.53/105	
Downflow	m/s / fpm	0.32/63	
Air volume			
Overall volume flow	m^3/h / cfm	1412/830	2116/1245
Downflow volume flow	m^3/h / cfm	830/488	1244/732
Inflow air volume flow	m^3/h / cfm	582/342	872/512
Maxisafe 2030i		120 V	
		1.2	1.8
Air speeds			
Inflow	m/s / fpm	0.45/88.6	
Downflow	m/s / fpm	0.32/63	
Air volume			
Overall volume flow	m^3/h / cfm	1225/720	1836/1080
Downflow volume flow	m^3/h / cfm	830/488	1224/732
Inflow air volume flow	m^3/h / cfm	395/232	592/348

Filter			
Herasafe 2030i / Maxisafe 2030i		1.2	1.8
Type		HEPA (H 14 acc. DIN EN 1822)	
Material		Glass fiber fleece	
Separability in MPPS	%	99.995	
Separability at 0.3 µm particle size	%	99.999	
Downflow			
Width	mm/in	1220/48	1830/72
Depth	mm/in	457/18	
Height	mm/in	93/3.7	
Exhaust			
Width	mm/in	610/24	915/36
Depth	mm/in	457/18	
Height	mm/in	117/4.6	
Prefilter			
Maxisafe 2030i		1.2	1.8
Type		HEPA (H 14 acc. DIN EN 1822)	
Material		Glass fiber fleece	
Separability in MPPS	%	99.995	
Separability at 0.3 µm particle size	%	99.999	
Width	mm/in	86.5/34	
Depth	mm/in	257/10	
Height	mm/in	575/23	

Ambient conditions 120 V			
Herasafe 2030i / Maxisafe 2030i		1.2	1.8
Temperature			
Max. ambient temperature during operation	°C / °F	40/104	
Min. ambient temperature during operation	°C / °F	10/50	
Humidity			
Max. humidity/operation	% r. H.	90	
Max. humidity/storage	% r. H.	90	
Heat dissipation to environment			
200 mm/8“ access opening			
Room temperature 20°C	kJ/s / BTU/hr	0.15/522	0.25/856
250 mm access opening			
Room temperature 20 °C	kJ/s / BTU/hr	0.18/614	0.32/1092
Room temperature rise			
Above room temperature with window closed	°K	< 2	
Ergonomics			
Noise level	dB(A)	62	
		The noise level was determined in accordance with NSF 49. The sound pressure level was measured at a distance of 1 m in front of the working opening. The measurement uncertainty is within a range of ± 2 dB.	

Herasafe 2030i / Maxisafe 2030i		1.2		1.8	
Dongle					
Hardware interface		40			
Standard					
Frequency band					
Data rate					
Output power					
Security					
Max. humidity (operation)	% h.r.	90			
Max. humidity (storage)	% h.r.	90			
Pollution degree					

Device Log

Device type:		**Part number:**	
Serial number:		**Service number:**	
Location:		**Operator's note:**	

Work carried out	Notes	Date	Signature

Certificate of Decontamination

Invoice recipient / Customer no.:			Location / Forwarding address:		
Year of manufacturer:	KC:	ST:	Name of technician:		Appointed date:
order date:	Ordered by:	Order no.:			
Type of device:			ID no. / Order no.:		Operating hours:
Equipment no.:	Factory no.:	Service device no.:	Date of delivery:	Date of start-up:	Customer inventory no.:

Certficate of decontamination

Dear customer,

when using biological and chemical agents within and ouside of devices, hazards to the health of the operating personnel may be present and contamination of the surroundings of the device may occur when service or repair works are carried out.
Within the scope of national and international legal regulations, such as
- responsibility of a company for the protection of its employees,
- responsibility of the operator for the operational safety of devices,
all possible hazards must absolutely be prevented Prior to any calibration, service, and repair works, prior to any relocation of a device, and prior to the shut-down of a device, the device must be decontaminated, disinfected, and cleaned as required by the work to be carried out.
Therefore, we ask you to fill in this certificate of decontamination before you start with the required work.

Yours sincerely

Thermo Electron LED GmbH

Works to be carried out (please mark where applicable)

Service	☐	Filter replacement	☐
Repair	☐	Relocation	☐
Calibration	☐	Transport	☐

Declaration of possible contamination (please mark where applicable)

The device is clear of biological material	☐	The device is clear of dangerous chemical substances	☐
The device is clear of radioactivity	☐	The device is clear of other dangerous substances	☐
The device is clear of cytostatic agents	☐		

Certification:

Prior to carrying out the required work, we have decontaminated, disinfected, and cleaned the device as described in the operating instructions of the device and in accordance with nationally applicable regulations.
The device does not present any hazards.

Note:

Date, legally binding signature, stamp

Appendix: City Time Zones

Time Zone, Offset to UTC	City
Africa / 00:00	Abidjan, Ivory Coast
	Accra, Ghana
	Algiers, Algeria
	Bamako, Mali
	Banjul, Gambia
	Casablanca, Morocco
	Conakry, Guinea
	Dakar, Senegal
	Lome, Togo
	Monrovia, Liberia
	Nouakchott, Mauritania
	Ouagadougou, Burkina Faso
	Sao Tome and Principe
	Sierra Leone
Africa / -01:00	Bissau, Guinea-Bissau
	El Aaiún, Western Sahara
Africa / +01:00	Bangui, Central African Republic
	Brazzaville, Congo (Republic)
	Douala, Cameroon
	Kinshasa, Congo (DRC)
	Lagos, Nigeria
	Libreville, Gabon
	Luanda, Angola
	Malabo, Equatorial Guinea
	N'Djamena, Chad
	Niamey, Niger
	Porto-Novo, Benin
	Tunis, Tunisia

Africa / +02:00	Blantyre, Malawi
	Bujumbura, Burundi
	Cairo, Egypt
	Gaborone, Botswana
	Harare, Zimbabwe
	Johannesburg, South Africa
	Juba, South Sudan
	Khartoum, Sudan
	Kigali, Rwanda
	Lubumbashi, Congo (DRC)
	Lusaka, Zambia
	Maputo, Mozambique
	Maseru, Lesotho
	Mbabane, Swaziland
	Tripoli, Libya
	Windhoek, Namibia
Africa / +03:00	Addis Ababa, Ethiopia
	Asmara, Eritrea
	Dar es Salaam, Tanzania
	Djibouti, Djibouti
	Kampala, Uganda
	Mogadishu, Somalia
	Nairobi, Kenya
America / -02:00	Noronha, Brazil
	Scoresbysund, Greenland
America / -02:30	St John's, Canada

America / -03:00	Araguaina, Brazil
	Bahia, Brazil
	Belem, Brazil
	Buenos Aires, Argentina
	Catamarca, Argentina
	Cayenne, French Guiana
	Cordoba, Argentina
	Danmarkshavn, Greenland
	Fortaleza, Brazil
	Godthab, Greenland
	Jujuy, Argentina
	La Rioja, Argentina
	Maceio, Brazil
	Mendoza, Argentina
	Montevideo, Uruguay
	Paramaribo, Suriname
	Punta Arenas, Chile
	Recife, Brazil
	Rio Gallegos, Argentina
	Salta, Argentina
	San Juan, Argentina
	San Luis, Argentina
	Santiago, Chile
	Sao Paulo, Brazil
	Tucuman, Argentina
	Ushuaia, Argentina
America / -04:00	Anguilla, Anguilla
	Antigua, Antigua & Barbuda
	Aruba, Aruba
	Asuncion, Paraguay
	Barbados, Barbados
	Blanc-Sablon, Canada
	Boa Vista, Brazil
	Campo Grande, Brazil
	Caracas, Venezuela
	Cuiaba, Brazil

Curacao, Curaçao
Dominica, Dominica
Glace Bay, Canada
Goose Bay, Canada
Grenada, Grenada
Guadeloupe, Guadeloupe
Guyana, Guyana
Halifax, Canada
Kralendijk, Caribbean Netherlands
La Paz, Bolivia
Lower Princes, Sint Maarten
Manaus, Brazil
Marigot, St. Martin
Martinique, Martinique
Miquelon, St. Pierre & Miquelon
Moncton, Canada
Montserrat, Montserrat
Pangnirtung, Canada
Port of Spain, Trinidad & Tobago
Porto Velho, Brazil
Puerto Rico, Puerto Rico
Santarem, Brazil
Santo Domingo, Dominican Republic
St Barthelemy, St. Barthélemy
St Kitts, St. Kitts & Nevis
St Lucia, St. Lucia
St Thomas, U.S. Virgin Islands
St Vincent, St. Vincent & Grenadines
Thule, Greenland
Tortola, British Virgin Islands

America / -05:00	Atikokan, Canada
	Bogota, Colombia
	Cayman, Cayman Islands
	Detroit, US
	Eirunepe, Brazil
	Grand Turk, Turks & Caicos Islands
	Guayaquil, Ecuador
	Havana, Cuba
	Indianapolis, US (Indiana)
	Marengo, US (Indiana)
	Tell City, US (Indiana)
	Vevay, US (Indiana)
	Vincennes, US (Indiana)
	Winamac, US (Indiana)
	Iqaluit, Canada
	Jamaica, Jamaica
	Louisville, US (Kentucky)
	Lima, Peru
	Menominee, US
	Nassau, Bahamas
	New York, US
	Nipigon, Canada
	Panama, Panama
	Port-au-Prince, Haiti
	Rio Branco, Brazil
	Thunder Bay, Canada
	Toronto, Canada

America / -06:00	Belize, Belize
	Cancun, Mexico
	Chicago, US
	Chihuahua, Mexico
	Costa Rica, Costa Rica
	El Salvador, El Salvador
	Guatemala, Guatemala
	Knox, US (Indiana)
	Petersburg, US (Indiana)
	Monticello, US (Kentucky)
	Managua, Nicaragua
	Matamoros, Mexico
	Merida, Mexico
	Mexico City, Mexico
	Monterrey, Mexico
	Ojinaga, Mexico
	Rainy River, Canada
	Rankin Inlet, Canada
	Regina, Canada
	Resolute, Canada
	Tegucigalpa, Honduras
	Winnipeg, Canada
America / -07:00	Boise, US
	Cambridge Bay, Canada
	Creston, Canada
	Denver, US
	Edmonton, Canada
	Beulah, US (North Dakota)
	Center, US (North Dakota)
	New Salem, US (North Dakota)
	Phoenix, US
	Swift Current, Canada
	Yellowknife, Canada

America / -08:00	Bahia Banderas, Mexico
	Dawson Creek, Canada
	Fort Nelson, Canada
	Hermosillo, Mexico
	Inuvik, Canada
	Juneau, US
	Los Angeles, US
	Mazatlan, Mexico
	Metlakatla, US
	Sitka, US
	Tijuana, Mexico
	Vancouver, Canada
	Whitehorse, Canada
America / -09:00	Dawson, Canada
	Yakutat, US
America / -10:00	Anchorage, US
America / -11:00	Adak, US
	Nome, US
Antarctica / +03:00	Syowa, Antarctica
Antarctica / +06:00	Mawson, Antarctica
	Vostok, Antarctica
Antarctica / +07:00	Davis, Antarctica
Antarctica / +08:00	Casey, Antarctica
Antarctica / +10:00	Dumont Durville, Antarctica
Antarctica / +11:00	Macquarie, Australia
Antarctica / +12:00	McMurdo, Antarctica
Antarctica / 00:00	Rothera, Antarctica
	Troll, Antarctica
Antarctica / -3:00	Palmer, Antarctica
Arctic / +01:00	Longyearbyen, Svalbard & Jan Mayen

Asia / +02:00	Amman, Jordan
	Beirut, Lebanon
	Damascus, Syria
	Famagusta, Cyprus
	Gaza, Palestine
	Hebron, Palestine
	Jerusalem, Israel
	Nicosia, Cyprus
Asia / +03:00	Aden, Yemen
	Baghdad, Iraq
	Kuwait, Kuwait
	Riyadh, Saudi Arabia
Asia / +03:50	Tehran, Iran
Asia / +04:00	Bahrain, Bahrain
	Baku, Azerbaijan
	Dubai, United Arab Emirates
	Muscat, Oman
	Qatar, Qatar
	Tbilisi, Georgia
	Yerevan, Armenia
Asia / +04:50	Kabul, Afghanistan
Asia / +05:00	Aqtau, Kazakhstan
	Aqtobe, Kazakhstan
	Ashgabat, Turkmenistan
	Atyrau, Kazakhstan
	Karachi, Pakistan
	Oral, Kazakhstan
	Qostanay, Kazakhstan
	Qyzylorda, Kazakhstan
	Samarkand, Uzbekistan
	Yekaterinburg, Russia
Asia / +05:50	Colombo, Sri Lanka
	Kathmandu, Nepal
	Kolkata, India
	Thimphu, Bhutan

Asia / +06:00	Almaty, Kazakhstan
	Bishkek, Kyrgyzstan
	Dhaka, Bangladesh
	Dushanbe, Tajikistan
	Hovd, Mongolia
	Omsk, Russia
	Tashkent, Uzbekistan
	Urumqi, China
Asia / +06:50	Yangon, Myanmar
Asia / +07:00	Bangkok, Thailand
	Barnaul, Russia
	Choibalsan, Mongolia
	Jakarta, Indonesia
	Krasnoyarsk, Russia
	Novokuznetsk, Russia
	Novosibirsk, Russia
	Phnom Penh, Cambodia
	Tomsk, Russia
	Ulaanbaatar, Mongolia
	Vientiane, Laos
Asia / +07:50	Kuala Lumpur, Malaysia
	Singapore, Singapore
Asia / +08:00	Brunei, Brunei
	Ho Chi Minh, Vietnam
	Hong Kong, Hong Kong
	Irkutsk, Russia
	Kuching, Malaysia
	Macau, Macao
	Makassar, Indonesia
	Manila, Philippines
	Pontianak, Indonesia
	Shanghai, China
	Taipei, Taiwan

Asia / +09:00	Chita, Russia
	Dili, East Timor
	Jayapura, Indonesia
	Khandyga, Russia
	Pyongyang, North Korea
	Seoul, South Korea
	Tokyo, Japan
	Ust-Nera, Russia
	Yakutsk, Russia
Asia / +10:00	Vladivostok, Russia
Asia / +11:00	Magadan, Russia
	Sakhalin, Russia
	Srednekolymsk, Russia
Asia / +12:00	Kamchatka, Russia
Asia / +13:00	Anadyr, Russia
Atlantic / 00:00	Canary, Spain
	Faroe, Faroe Islands
	Madeira, Portugal
	Reykjavik, Iceland
	St Helena, St. Helena
Atlantic / -1:00	Azores, Portugal
Atlantic / -2:00	Cape Verde, Cape Verde
	South Georgia, South Georgia & South Sandwich Islands
Atlantic / -4:00	Bermuda, Bermuda
	Stanley, Falkland Islands (Islas Malvinas)
Australia / +08:00	Perth, Australia
Australia / +09:50	Adelaide, Australia
	Broken Hill, Australia
	Darwin, Australia
Australia / +08:45	Eucla, Australia

Australia / +10:00	Brisbane, Australia
	Currie, Australia
	Lindeman, Australia
	Lord Howe, Australia
	Melbourne, Australia
	Sydney, Australia
Australia / +11:00	Hobart, Australia
Europe / 00:00	Ceuta, Spain
Europe / +01:00	Amsterdam, Netherlands
	Andorra, Andorra
	Belgrade, Serbia
	Berlin, Germany
	Bratislava, Slovakia
	Brussels, Belgium
	Budapest, Hungary
	Busingen, Germany
	Copenhagen, Denmark
	Dublin, Ireland
	Gibraltar, Gibraltar
	Guernsey, Guernsey
	Isle of Man, Isle of Man
	Jersey, Jersey
	Lisbon, Portugal
	Ljubljana, Slovenia
	London, UK
	Luxembourg, Luxembourg
	Madrid, Spain
	Malta, Malta
	Monaco, Monaco
	Oslo, Norway
	Paris, France
	Podgorica, Montenegro
	Prague, Czech Republic
	Rome, Italy
	San Marino, San Marino
	Sarajevo, Bosnia

	Skopje, North Macedonia
	Stockholm, Sweden
	Tirane, Albania
	Vaduz, Liechtenstein
	Vatican, Vatican City
	Vienna, Austria
	Warsaw, Poland
	Zagreb, Croatia
	Zurich, Switzerland
Europe / +02:00	Athens, Greece
	Bucharest, Romania
	Helsinki, Finland
	Istanbul, Turkey
	Mariehamn, Iland Islands
	Sofia, Bulgaria
Europe / +03:00	Chisinau, Moldova
	Kaliningrad, Russia
	Kiev, Ukraine
	Minsk, Belarus
	Moscow, Russia
	Riga, Latvia
	Simferopol, Ukraine
	Tallinn, Estonia
	Uzhgorod, Ukraine
	Vilnius, Lithuania
	Zaporozhye, Ukraine
Europe / +04:00	Astrakhan, Russia
	Kirov, Russia
	Samara, Russia
	Saratov, Russia
	Ulyanovsk, Russia
	Volgograd, Russia
Indian / +03:00	Antananarivo, Madagascar
	Comoro, Comoros
	Mayotte, Mayotte
Indian / +04:00	Mahu, Seychelles

	Mauritius, Mauritius
	Réunion, Réunion
Indian / +05:00	Chagos, British Indian Ocean Territory
	Kerguelen, French Southern Territories
	Maldives, Maldives
Indian / +06:50	Cocos, Cocos (Keeling) Islands
Indian / +07:00	Christmas, Christmas Island
Pacific / -5:00	Galapagos, Ecuador
Pacific / -6:00	Easter, Chile
Pacific / -08:00	Pitcairn, Pitcairn Islands
Pacific / -9:00	Gambier, French Polynesia
Pacific / -09:30	Marquesas, French Polynesia
Pacific / -10:00	Honolulu, US
	Rarotonga, Cook Islands
	Tahiti, French Polynesia
Pacific / -11:00	Apia, Samoa
	Fakaofo, Tokelau
	Midway, U.S. Outlying Islands
	Niue, Niue
	Pago Pago, American Samoa
Pacific / -12:00	Enderbury, Kiribati
	Kwajalein, Marshall Islands
Pacific / +09:00	Palau, Palau
Pacific / +10:00	Bougainville, Papua New Guinea
	Chuuk, Micronesia
	Guam, Guam
	Port Moresby, Papua New Guinea
	Saipan, Northern Mariana Islands
Pacific / +11:00	Efate, Vanuatu
	Guadalcanal, Solomon Islands
	Noumea, New Caledonia
	Pohnpei, Micronesia
Pacific / +11:50	Nauru, Nauru
	Norfolk, Norfolk Island
Pacific / +12:00	Auckland, New Zealand
	Fiji, Fiji

	Funafuti, Tuvalu
	Kosrae, Micronesia
	Majuro, Marshall Islands
	Tarawa, Kiribati
	Wake, U.S. Outlying Islands
	Wallis, Wallis & Futuna
Pacific / +12:45	Chatham, New Zealand
Pacific / +13:00	Tongatapu, Tonga
Pacific / +14:00	Kiritimati, Kiribati

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