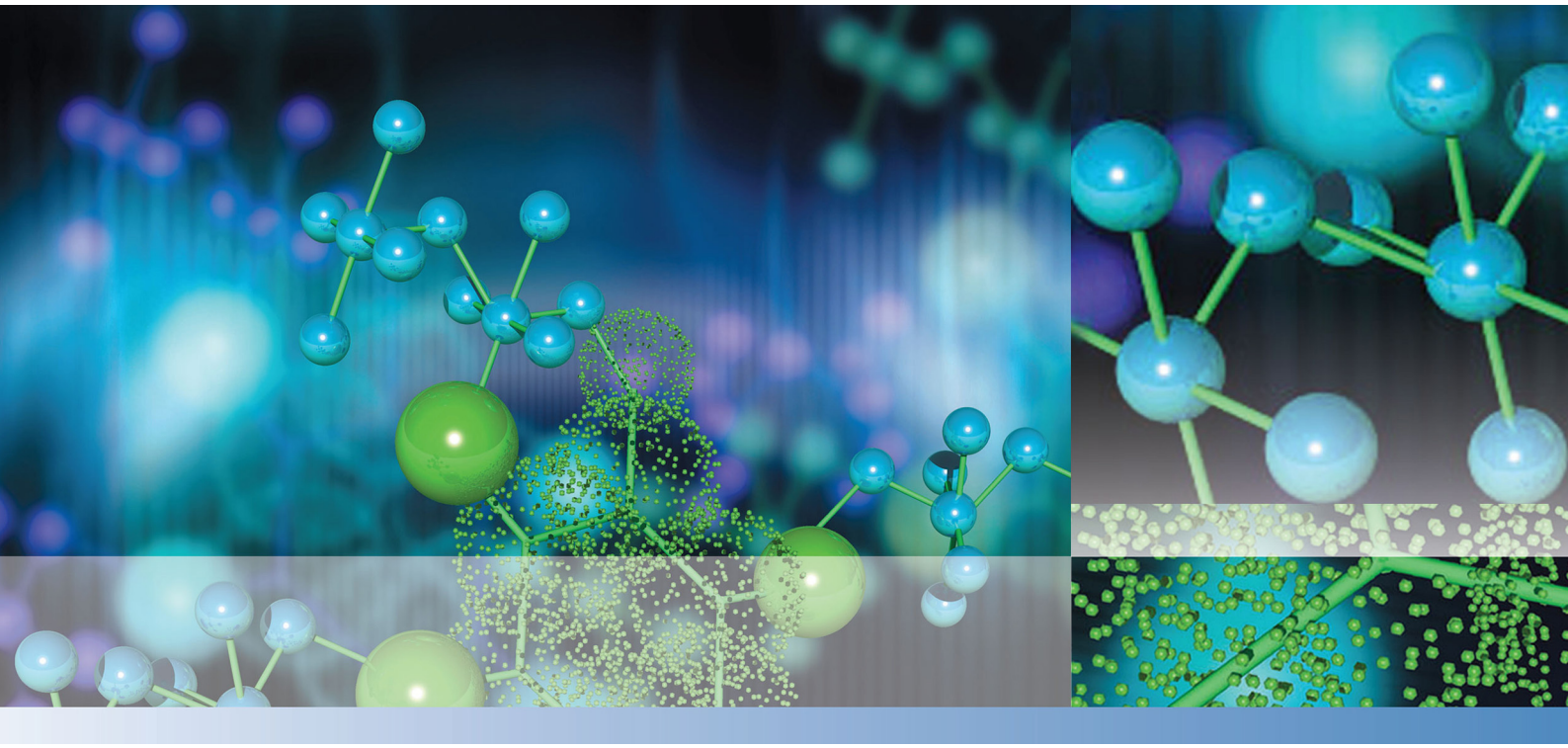
thermoscientific



Thermo Scientific

HERACELL VIOS 160i LK/ HERACELL VIOS 250i LK

CO_2 Incubator

User Manual

50162755 A **July 2022**

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Preface

General Notes

Identification of the Device and of the Documentation

Identification of the Device

Identification data

Device name:	CO_2 incubator
Type designation:	***HERACELL VIOS 160i LK***
	HERACELL VIOS 250i LK

Allocation of product documentation

Documents CD-ROM	50143971

Certifications and quality audit:

Certification:	CE Certification
Test mark:	TÜV GS, cCSAus, EAC

Instruction of the Operating Personnel

These operating instructions describe the CO_2 incubator ***HERACELL VIOS 160i LK*** / ***HERACELL VIOS 250i LK***. The CO_2 incubator has been manufactured in keeping with the latest technological developments and is operationally safe. However, the device may present potential hazards, particularly if it is operated by inadequately trained personnel or if it is not used in accordance with the intended purpose. Therefore, the following must be observed to prevent accidents:

- The CO_2 incubator must be operated only by trained and authorized personnel.
- For any operation of this device, 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 device and accessories,
  - which protective measures apply when 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.

Applicability of the Instructions

Original Document for Translation

- The contents of the operating instructions are subject to change without further notice.
- In case of conflicting translations into foreign languages the German-language version of these operating instructions shall be binding.
- Keep these operating instructions close to the device 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 Scientific immediately for your own safety.

Warranty

Requirements for Warranty

Thermo Scientific warrants the operational safety and functions of the CO2 incubator for 2 years, 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 Fisher Scientific are used,
- inspections and maintenance are performed at the specified intervals.

The Cell Locker and all accessories have a one year warranty. The warranty is valid from the date of delivery of the device to the operator.

Explanation of Safety Information and Symbols

Safety Information and Symbols used in the Operating Instructions



WARNING Indicates a hazardous situation which, if not avoided, could result in death or serious injuries.



CAUTION Indicates a hazardous situation which, if not avoided, could result in minor or moderate injuries.



CAUTION Indicates a situation which, if not avoided, could result in property damage.

Note Is used for applicational hints and useful information.

Additional Symbols for Safety Information:



Wear safety gloves!



Wear safety goggles!



Harmful liquids!



Electric shock!



Hot surfaces!



Fire hazard!



Explosion hazard!



Suffocation hazard!

Symbols on the Device



CE conformity mark: confirms conformity according to EU Guidelines



TÜV-tested safety



Mark of conformity USA/Canada



EAC conformity mark: confirms conformity according to all technical regulations of the Eurasian customs union (Russia, Kazakhstan and Belarus)



Observe operating instructions!



Hot surfaces!

Intended Purpose of the Device

Correct Use

This CO_2 incubator is designed for preparing and cultivating cell cultures, but it is not to be used for medical applications or for in-vitro-diagnostics. To that end, a controlled set of physiological ambient conditions is produced in the workspace of the device by exerting precise control of the following parameters:

- Temperature
- CO_2 content
- O_2/N_2 content
- Relative humidity

Typically, this CO_2 incubator has been designed for being installed and operated in the following areas:

- Laboratories for cytobiological and biotechnological experiments of safety levels L1, L2, and L3
- Medical-microbiological laboratories in accordance with DIN EN 12128
- Research labs in clinics and hospitals

This device is intended for professional use only and must only be operated by trained staff.

Incorrect Use

Do not use cell or tissue cultures in the device that are not in accordance with the regulations of safety levels L1, L2, and L3. Do not use tissues, substances or liquids that:

- are easily ignitable or explosive,
- release vapors that form combustible or explosive mixtures when exposed to air,
- release poisons.

Do not use the Cell lock in a medical device.

Standards and Directives

The device complies with the following standards and guidelines:

- Low Voltage Directive 2014/35/EU
- IEC 61010-1:2010+Corr. 2011, Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
- IEC 61010-2-010:2003, Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-010: Particular requirements for laboratory equipment for the heating of material
- EMC Directive 2014/30/EU
- IEC 61326-1:2012, Electrical equipment for measurement, control and laboratory use - EMC requirements, Part 1: General requirements
- FCC 47, Part 15, § 15.107, EMC regulation FCC
- FCC 47. Part 15, § 15.109, EMC regulation FCC

For other countries, the applicable national regulations are binding.

US (FCC)

"**NOTE**: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense".

Canada (ICES-001)

"This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme à la norme NMB-001 du Canada".

Safety Notes on Gases

Note Installation work:
Any work on supply lines and pressurized gas containers, cylinders or containers used for storing CO_2- or O_2/N_2 must only be carried out by expert personnel using the appropriate tools.

Note
It must be ensured that the exposure limits at work place for CO_2 and/or O_2/N_2 are not exceeded. For the Federal Republic of Germany the TRGS 900 should be observed; other countries may have different limit values. The country-specific national exposure limits at work place shall be met.

Instruction of the Personnel:

Personnel operating devices with CO_2 supply must be instructed about the particularities in the handling of CO_2 before starting their work:

- correct operation of pressurized gas containers and gas supply systems,
- obligation to report damages and shortcomings in CO_2 supply lines,
- measures to be taken in case of accidents or failures.

These instructions must be repeated at appropriate intervals and must comprise the particular operating instructions of the gas supplier.

Safety Notes on Carbon Dioxide (CO_2)

Since CO_2 is rated as a harmful gas, certain safety instructions must be observed when the CO_2 incubator is started up and when the device is operated.



Suffocation hazard!
Large amounts of carbon dioxide (CO_2) released into the room atmosphere may cause suffocation. If CO_2 is released, initiate safety measures immediately!

- Leave the room immediately and do not allow others to enter the room!
- Inform security service or fire department!

Safety Notes on Oxygen (O_2)

O_2 is a gas that promotes combustion and may explode in combination with grease-containing materials.



Oxygen explosion!
Oxygen (O_2) may explode in combination with oils, greases, and lubricants. If highly compressed oxygen comes in contact with grease- or oil-containing substances, the mixture may explode!
Control panel and display window protective foil!

- For cleaning these device components, use only oil- and grease-free lubricants.

Keep all connections and components of the oxygen system free from substances that contain oil, grease, or lubricant!



Fire hazard!

Released oxygen (O_2) promotes combustion. Do not use open flames in the vicinity of oxygen-operated systems!

- Do not smoke in the vicinity of oxygen systems.

Do not expose the components of an oxygen system to excessive heat.

Safety Notes on Nitrogen (N_2)

Nitrogen mixes easily with air. High concentrations of nitrogen reduce the oxygen content in the air.



Suffocation hazard!
Large amounts of nitrogen (N_2) released into the room atmosphere may cause suffocation. If N_2 is released, initiate safety measures immediately!

- Leave the room immediately and do not allow others to enter the room!
- Inform security service or fire department!

1

Delivery of the Incubator

Content

- "Packaging" on page 1-1
- "Acceptance Inspection" on page 1-1
- "Standard Equipment Components HERACELL VIOS 160i LK / 250i LK" on page 1-2
- "Optional Equipment Components HERACELL VIOS 160i LK / 250i LK" on page 1-2
- "Optional Equipment Components HERACELL VIOS 250i LK" on page 1-3

Packaging

The CO_2-Incubator ***HERACELL VIOS 160i LK*** / ***HERACELL VIOS 250i LK*** is delivered in a stable packaging box. All packaging materials can be separated and are reusable:

- Packaging carton: Recycled paper
- Foam elements: Styrofoam (CFC-free)
- Packaging film: Polyethylene
- Packaging ribbons: Polypropylene
- Feet: Polypropylene
- Pallet: Untreated wood

Acceptance Inspection

Upon delivery, check immediately for:

- completeness,
- possible damage.

If components are missing or damage is found on the device or the packaging, esp. damages caused by humidity and water, please contact the carrier as well as the customer service immediately.

Standard Equipment Components *HERACELL VIOS 160i LK / 250i LK*

Quantity of components supplied	Pieces
Water reservoir cover panel	1
Max. water level sensor	1
Rear wall air duct	1
Air duct top	1
Airbox with sealing package	1
Prefilter	1
Shelves	3
Support rails for shelves	4
Shelf support for inserts	6
Plug for access port	1
Power Cord	1
CO_2 connecting hose set	1
User Manual	1
Quick-release connector with hose for water draining	1

Optional Equipment Components *HERACELL VIOS 160i LK / 250i LK*

Components delivered with oxygen supply control option	Pieces
O_2 sensor head	1
O_2 connecting hose set	1
Components delivered with CO_2 gas tank monitor option	
CO_2 gas tank monitor connecting hose set	1
Components delivered with O_2/N_2 gas tank monitor option	
O_2 connecting hose set/N_2 gas tank monitor	1
Components delivered with filter option	
HEPA-filter or VOC filter	1
Optional equipment components 4...20mA interface	
Connector 4...20mA	1

Optional Equipment Components *HERACELL VIOS 160i LK*

Components	Pieces
Threefold gas-tight screen	1
6-fold gas tight screen	1
Cell locker	6
Water funnel	1

Optional Equipment Components *HERACELL VIOS 250i LK*

Components delivered with 250 liter units with split inserts	Pieces
Support brackets	3
Split inserts	6
Sixfold gas-tight screen	1

2

Installation of the Device

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- "Space Requirements" on page 2-2
- "Transport" on page 2-3
- "Stacking" on page 2-3
- "Retrofitting/Modifications" on page 2-11

Environmental Conditions

The device must only be operated at locations that meet the particular ambient conditions listed below:

Requirements:

- Draft-free and dry location.
- The minimal distance to adjacent surfaces must be observed on all sides, see "Space Requirements" on page 2-2.
- The operating room must be equipped with appropriate room ventilation.
- Solid, level, fire-proof surface.
- Vibration-proof substructure (floor stand, lab table) capable of bearing the weight of the device and of accessories (particularly if several devices are stacked).
- The electrical system of the device has been designed for an operating height of up to 2000 m above sea level.
- To ensure a constant incubation temperature of 37 °C, the ambient temperature must be within a range of +18 °C to +34 °C.
- Relative humidity up to 80% (max.).
- No direct exposure to sunlight.
- Devices that produce excessive heat must not be placed near the location of ***HERACELL VIOS 160i LK*** / ***HERACELL VIOS 250i LK***

Room Ventilation

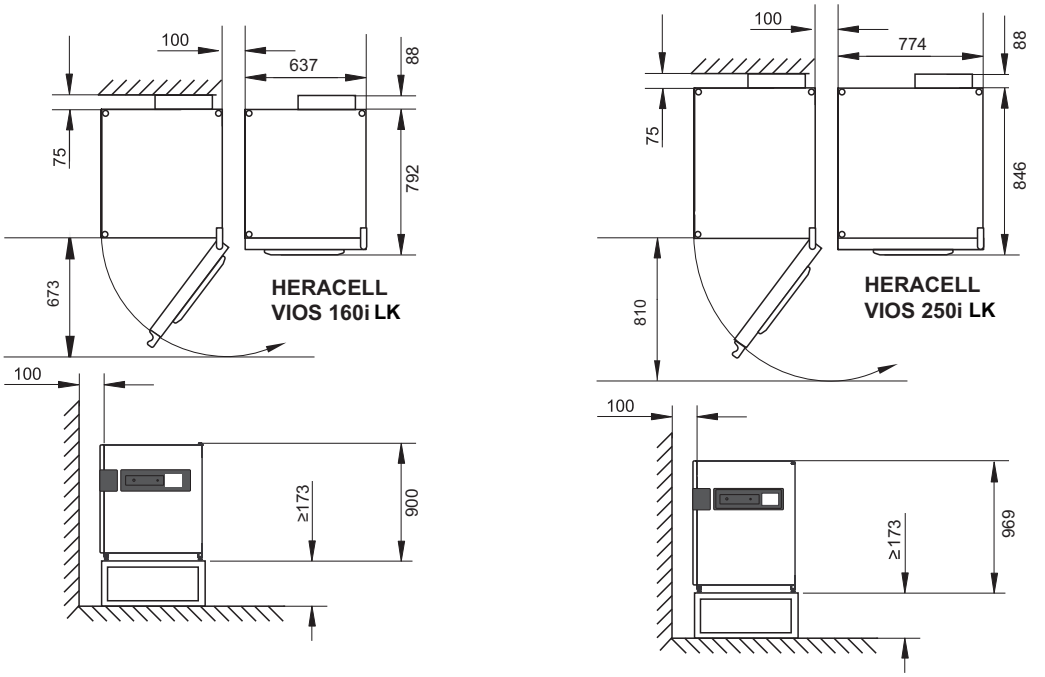
When CO_2-/O_2-/N_2 is supplied, the workspace of the incubator is slightly pressurized. The pressure is released through the pressure compensation opening into the operating room.
Pressure compensation and any opening of the glass door/gas-tight screen during the operation of the device will release very small quantities of CO_2-/O_2-/N_2 into the operating room. The room ventilation must be capable of carrying the released gas safely off into the open.
In addition, heat dissipating from the device during continuous operation may cause a change in the room climate.

- Therefore, the ***HERACELL VIOS 160i LK*** / ***HERACELL VIOS 250i LK*** must only be installed in rooms with sufficient ventilation.
- Do not install the device in room recesses without ventilation.
- The room ventilation should be a technical ventilation that complies with the national requirements for laboratories or some other suited ventilation system with appropriate capacity.

Space Requirements



WARNING EMERGENCY STOP!
The mains socket must be accessible at all times for the case of an EMERGENCY STOP. The mains socket must be easily identifiable by the user and freely accessible at all times.



All dimensions in mm.

Figure 2-1. Device Dimensions

Note Accessibility of the devices:
To ensure the accessibility for care and maintenance works, keep larger side and rear distances. The swivel-out for units with 6-fold gas tight screen with Cell locker must have a clearance to the wall directly at the hinge side of >= 31 cm / 12.2".

Transport

For transport, do not lift the device using the doors or components attached to the device (e.g. control box on rear panel) as lift points.

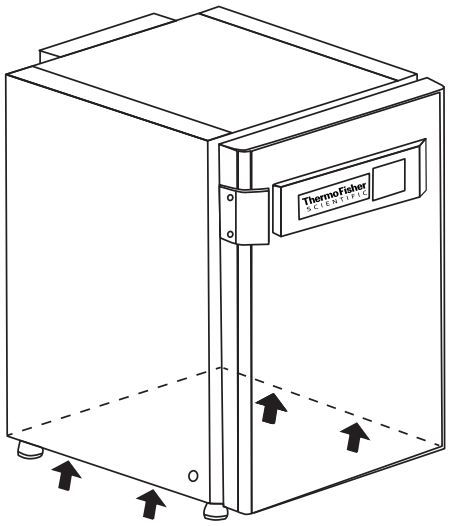


Figure 2-2. Lift Points

Note Lift points:
Lift the device only using the lift points.



CAUTION Heavy loads! Lift with care!
To avoid injury through physical strain, such as strain traumata and slipped discs, do not attempt to lift the incubator alone!
To avoid injury through dropped loads, be sure to wear Personal Protection Equipment, such as safety shoes, when lifting the incubator.
To avoid crushing your fingers or hands (particularly in a closing door) or damaging the incubator, do not use any other lift points than those indicated in the illustration above.

Stacking

HERACELL VIOS 160i LK / ***HERACELL VIOS 250i LK*** is suited for stacking up to two devices of the same device type. This is accomplished by placing an optional stacking adapter (1/Figure 2-3) between the two units.

As an option, a mobile base rack (2/Figure 2-3) is available in order for the units to be movable.

As an alternative other support frames without castors (4/Figure 2-3) can be used for stacking up two devices.

Note
When installing the stacking adapter and stacking the units, follow the assembly instructions delivered with the stacking adapter.

Note Moving stacked devices:
Before moving stacked devices, be sure to remove the support brackets!
Stacked devices provided with a mobile base rack must only be moved inside rooms on even floors without any slopes.

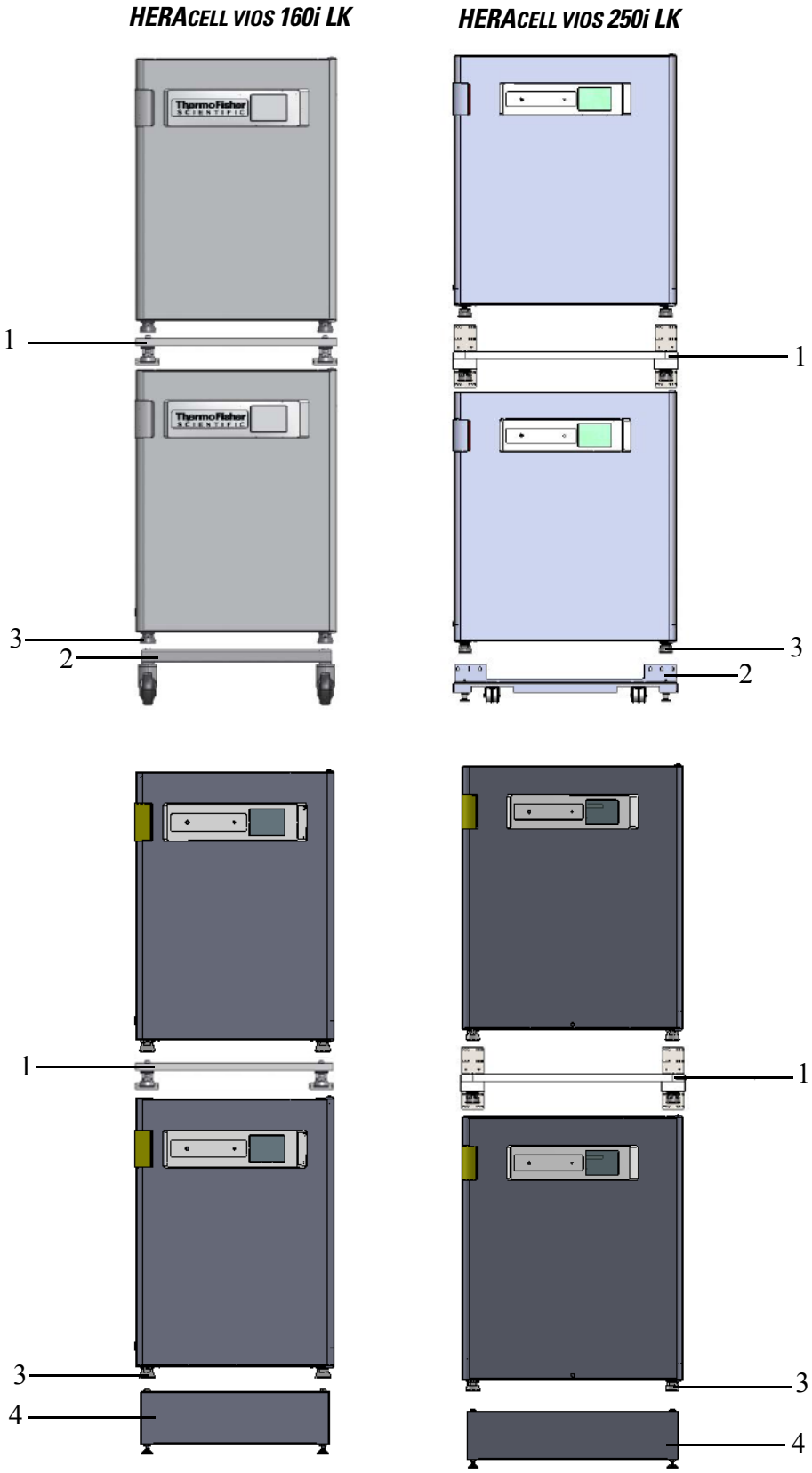


Figure 2-3. Stacking

1. Place the lower unit with the device stands (3/Figure 2-3) on the stacking elements (1/Figure 2-4) on top of the mobile base rack (2/Figure 2-4) or the support frame without castors (4/Figure 2-3).

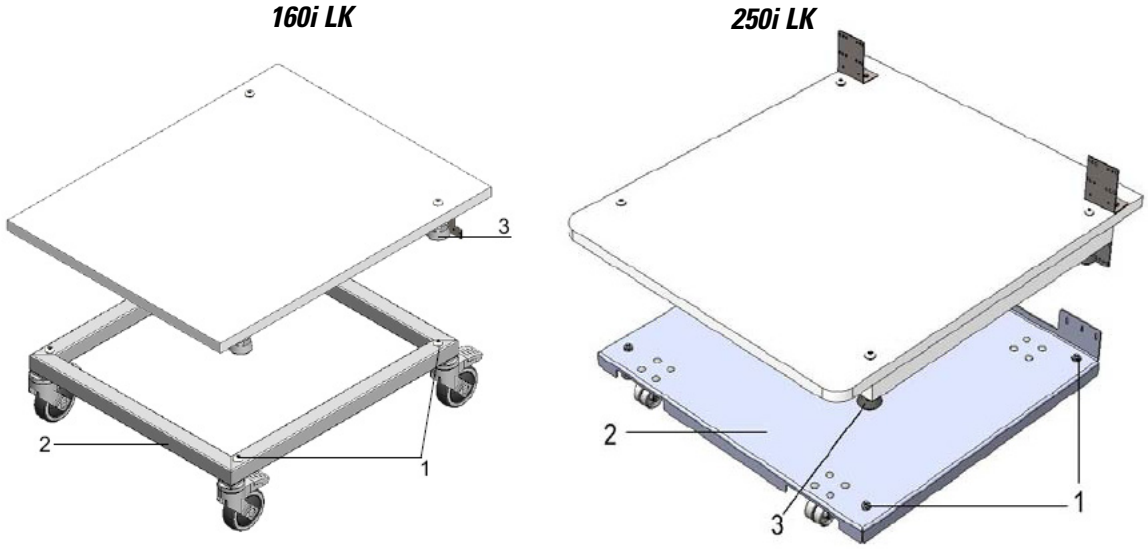


Figure 2-4. Stacking Adapter and Base Rack with Stacking Elements

2. Place bottom of adapter plate (7/Figure 2-5) on the top panel of the lower unit (8/Figure 2-5).
3. On both sides, align the bores in the connecting tab (9/Figure 2-5) of the adapter plate (7/Figure 2-5) with the bores in the rear wall of the lower unit (8/Figure 2-5).

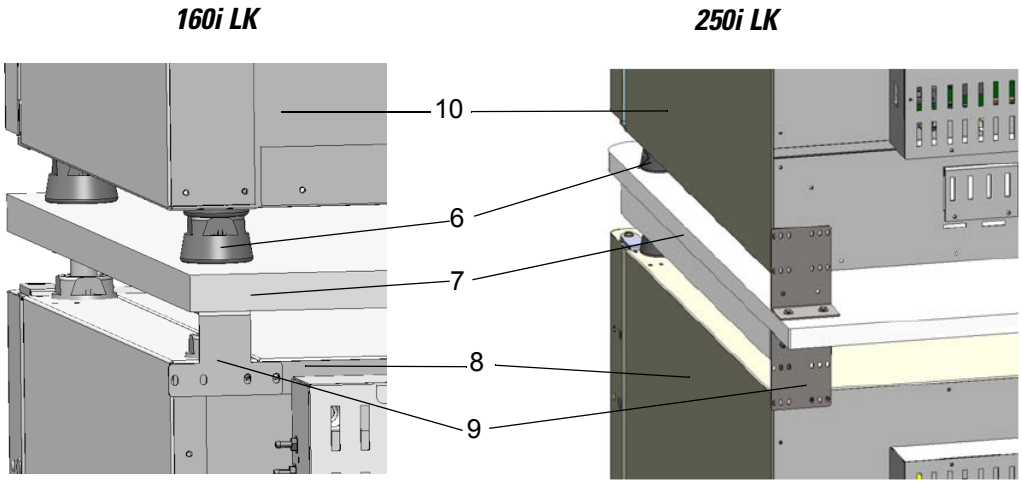


Figure 2-5. Fastening the Adapter Plate to the Lower Unit

4. Use the fastening screws supplied to bolt the adapter plate (7/Figure 2-5) to the rear wall of the lower unit (8/Figure 2-5).
5. Fasten adapter plate (7/Figure 2-5) to the opposite corner of the unit using two screws.
6. Place the device to be stacked with the device stands (6/Figure 2-5) onto the stacking elements (1/Figure 2-4) at the top of adapter plate.

The devices are secured to one another by their own weight, only for the adapter plate (7/Figure 2-5) to the upper unit (10/Figure 2-5).

7. Remove the four screws at the top rear edge of the upper device, as indicated by the arrows in Figure 2-6.

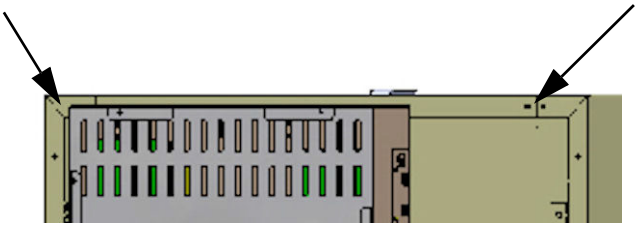


Figure 2-6. Removing the Screws for the Wall Brackets

8. Bend both ends of the wall brackets (4/Figure 2-7) by an angle of approx. 90 degrees to obtain two rectangular tabs.
9. Use the four screws to secure the wall bracket to the back of the device, with the tab facing downward on the device side.
10. Make sure that the stacking feet of the upper device are correctly aligned on the stacking adapter.
11. Secure the wall brackets to a load-bearing structural part of the building using suitable mounting hardware, such as wood screws and wall plugs.

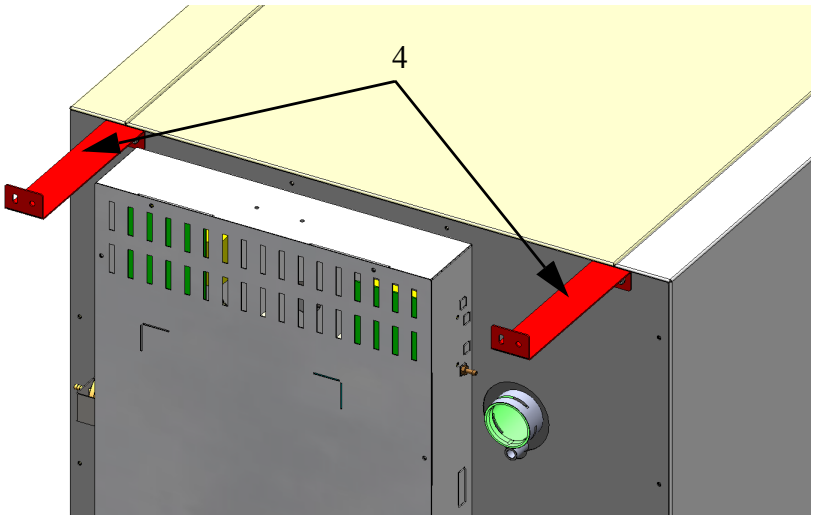


Figure 2-7. Mounting the Wall Brackets



CAUTION Risk of tipping and dropping of stacked devices!
To avoid the risk of tilting of the device, the support bracket must be installed to a structural part of the building that is capable of bearing the extra load. The installation must be carried out by qualified personnel only. For connecting the wall bracket to the building structure, be sure to use appropriate screws and wall plugs with a load rating of at least 25 kg (55 lbs.).



CAUTION Transporting stacked devices!
Stacking elements are no connection elements. Stacked devices provided with a mobile base rack must only be moved inside rooms on even floors without any slopes.

Note Fastening on mobile racks:
If the devices are installed onto mobile racks, make sure that the rollers are secured with a locking brake (if existing) during the operation of the incubators and that the rollers are oriented toward the front for increased stability.

Condensate formation during the operation of stacked devices:
As a rule when operating stacked devices of type ***HERACELL VIOS 160i LK*** and ***250i LK***, an adapter plate should be placed between the two devices for thermal separation.
If stacked devices are operated at an ambient temperature of more than 28 °C, an overtemperature alarm is triggered on the upper device while the steri-run decontamination routine is run for the lower device. Condensate formation may then occur on the upper device.

Stacking variants

Possible stacking combinations		Bottom stacking position			
		HERAcell Vios 160i LK Steri-Cycle i160 LK	HERAcell Vios 250i LK Steri-Cycle i250 LK	HERAcell 150i	HERAcell 240i
Top stacking position	HERAcell Vios 160i LK Steri-Cycle i160 LK	50148171	50154522	50148172	
	HERAcell Vios 250i LK Steri-Cycle i250 LK		50154522		50148175

Details see assembly instruction of stacking adapter kit.

Installing the Support Stand with Castors



Figure 2-8. Support Stand with Castors without Supporting Feet (160i LK Unit)

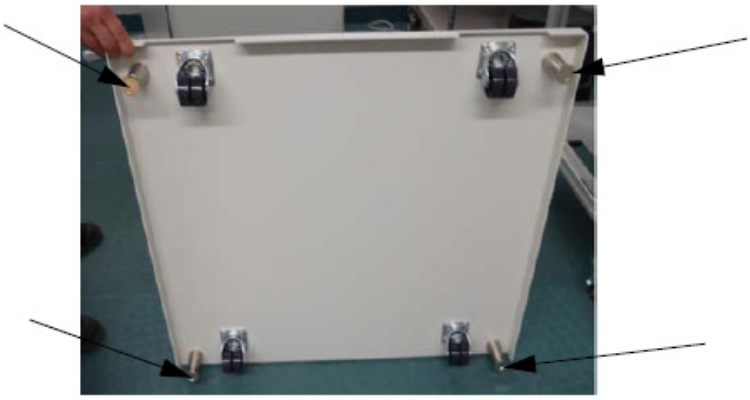
CAUTION Providing Stability
Make sure that the support stand castors are locked during operation of the device and that the castors are facing forward.

- Lock the support stand with the paddle (3/Figure 2-8) at the top side of the castors.
- Position unit with unit feet (1/Figure 2-8) matching all 4 staple pads (2/Figure 2-8).
  For positioning, lift the device only using the lift points (Figure 2-2). Do not lift the device by using the doors or components attached to the device (e.g. control box on rear panel) as lift points.

Support Stand with Castors and Supporting Feet (160i LK and 250i LK Unit)

Scope of Delivery

1 support stand, 6 screws M4x16



- Remove the 6 screws at the lower rear side of the unit. They will be replaced with the six new supplied screws.

- Place the unit on the support stand, matching the nuts of the supporting feet. Make sure, that the holes of the removed screws are matching with the holes in the angles of the support stand.
- Screw in the 6 new supplied screws and tight them.

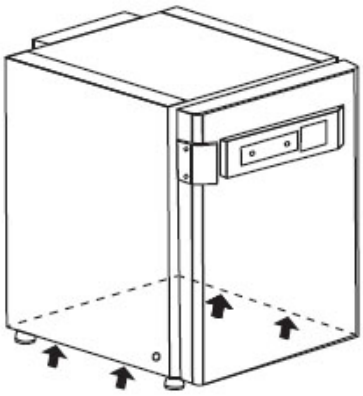


- Push the support stand with the assembled unit careful to the intended location.

Note
Please screw in the supporting feet with a pipe wrench before using the support stand to move the unit.

- Adjust the support stand by screwing the supporting feet with a pipe wrench until it stands level.

CAUTION Providing Stability
Make sure that the supporting feet are screwed out and adjusted with a pipe wrench after positioning it at its intended location.



Note
Lift the device only by using the lifting points.

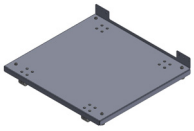
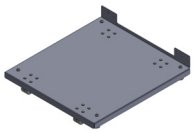
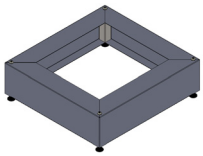
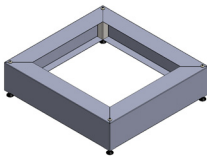
CAUTION Heavy loads! Lift with care!
To avoid injury through physical strain, such as strain traumata and slipped discs, do not attempt to lift the incubator alone!
To avoid injury through dropped loads, be sure to wear Personal Protection Equipment, such as safety shoes, when lifting the incubator. To avoid crushing your fingers or hands (particularly in a closing door) or damaging the incubator, do not use any other lift points than those indicated in the illustration above.



CAUTION
Tilting of units on a support stand with castors.



Moving units must be done very carefully. Ungentle slow down or accelerating of the unit or units may result in tilting from the support stand with castors. Don‘t move with front door open. The support stand with castors should only be used for the near vincinity of the installation side, inside the laboratory, not for transportation purposes.

Material Number	Support stand Options	Description
50145394		Support stand with castors for HERAcell VIOS 160i LK and Steri-Cycle i160 LK
50154407		Support stand with castors for HERAcell VIOS 160i LK and Steri-Cycle i160 LK
50154551		Support stand with castors for HERAcell VIOS 250i LK and Steri-Cycle i250 LK
50145435		Support frame for double chamber, 200 mm high (without castors) for HERAcell VIOS 160i LK and Steri-Cycle i160 LK
50145436		Support frame for single chamber, 780 mm high (without castors) for HERAcell VIOS 160i LK and Steri-Cycle i160 LK
50149102		Support frame for double chamber, 200 mm high (without castors) for HERAcell VIOS 250i LK and Steri-Cycle i250 LK
50149125		Support frame for single chamber, 780 mm high (without castors) for HERAcell VIOS 250i LK and Steri-Cycle i250 LK

Retrofitting/Modifications

The following components can be retrofitted to the standard version:

HERACELL VIOS 160i LK

- threefold gas-tight screen (the gas-tight screen is installed in place of the glass door),
- door hinge replacement on outer door and glass door,
- 6-fold gas tight screen with Cell locker,
- lockable outer door,
- infrared (IR) CO_2 sensor (replaces the standard TCD sensor),
- 4-20 mA data interface.
- gas cylinder monitor

HERACELL VIOS 250i LK

- threefold gas-tight screen (the gas-tight screen is installed in place of the glass door),
- door hinge replacement on outer door and glass door,
- lockable outer door,
- split inserts,
- infrared (IR) CO_2 sensor (replaces the standard TCD sensor),
- 4-20 mA data interface.
- gas cylinder monitor

Note Modifications:
Retrofittings and modifications must only be performed by the Technical Service of Thermo Electron LED GmbH.

3

Description of the Device

Table of Contents

- "HERACELL VIOS 160i LK / VIOS 250i LK Front View" on page 3-2
- "HERACELL VIOS 160i LK / VIOS 250i LK Rear View" on page 3-4
- "Safety Devices HERACELL VIOS 160i LK / VIOS 250i LK" on page 3-6
- "Workspace Atmosphere" on page 3-6
- "Door Switch" on page 3-10
- "Sensor System" on page 3-11
- "Supply Interface" on page 3-13
- "Workspace Components" on page 3-17

HERACELL VIOS 160i LK / VIOS 250i LK Front View

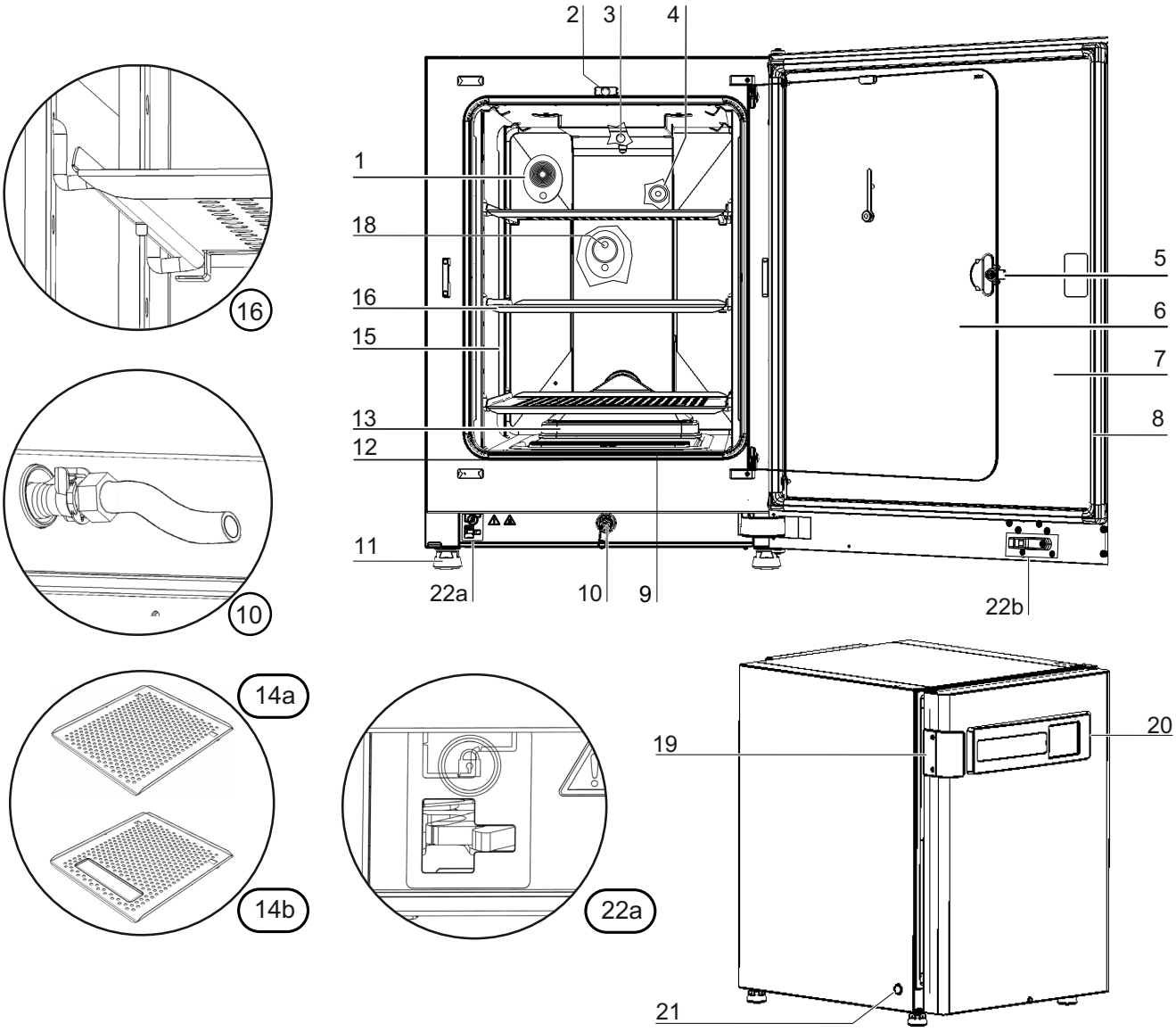


Figure 3-1. ***HERA CELL VIOS 160i LK / VIOS 250i LK*** Front View

1. Pressure compensation opening /Access port with plug
2. Door switch for glass door
3. Temperature Sensor
4. O_2 sensor (optional)
5. Door handle for the glass door or the gas-tight screen
6. Glass door or gas-tight screen (optional)
7. Outer door
8. Magnetic door seal, replaceable
9. Prefilter
10. Water drain
11. Stand, height-adjustable
12. Glass door seal, replaceable
13. Airbox with seal and HEPA-filter
14. -
15. Support rail
16. Insert with shelf support
17. -
18. IR CO_2 sensor
19. Door handle, outer door
20. iCan™ Touchscreen (Control panel)
21. Power switch
22. a = Electromechanical door lock / b - Closing hook on outer door (only on devices ordered with the door lock option)

HERACELL VIOS 160i LK / VIOS 250i LK Rear View

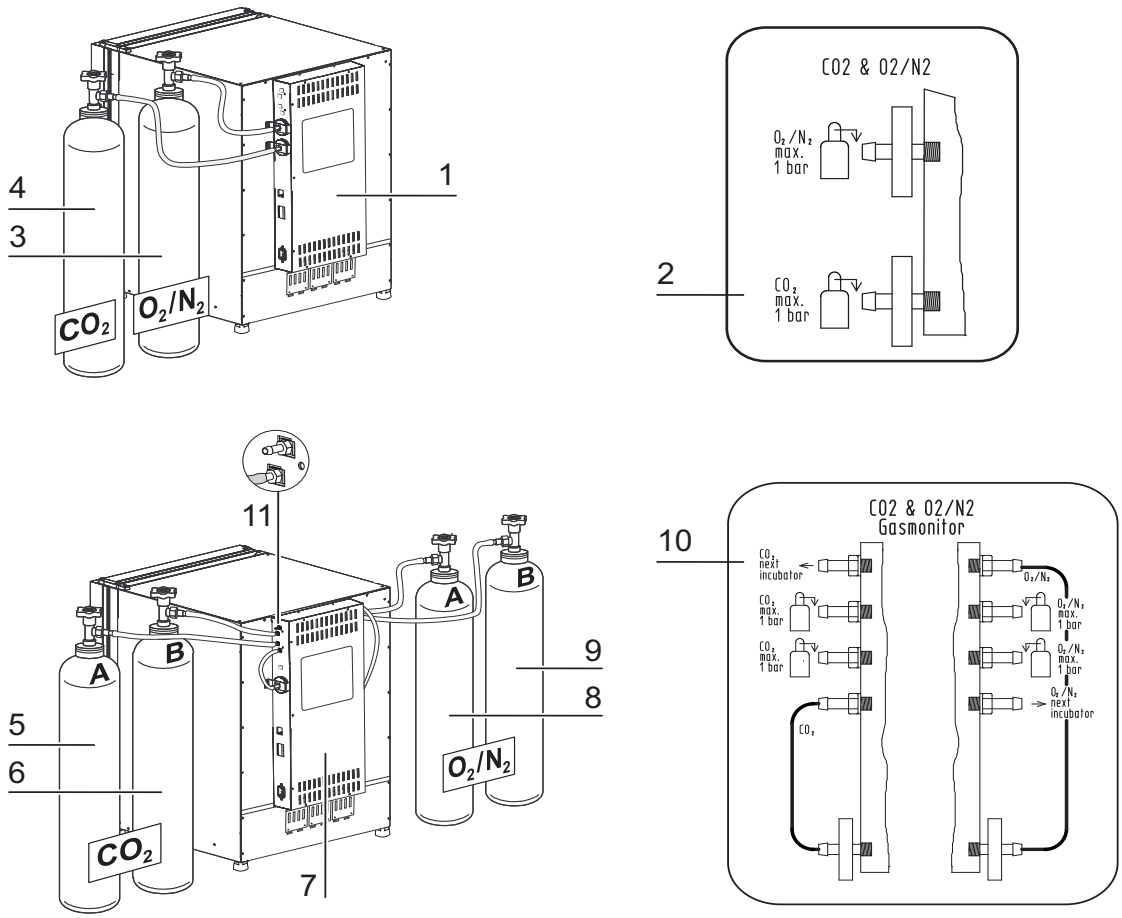


Figure 3-2. ***HERACELL VIOS 160i LK / VIOS 250i LK*** Rear View

1. Control box with supply interface for combined gas connection (optional) CO_2 and O_2/N_2 without gas monitoring
2. Diagram: CO_2 and O_2/N_2 gas connection without gas monitoring
3. O_2 /N_2 gas cylinder
4. CO_2 gas cylinder
5. Primary CO_2 gas supply A with optional gas monitoring
6. Secondary CO_2 gas supply B with optional gas monitoring
7. Control box with supply interface for combined gas connection (optional) CO_2 and O_2 /N_2 with gas monitoring (optional)
8. Primary O_2-/N_2 gas supply A with optional gas monitoring
9. Secondary O_2-/N_2 gas supply B with optional gas monitoring
10. Diagram: CO_2 and O_2/N_2 gas connection with optional gas monitoring

11. Distributor connection for looping through the CO_2 gas supply for up to three additional devices (independent of device type)

    Hidden: Distributor connection for looping through the O_2-/N_2 gas supply for three additional devices, opposite to the control box

Looped-through Gas Supply at *HERACELL VIOS 160i LK / HERACELL VIOS 250i LK*

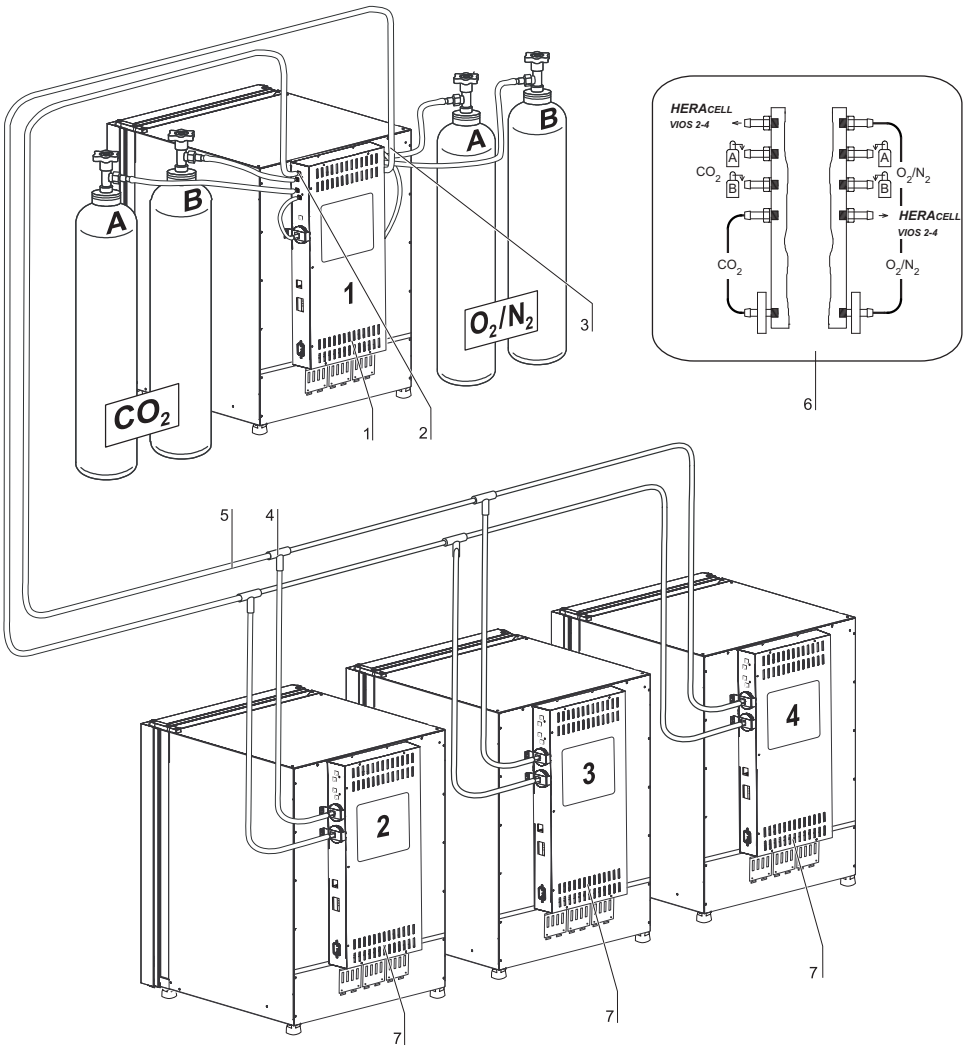


Figure 3-3. Looped-through Gas Supply *HERACELL VIOS 160i LK / HERACELL VIOS 250i LK*

1. Control box with supply interface for combined gas connection (optional) CO_2 and O_2/N_2 with gas monitoring (optional)
2. Distributor connection for looping through the CO_2 gas supply for up to three additional devices (independent of device type)
3. Distributor connection (hidden) for looping through the O_2-/N_2-gas supply for three additional devices (independent of device type)
4. Tee joint for fitting the gas pressure hoses together

5. Gas pressure hose for looping-through the gas supply
6. Diagram: CO_2 and O_2/N_2 gas connection with optional CO_2 and O_2 gas monitoring
7. ***HERACELL VIOS 160i LK*** / ***HERACELL VIOS 250i LK*** with looped-through gas supply; therefore the device must only be equipped with combined gas connection (optional) CO_2 and O_2/N_2.

Safety Devices *HERACELL VIOS 160i LK / VIOS 250i LK*

The device is equipped with the following safety devices:

- A door switch interrupts the $CO_2/O_2/N_2$ supply and the workspace heating when the glass door is opened.
- When operated with the gas monitoring option, a gas monitor switches the gas supply to a full gas tank.
- An overtemperature protection protects the samples from harmful overheating in case of failures.
- A pressure compensation opening ensures pressure compensation in the device workspace.
- The alarm relay circuit uses audible and visual alarms to indicate errors during operation.

Workspace Atmosphere

In the workspace of the incubator, the particular physiological ambient conditions for the preparation and cultivation of cell and tissue cultures are simulated. The workspace atmosphere is determined by the following factors:

- Temperature
- Relative humidity
- CO_2 concentration
- O_2 concentration (optional)

Temperature:

To ensure undisturbed operation, the temperature in the operating room must be at least 18 °C and the incubation temperature must exceed this temperature by at least 3 °C.
The heating system controls the incubation temperature from this temperature threshold up to 55 °C. By heating the inner compartment with independent heater circuits and by separately heating the outer door in addition, condensation is prevented on the sidewalls and the ceiling of the workspace and the glass door or gas-tight screen.

Relative Humidity:

The heating of the workspace promotes the condensation of the water, thereby ensuring a constant humidity within the workspace. For continuous operation, a sufficient quantity of processed water with the recommended water quality must be provided:

- max. fill volume for ***HERACELL VIOS 160i LK*** and ***HERACELL VIOS 250i LK***: 3 l.

Water Quality Recommendations:

For trouble-free operation, fill the water reservoir with sterilized distilled water or water treated to an equivalent quality level. The acceptable conductivity should be within the range of 1 to 20 µS/cm (resistivity should be within the range of 50 kOhmcm to 1 MOhmcm).



CAUTION Termination of warranty!
Using chlorinated tap water or additives that contain chlorine will void the manufacture warranty. Similarly, the use of ultrapure water whose conductivity is out of the range of 1 to 20 µS/cm and whose resistivity is out of the range of 50 kOhmcm to 1 MOhmcm will void the manufacture warranty.
If you should have any questions, please contact Technical Support of Thermo Fisher Scientific.



CAUTION No tap or ultrapure water in humidity reservoir
Sterile distilled water or water treated to an equivalent quality level is the recommendation for use in the integrated humidity reservoir. The acceptable conductivity should be within the range of 1 to 20 µS/cm (resistivity should be within the range of 50 K-Ohm-cm to 1 M-Ohm-cm). The pH should be in the range of 7-9. Ultrapure Type 1 water or deionized (DI) water with a resistivity approaching or equal to 18.2 M-Ohm-cm, contains very few ions and will actively pull ions from interior components, damaging stainless steel, copper, and glass. If there is only access to DI or Type 1 water, one option is to add a sterile solution of weak sodium bicarbonate to raise the pH and add ions (recommend 84 mg/l (1 mmol/l).



CAUTION No chloride containing disinfectants
While stainless steel is resistant to corrosion, it is not corrosion proof. Many chemicals have a negative effect on stainless steel, especially chlorine and derivatives with oxidizing activity.
The addition of chloride-containing disinfectants or copper sulfate into the water as a constant disinfectant is not recommended because these can damage the connecting stainless steel/copper joint of the drain.For cleaning the interior, the recommendation is mild soap solution in water then rinse to remove residues. Wipe the interior surfaces and parts with a diluted quaternary ammonium disinfectant. Follow this by wiping with 70% alcohol to remove any remaining traces of the disinfectant.

Under normal operating conditions and at the usual incubation temperature of 37 °C, a constant relative humidity of approx 93% is achieved in the workspace.
If condensation occurs on the culture containers due to high relative humidity, the humidity in the workspace can be set to a lower level. The relative humidity in the workspace is lowered from approx. 93% to approx. 90%. The modification requires an extended adaption phase. To ensure that it effectively prevents dew formation on culture containers, it must be used as a permanent setting.

Instructions for activating the Low Humidity function are given in section “Low Humidity Setting“ on page 6-33.

Prefilter

Placed on the front section of the water reservoir cover is a pre-filter. The pre-filter consists of a dual-layer wire mesh with a silicone frame and is autoclavable as well as heat-resistant. The pre-filter must remain installed in the device during the Steri-run decontamination routine, but needs to be removed for refilling the water reservoir.

HEPA-Filter and Air Duct

The air stream from the water reservoir towards the workspace is channeled through a HEPA-filter in order to minimize the risk of contamination. The filter works with separation rate of 99.998 % for a particle size of 0.3 µm (HEPA-filter quality).

The HEPA-Filter (2/Figure 3-4) must be inserted into the airbox (1/Figure 3-4) from below. The airbox rests on the water reservoir cover panel (2/Figure 4-6) and is pushed against the air intake.

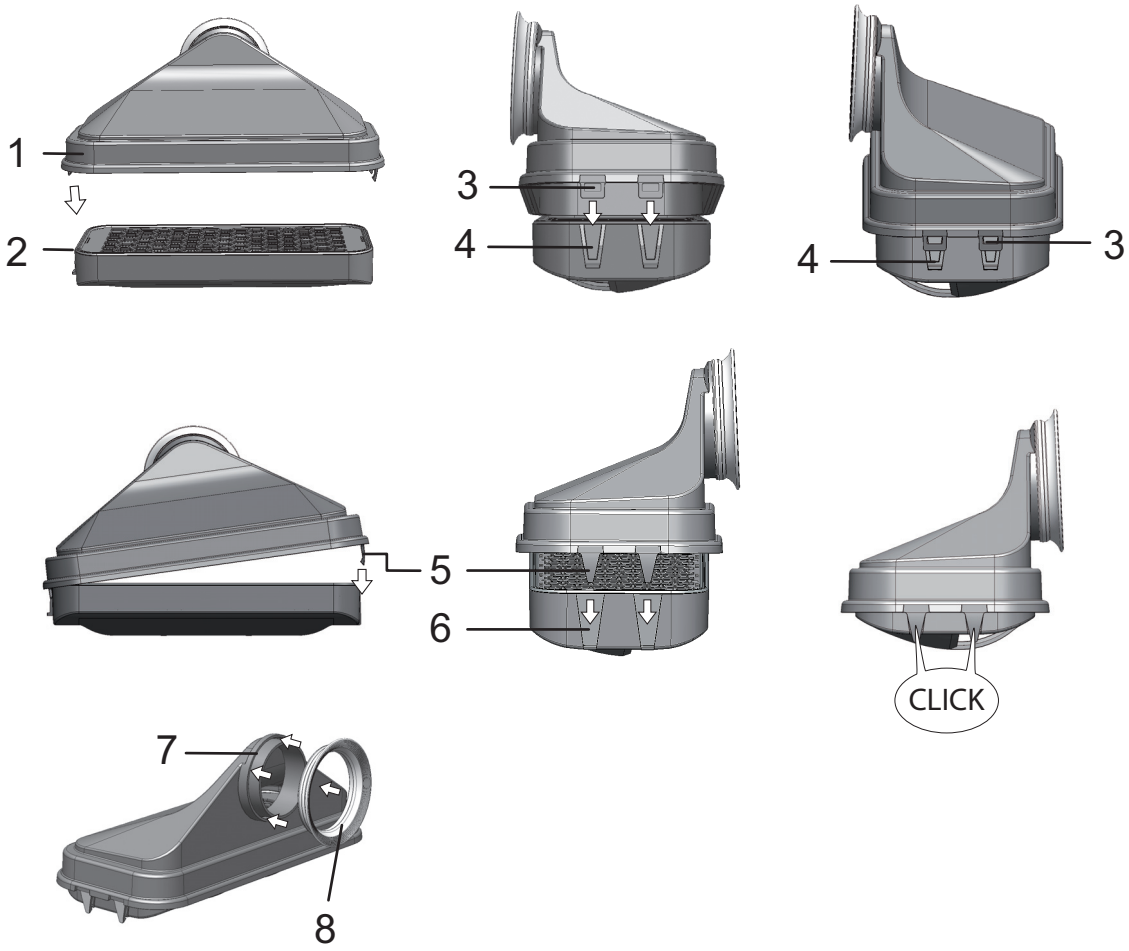


Figure 3-4. HEPA-Filter and Airbox

Instructions for activating the HEPA-filter monitor are given in section "Activating / De-Activating the HEPA-Filter:" on page 6-39.

The air duct feeds the flow of air from the fan along the rear wall (3/Figure 3-5) to the workspace ceiling, thus ensuring an optimum temperature distribution. At the same time, it directs the incoming stream of process gases into workspace and ensures that the gases are optimally intermixed.

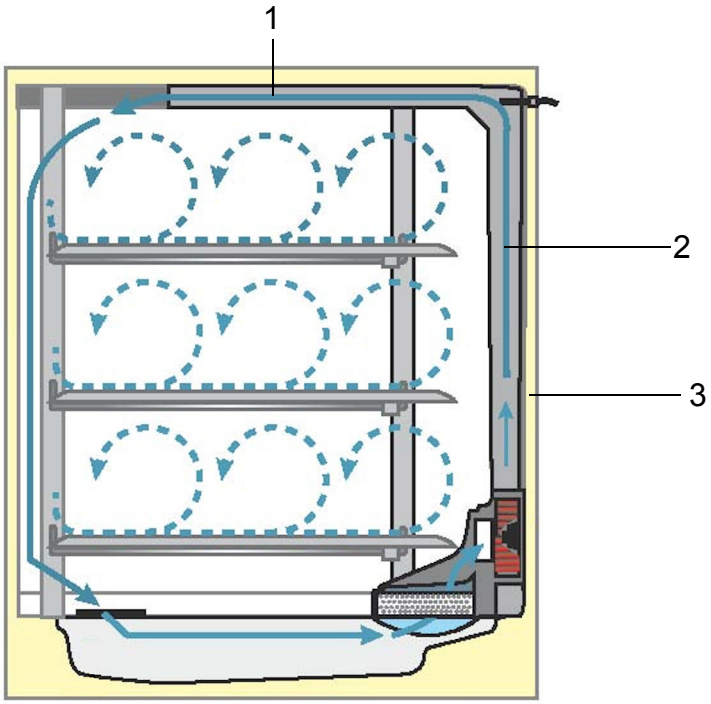


Figure 3-5. Air Duct

The air duct consists of two shaped pieces of sheet metal:

1. Ceiling duct (1/Figure 3-5)
2. Rear wall duct (2/Figure 3-5)
3. Back wall of the workspace (3/Figure 3-5)

The air duct and HEPA-filter can be installed and removed without any tooling.

CO_2 Supply:

To ensure the growth conditions for the cell and tissue cultures, the workspace is supplied with CO_2. The pH of the bicarbonate-buffered culture media largely depends on the CO_2 content of the workspace atmosphere.
The CO_2 content of the workspace atmosphere can be controlled within a range of 0-20 %.
The supplied CO_2 must have one of the following quality characteristics:

- Purity 99.5 % min
- medical gas quality.

O_2 Supply:

If the CO_2 incubator is to be operated with more than 21 % oxygen, the workspace is supplied with oxygen (optional).
The O_2 content of the workspace atmosphere can be controlled within a range of 21 % to 90 %.

Operation with higher oxygen concentrations requires that the fire protection caution notes in Preface in the section Safety Notes on Gases on page 7 be heeded.

N_2 Supply:

If the oxygen content during operation is to be lowered to less than 21% (air oxygen content), the workspace is supplied with nitrogen. The O_2 concentration in the workspace atmosphere can be controlled depending on sensor technology.

Door Switch

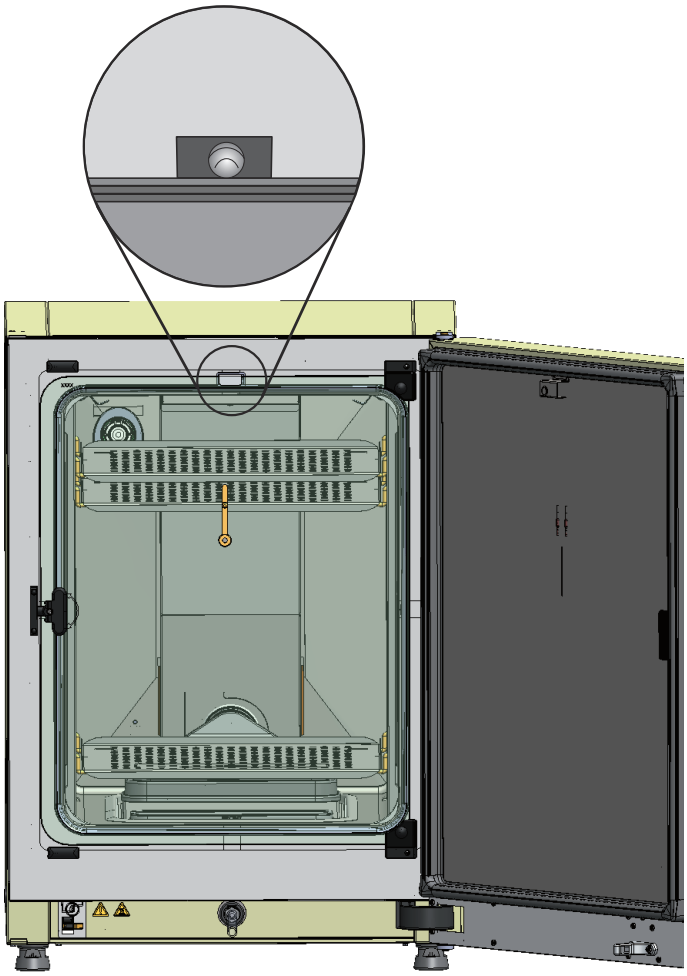


Figure 3-6. Door Switch

A door switch is installed at the upper edge of the workspace opening. When the door switch is activated by opening the glass door, the gas supply and workspace heating are suspended. The display shows a corresponding message.
An alarm sounds, if the door is open longer than 30 seconds. If the door remains open for more than 10 minutes, an audible alarm sounds and the alarm relay responds.
The outer door can only be closed after the glass door has been latched properly.

Note Versions with gas-tight screen:
For devices with the optional gas-tight screen, the door switch function described above is activated when the outer door is opened.

Sensor System

Mounted in the rear wall of the workspace are the fan wheel and the sensor modules:

- Sensor for the acquisition of the workspace temperature and the overtemperature protection (1/Figure 3-7).
- O_2 sensor (optional) for the acquisition of the oxygen content in the workspace atmosphere (2/Figure 3-7).
- CO_2 sensor for the acquisition of the CO_2 content in the workspace atmosphere (3/Figure 3-7). Depending on the configuration, a TCD sensor or IR sensor (option) is mounted in this location.
- rH sensor for monitoring the humidity of the workspace atmosphere (4/Figure 3-7). The rH sensor (option) teams up with the TCD sensor to provide for humidity compensation. It is not present on units operated with an IR sensor.

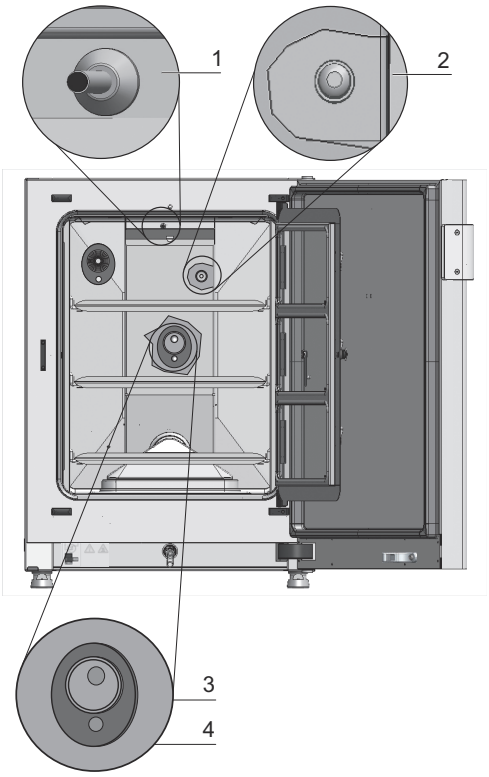


Figure 3-7. Temperature, O_2, CO_2 and Humidity Sensors

- The water level sensor (1/Figure 3-8) alerts the user when the water reservoir (2/Figure 3-8) needs to be refilled. When the water reservoir level falls to 0,5 l, the display field **rH** shows **Error - rH - No water** (see also “Error Messages“ on page 6-45).

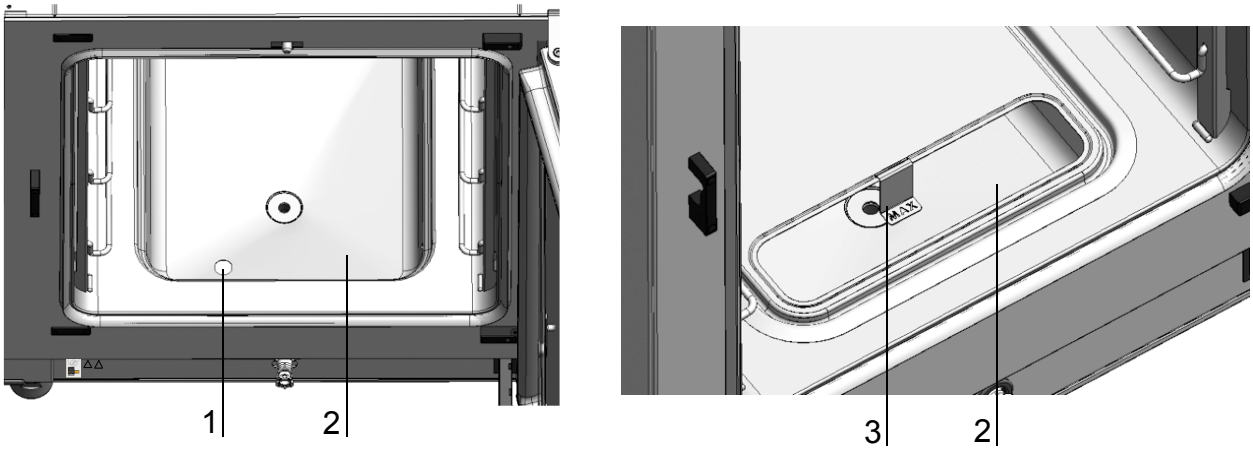


Figure 3-8. Sensors for Water Level

- Additionally, a mechanical/visual indicator for the maximum water level is available to assist the user in filling the water reservoir (see/Figure 3-8).

The sensor for the acquisition of the workspace temperature as well as the CO_2 sensor and the optional O_2 sensor are integral to the control system of the device. Their measured values are compared to the selected set values. Based on this data, the control system controls heating and CO_2-/O_2-/N_2 supply. The fan ensures that the incoming gases are well intermixed with the humidified air, thus providing for an even temperature distribution throughout the workspace.

The overtemperature protection feature is factory-preprogrammed and requires specially trained service personnel in case changes are needed. It protects the stored cultures from overheating.
If the set temperature is exceeded by more than 1°C, the thermal protection responds and the workspace temperature is automatically reduced to the selected set value so that the incubation process can be continued even in case of a failure. Any response of the thermal protection will simultaneously trigger a visual alarm. If the thermal protection is enabled:

- An error message (Temp.-Actual value high) and an acoustic alarm signal are issued,
- the alarm relay responds.

If the error message is accepted, the display shows the Overtemperature icon to indicate the response of the thermal protection, and the temperature display is highlighted in red.

Supply Interface

Standard Interfaces

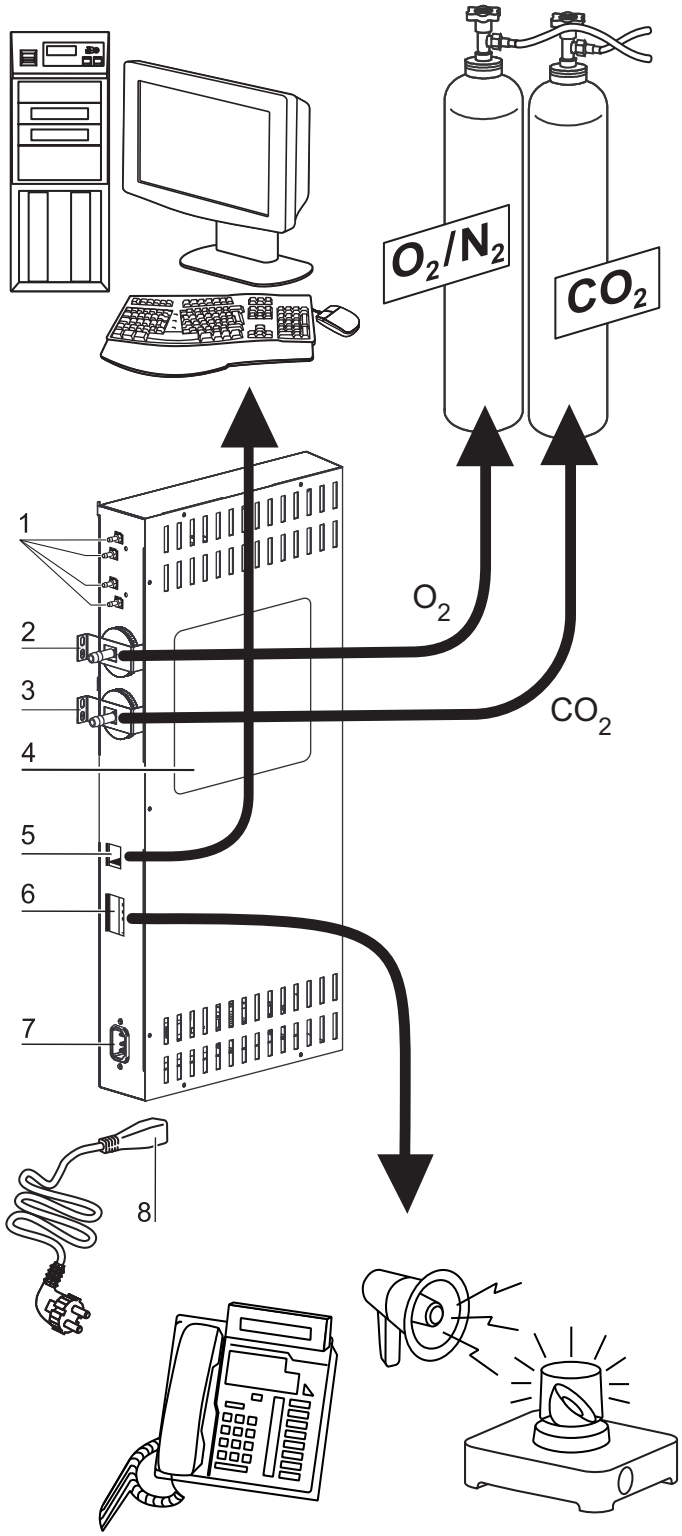


Figure 3-9. Interfaces (Right Side of Control Box)

All supply connections are installed in the supply interface (control box) in the rear of the device.

Mounted on the right side (Figure 3-9) of the control box are the connectors for the basic functions of the unit as well as various optional elements:

1. four connectors to the built-in gas distributor used for the gas monitoring option and for looping through the CO_2 gas supply to additional units
2. O_2 connector (not available with CO_2 and O_2/N_2gas supply sources and simultaneous use of gas monitoring option)
3. CO_2 connector
4. Label
5. USB interface
6. Alarm contact
7. Power supply connection

Optional Interfaces

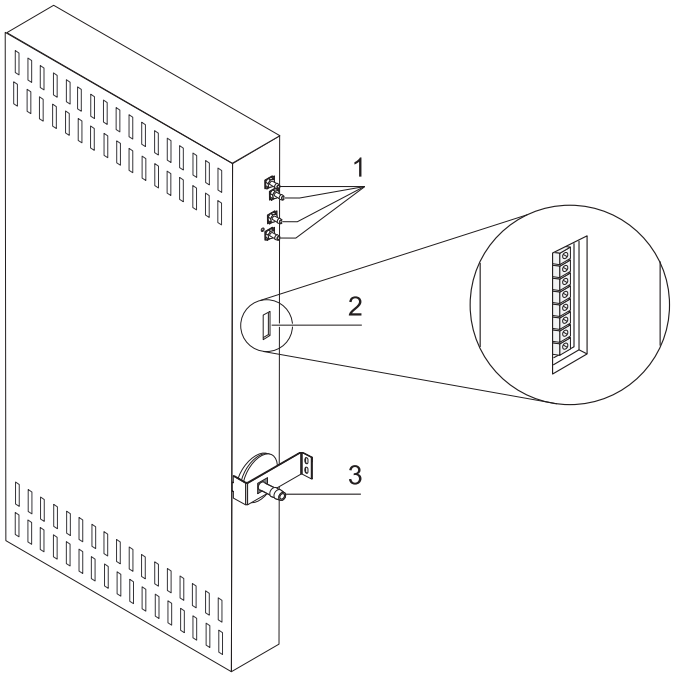


Figure 3-10. Optional Interfaces (Left Side of Control Box)

The connectors on the left side (Figure 3-10) are only available with units equipped with the respective options:

1. four connectors to the built-in gas distributor used for the gas monitoring option and for looping through the – likewise optional - O_2 gas supply to additional units
2. 4...20 mA interface (option)
3. O_2 connector (option, only available with CO_2- and O_2-/N_2- gas supply sources and simultaneous use of gas monitoring option)

Gas Connection:

The gas supply lines between the device and the gas supply system are connected using the supplied connecting hoses. CO_2 and O_2/N_2 are supplied to the unit through dedicated connectors (2 and 3/ Figure 3-9 as well as 3/Figure 3-10).
All process gases must be supplied to the device at a fixed pressure that has been preset within a range of 0.8 to 1.0 bar (11.6 to 14.5 psi) and must remain unchanged.
Before the gases are fed into the workspace, they flow through a gas inlet filter with a separation rate of 99.998 % for a particle size of 0.3 µm (HEPA-filter quality).
The illustration shows the optional combined gas connection without the optional gas monitoring system.

Label:

The label (4/Figure 3-9) contains information about gas supply, an alarm contact terminal legend, and notes about the electrical fusing of the device.

USB Interface:

The USB interface (5/Figure 3-9) allows for connecting the incubator to a PC. This connection - USB 1.1 / USB 2.0 / USB 3.0 full speed compatible - allows the fast (and temporary) acquisition of the major operating parameters (temperature, CO_2-/O_2-/N_2 concentration, error codes, etc.).

4-20 mA Interface:

The optional 4-20 mA interface (2/Figure 3-10) converts the digital actual values displayed for temperature, CO_2 concentration, O_2 concentration (optional) and relative humidity into a continuous output current of 4-20 mA each. This is accomplished by a microprocessor supported by a 4-channel D/A converter. The D/A converter provides a resolution of 16 bit per channel, equivalent to 65536 incremental values.

The interface port accepts various customer-supplied external measurement devices with 4-20 mA inputs - for example, the Thermo Scientific Smart-Vue Wireless Monitoring System (not supplied).

The table below lists the output signals:

Channel No.	Output Parameter (actual value)	Resolution	Measuring range	Output signal
1	Temperature	0.08 MA/°C	0...200 °C	4...20mA
2	CO_2 concentration	0.8 mA/%	0...20% CO_2	4...20mA
3	O_2- concentration*	0.16 mA/%	0...100% O_2	4...20mA
4	Not used			
Parameters marked with an asterisk "*" are only output if the respective option is installed.				

The measured samples are governed by the following function:

$$MW = I_0 + I \times \frac{I_{max} - I_0}{MB}$$

I_0 = 4m A, MV = measured value (°C, % or rH%)
I_{max} = 20m A, MB = measurement range

The meaning of the output signals is explained in the table below:

Current	Significance
4 mA	The measured value is smaller than or equal to the lower boundary of the measurement range.
20 mA	The measured value is greater than or equal to the upper boundary of the measurement range.
2 mA	The unit is fully functional, but there is no valid measured value available (for example, the optional sensor is not installed, the unit is still in the warm-up phase, or similar.).
0 mA	Error

The four 4-20 mA output signals are broken out onto a detachable, 8-pin terminal block (3,5 mm / 0.14 inch). The mating connector is delivered as a standard accessory. The pin-out can be taken from the following table.

Pin No.	Channel Description
1	Channel 1: Temperature
2	Channel 1 Ground
3	Channel 2: CO2
4	Channel 2 Ground
5	Channel 3: O2
6	Channel 3 Ground
7	Channel 4: Not used
8	Channel 4 Ground

Alarm Contact:

The device can be connected to an on-site, external alarm system (such as a private branch telephone exchange, a facility monitoring system, visual or audible alarm indicators.
For this purpose, a potential-free alarm contact is preinstalled in the device. This contact is broken out to the control box on the backside of the unit (6/Figure 3-9).

Note Alarm contact:
The alarm contact responds for all errors reported by the control loops (see chapter Error Messages).

Power Supply Connection:

Mains power is connected to the unit using a cable with an IEC connector plugged into the IEC socket in the control box (7/Figure 3-9). The mains socket must be easily identifiable by the user and freely accessible at all times.

Workspace Components

The incubator workspace is designed to prevent the formation of condensates and unwanted contamination by means of a HEPA-filter mounted directly into the workspace. The HEPA-filter in the workspace protects the water used for humidifying the air, ensures near clean room conditions (clean room Class ISO 5) while at the same time having no negative impact on the stored cultures.

Interior Container

The workspace of the incubator is designed to rule out any contamination that may prove detrimental to incubation operation. Condensate prevention and the use of a HEPA filtration system - built directly into the workspace, yet without compromising the surface area available for incubating cultures - protect the water supply used for humidifying and provides for a Class 5 clean room ISO air quality.

Interior Container Materials

The standard version is equipped with an interior container made of stainless steel or copper.

Depending on the material of the interior container, workspace components such as the air duct and shelving is also made of the same stainless steel or copper material.

The airbox for the HEPA-filter is made of thermally resistant plastics material and must remain installed while the Steri-Run decontamination routine is running.



WARNING The HEPA-filter cartridge is only resistant to temperatures up to 60°C, not autoclavable and must be removed prior to starting Steri-Run decontamination.

Note Oxidation of copper components:
When exposed to heat and humid air, the copper material of the interior container will oxidize. This results in a discoloration of the copper components during the test run for checking the device functions.
Do not remove the oxide layer during routine cleaning as the antimicrobial effect of the copper material is based on it.

The shelving system components, the airbox, the air duct and the cover of the water reservoir can be removed without any need for tools, leaving only the easily treated, surface-reduced interior container for cleaning and manual disinfection of the unit.

Glass Door and Optional Gas-Tight Screen

The standard version of the ***HERACELL VIOS 160i LK*** and ***HERACELL VIOS 250i LK*** units is equipped with a single-locked door made of tempered safety glass.

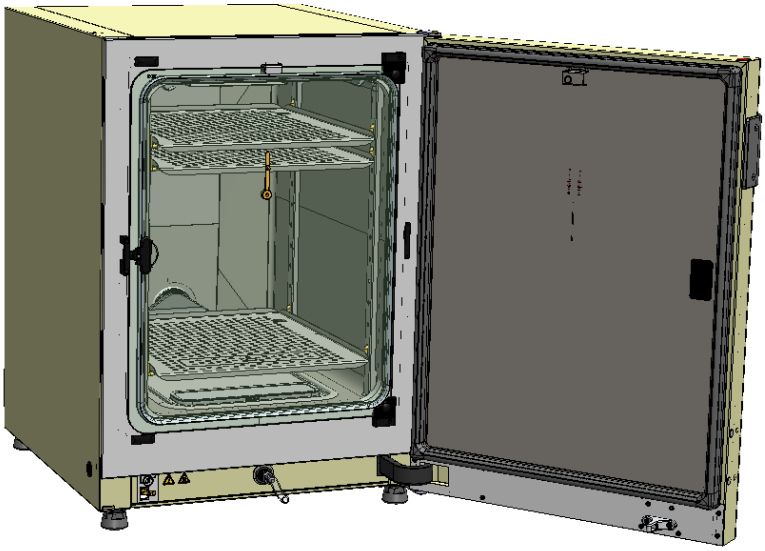


Figure 3-11. ***HERACELL VIOS 160i LK*** with Glass Door

Due to the significantly smaller cross-section of the openings for accessing the samples, devices that are equipped with the optional gas-tight screen have a considerably lower contamination hazard and the recovery times of the incubation parameters are shorter for:

- workspace temperature,
- CO_2 concentration,
- O_2-/N_2 concentration,
- relative humidity.

Gas-tight screens are available as options for both types of products:

- ***HERACELL VIOS 160i LK***: threefold gas-tight screen (see Figure 3-12),
- ***HERACELL VIOS 250i LK***: sixfold gas-tight screen.
- Optional 6-fold gas tight screen with Cell locker (see Appendix).

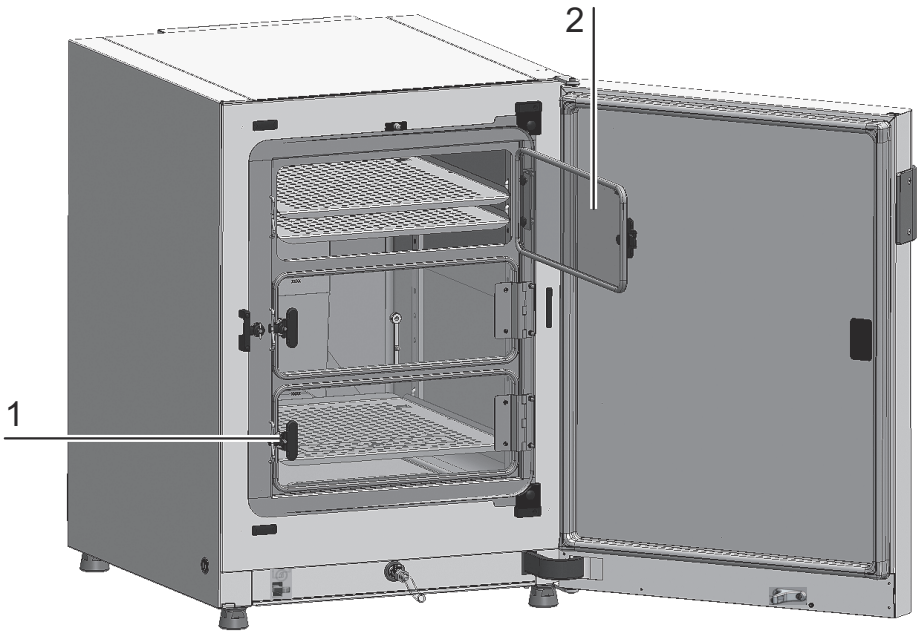


Figure 3-12. ***HERACELL VIOS 160i LK*** with Threefold Gas-Tight Screen

Each door of the gas-tight screen (2/Figure 3-12) is separately locked (1/Figure 3-12).

Water Reservoir

The water reservoir is sunk into the interior container bottom and separated from the workspace by means of a cover panel. A drain (2/Figure 3-13) provided in the front section of the water reservoir allows for quickly draining the water through a fill and drain valve (3/Figure 3-13) located at the front section of the device.

Placed on the front section of the water reservoir cover is a pre-filter (4/Figure 3-13). The pre-filter consists of a dual-layer wire mesh with a silicone frame and is autoclavable as well as heat-resistant. The pre-filter must remain installed in the device during the Steri-run decontamination routine, but needs to be removed for refilling the water reservoir. The pre-filter must remain installed in the device during the Steri-run decontamination routine, but needs to be removed for refilling the water reservoir.

Additional instruction when filling with 6-door gas tight screen, see Appendix.

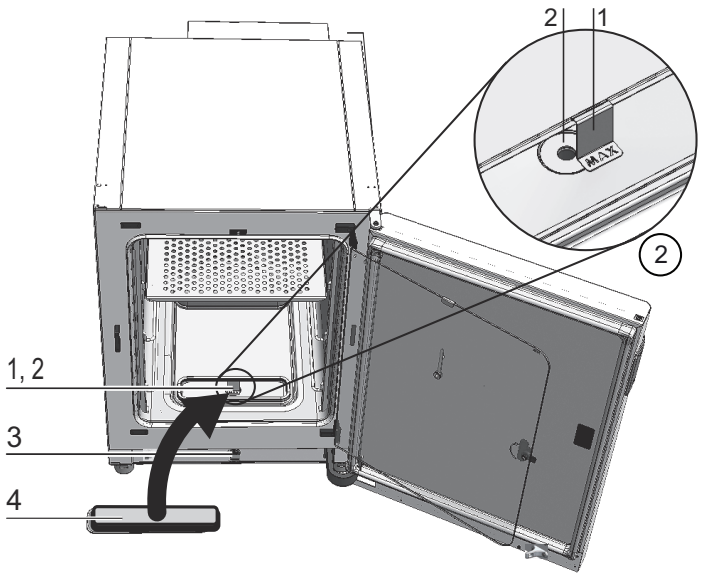


Figure 3-13. Water Reservoir

The water reservoir is monitored by the water level sensor described in section “Sensor System“ on page 3-11.

A fill level indicator with the punched-out word “MAX“ (1/ Figure 3-13) is suspended above the water reservoir to indicate the maximum fill level. The maximum fill volume of the water reservoir is 3 liters.

In order to minimize interference to the workspace atmosphere during water replacement without disruption of incubation operation, the unit has a front-side quick-drain valve. Plugging the drain tube supplied into the front-side quick-drain valve starts draining immediately.

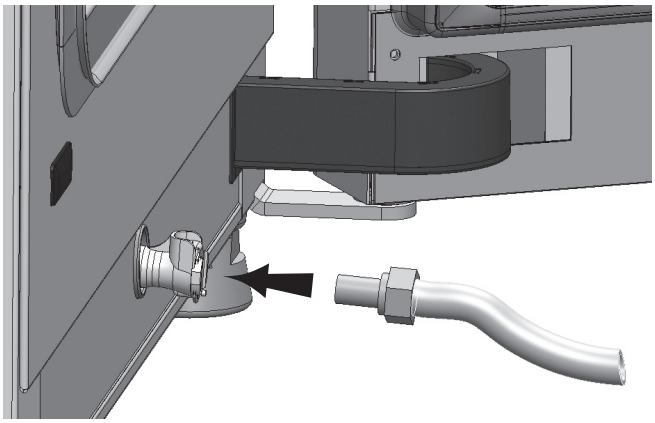


Figure 3-14. Fill and Drain Valve of Water Reservoir

Water Filling

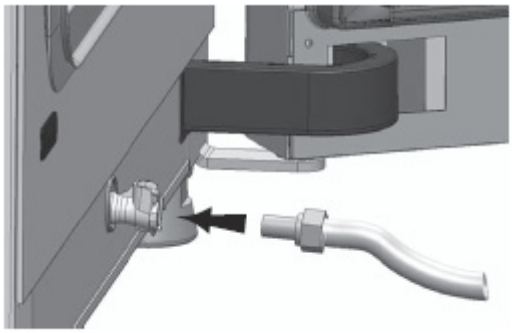


Figure 3-15. Fill and Drain Valve Incubator

Through the water valve at the incubator, water can be filled with a re-filling funnel.

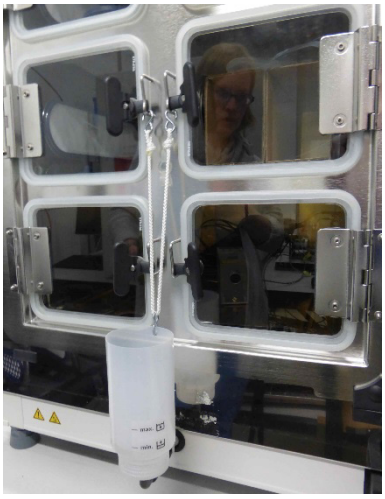


Figure 3-16. Refill Funnel

Hang-in the hooks of the refill device in the locks of the glass doors as shown above.
Connect the hose to the fill and drain valve.

The refill funnel determines the height difference of the water level in the incubator, according to the principle of the communicating tubes.
Min. level is 0.5 L, max. level 3.5 L. The funnel contains approximately 0.4 L water.

- Insert the funnel in the water drain, wait for it to stabilize to show the approximate level of water.
- Fill the funnel to the top to facilitate gravity to fill with sterile distilled water. This may take up to several times.
- Keep adding until the maximum level indicator is reached.

Heating System

The workspace is heated by a surface heater system. The arrangement of the heating elements ensures that condensate formation above the water reservoir is prevented.
The outer door of the unit and the perimeter of the door opening are heated as well. The heat radiated onto the interior glass door/gas-tight screen prevents condensate formation.
The workspace of the device always remains visible, despite high humidity.

Rear Panel Openings

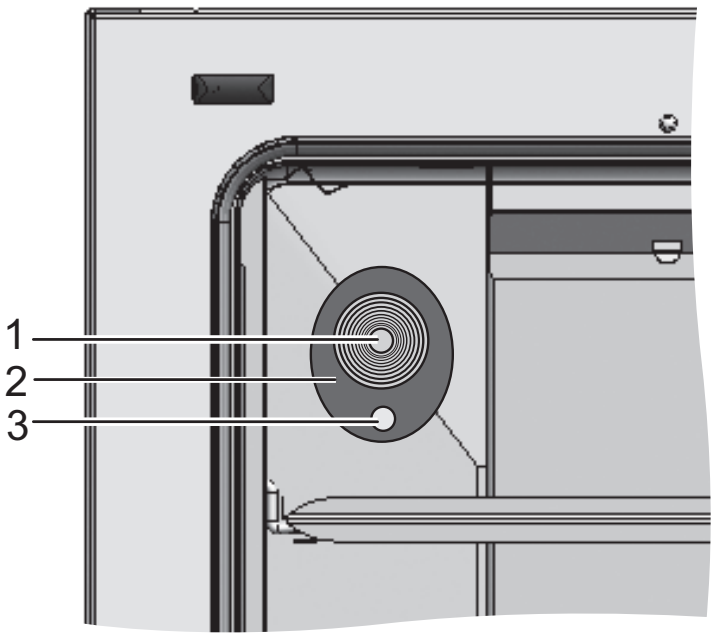


Figure 3-17. Rear Panel Openings

The access port with insert (Figure 3-17 Ø 42 mm / 1.66 inch) can be sealed with a plug (1/Figure 3-17) and allows for feeding cables, tubes or additional sensors into the workspace of the unit.

The pressure compensation opening (3/Figure 3-17) located directly beneath the access port in the rear wall of the unit ensures pressure compensation between the workspace of the unit and the operating room.

Note
To avoid damage to the silicone, sure to remove the silicone plug from the inner chamber and plug it into the outer side of the access port before starting the high-temperature decontamination routine.

Note Operating conditions:
When accessories are to be operated in the workspace of the CO_2 incubator, the ambient condition requirements must be observed (see table). The energy introduced into the workspace affects the beginning of the temperature control range. When additional heating sources are introduced into the workspace, condensation (e.g. at the glass door) may occur.

Introduced energy	Beginning of the temperature control range	
	General	Example: RT* = 21 °C
0 W	RT + 3 °C	24 °C
5 W	RT + 6.5 °C	27.5 °C
10 W	RT + 9.5 °C	30.5 °C
15 W	RT + 13 °C	34 °C
20 W	RT + 16 °C	37 °C
*RT = Room temperature		

Shelf System

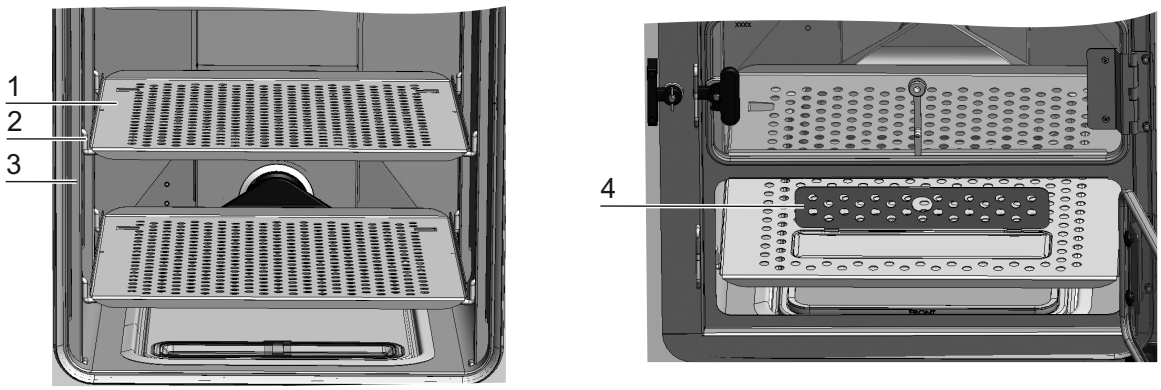


Figure 3-18. Shelf System Components

The support rails (3/Figure 3-18) of the shelf system are perforated every 42 mm (1.66 inch) so that the support hooks (2/Figure 3-18) can be inserted variably for any culture container size required. The shelves (1/Figure 3-18) have an integrated tilt protection and withdrawal stop. ***HERACELL VIOS 250i LK*** models come equipped with a single-piece bottom insert, as shown on the left side in Figure 3-18, ***HERACELL VIOS 160i LK*** with a cutout for refilling (4/Figure 3-18). For details on using the shelf system, see “Start-up“ on page 4-1.

Additional instruction when using shelf with 6-fold gas tight screen, see Appendix.

Electromechanical Door Lock Assembly

The electromechanical door lock assembly consists of a rotary latch (detail A in Figure 3-19) driven by a built-in motor, a built-in mechanical emergency release lever (detail C) and a closing hook (detail B) mounted on the inner side of the door.

The door lock assembly is a safety device that denies access to the incubator‘s workspace while the Steri-Run decontamination routine is running. It locks the door of the incubator as soon as the workspace temperature reaches, then surpasses 65 °C. When the decontamination routine ends, the door lock assembly releases the door lock shortly after the temperature has dropped below 65 °C.

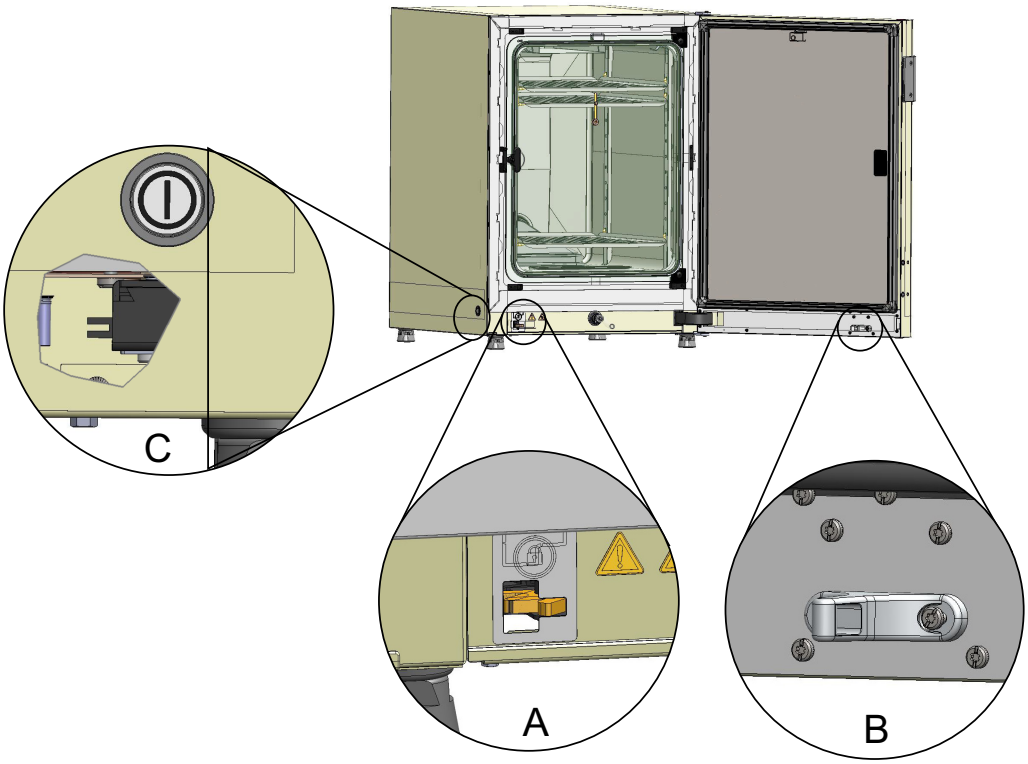


Figure 3-19. Door Lock Latch and Emergency Release on Underside of Incubator

When a power outage occurs, the latch retains its current position. Upon return of power, and when the decontamination routine has been launched and active before, the latch unlocks the door automatically when the temperature drops below 65 °C. If necessary, the door may be unlocked at any time by pulling the emergency release lever (C) towards the side wall. The emergency release lever is located at the bottom of the incubator next to the main power switch. Detail C of Figure 3-19 presents a breakout view through the side panel to illustrate the lever location.

4

Start-up

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- "Adapting the Unit to the Ambient Atmosphere" on page 4-2
- "Preparing the Workspace" on page 4-2
- "Installing the "MAX" Fill Level Indicator and the Pre-Filter" on page 4-3
- "Install the Air Duct" on page 4-5
- "Installing the Shelf System" on page 4-9
- "Mount the Split Inserts (Optional) into the HERACELL VIOS 250i LK" on page 4-11
- "Gas Connection" on page 4-11
- "Power Supply Connection" on page 4-16
- "Connecting the USB Interface:" on page 4-17
- "Connecting the Alarm Contact:" on page 4-18

Adapting the Unit to the Ambient Atmosphere



CAUTION Adapting the unit to the ambient atmosphere!

Prior to commissioning allow sufficient time the unit to adapt to the ambient atmosphere.

- Prior to powering up, place the unit for approx. 2 hours in the operating room at the expected prevailing operating room temperature.
- Open device doors.

Preparing the Workspace

Upon delivery, the CO_2 incubator is not in a sterile state. Before the initial start-up, the device must be decontaminated.
Before the decontamination is performed, the following workspace components must be cleaned:

- Support rail
- Shelf support
- Prefilter
- Air duct
- Airbox
- Shelves
- Workspace surfaces
- Glass door seal
- Glass door/gas-tight screen.

Note Decontamination:
For details about the cleaning and disinfection of the device see chapter “Cleaning and Disinfection“ on page 8-1.



CAUTION
Observe the instructions or technical data of the manuals delivered with the spare parts or accessories. The instructions or technical data can differ from them stated in this manual.

Installing the “MAX” Fill Level Indicator and the Pre-Filter

The “MAX” fill level indicator and the pre-filter can be installed without any need for tools:

1. Make sure that the tube is removed from the fill and drain valve (3/Figure 4-2).
2. Check whether the drain (2/Figure 4-2) in the front section of the water reservoir is free of obstruction; it is needed for discharging the water through the fill and drain valve (3/Figure 4-2) on the front side of the unit.
3. Suspend the “MAX” fill level indicator (1/Figure 4-1) in the slot provided in the water reservoir cover panel (5/Figure 4-1).

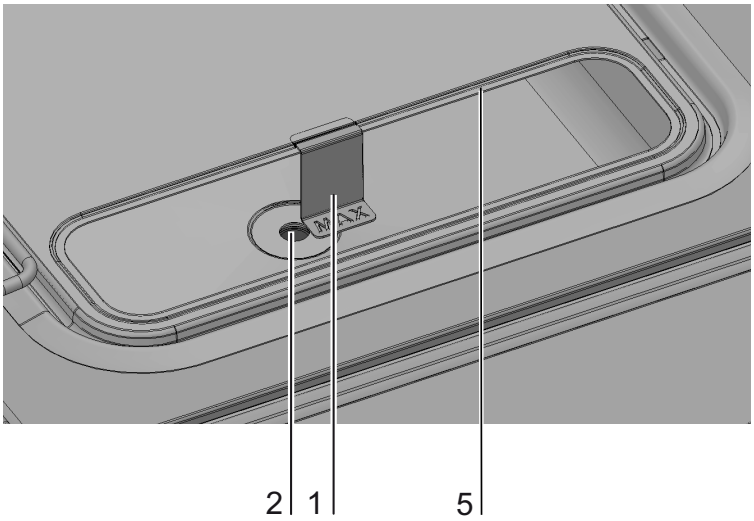


Figure 4-1. “MAX” Fill Level Indicator

4. Insert the pre-filter (4/Figure 4-2) into the water reservoir cover panel.

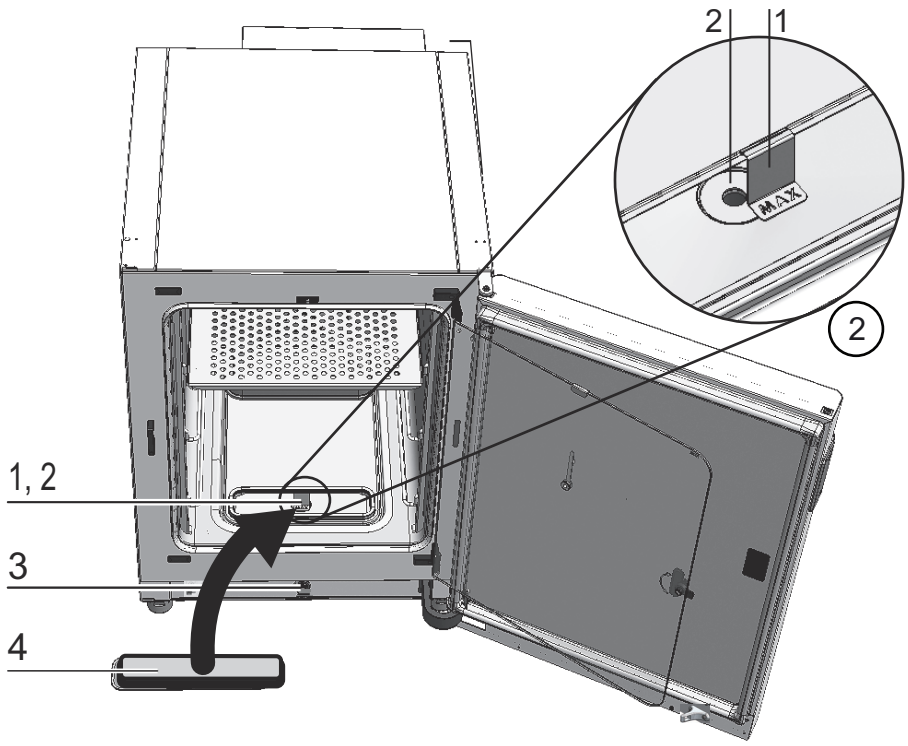


Figure 4-2. “MAX” Fill Level Indicator and Pre-Filter

Install the Air Duct

1. Join the top part (1/Figure 4-3) of the air duct with the rear part (2/Figure 4-3) (see Figure 4-3, steps A-E). Make sure, that in step C of Figure 4-3 the positioning tab at the rear part clicks into place in the rectangular hole of the bottom part.
2. Place the tab at the bottom of the rear part (2/Figure 4-3) on the two rear wall studs and tilt the air duct backwards.
3. Lock the lateral keyholes of the top part (step G/Figure 4-3) into the retaining screws in the workspace ceiling.

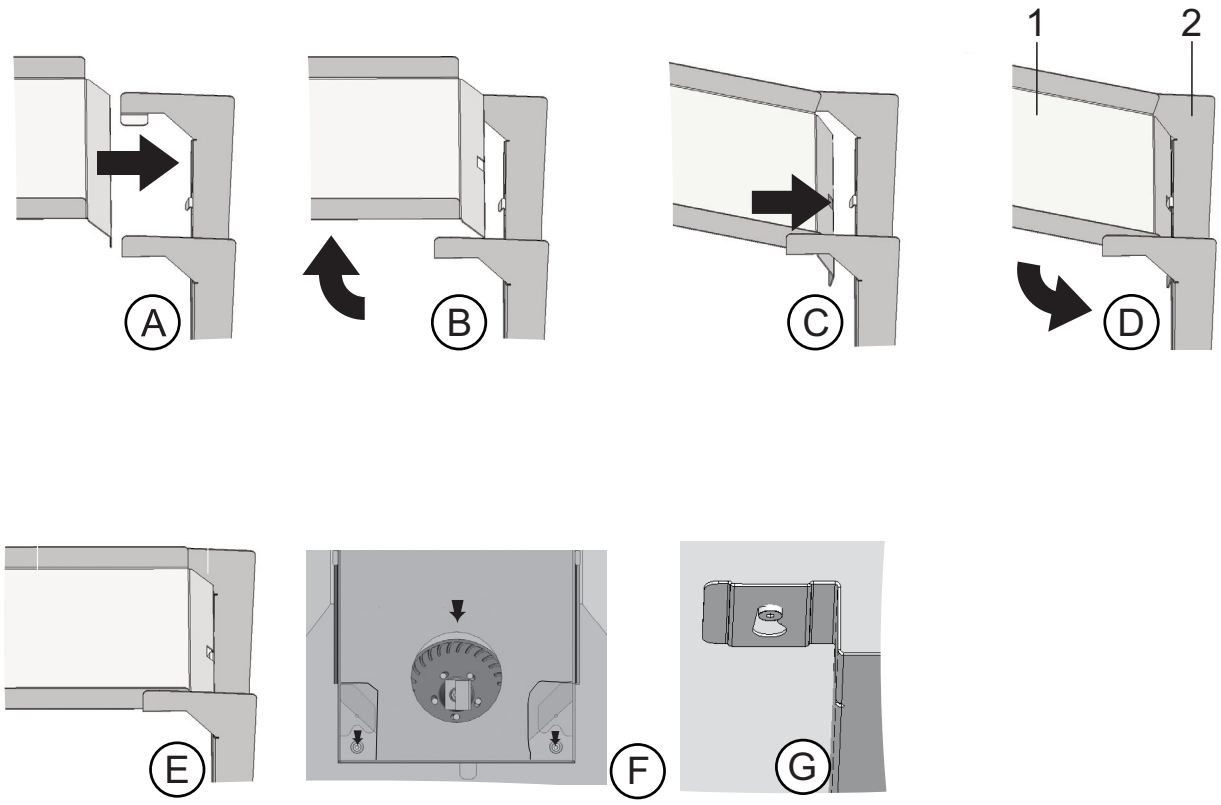
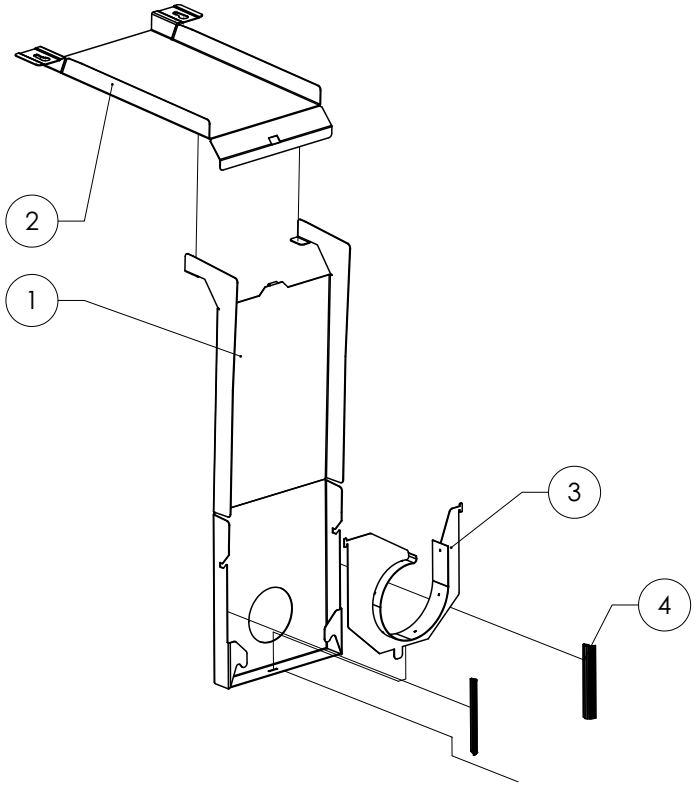


Figure 4-3. Assembling the Air Duct

Figure 4-4 shows lists the parts that make up the air duct assembly installed in the inner chamber.



1 – air duct rear wall
(spare part includes 3 and 4)
2 – air duct ceiling
3 – blower scroll
4 – sealing parts

Figure 4-4. ***HERACELL VIOS 160i LK*** Air Duct Assembly Components

Note On ***HERACELL VIOS 160i LK*** models, do not remove the sealings of the air ducts before installation in the rear wall. The rear wall air ducts are important for a proper air flow on VIOS160 models with a stainless steel inner chamber.

Installing the HEPA-Filter and the Water Reservoir Cover Panel

The HEPA-filter (2/Figure 4-5) must be inserted into the airbox (1/Figure 4-5) from below. The airbox rests on the water reservoir cover panel (2/Figure 4-6) and is pushed against the air intake.

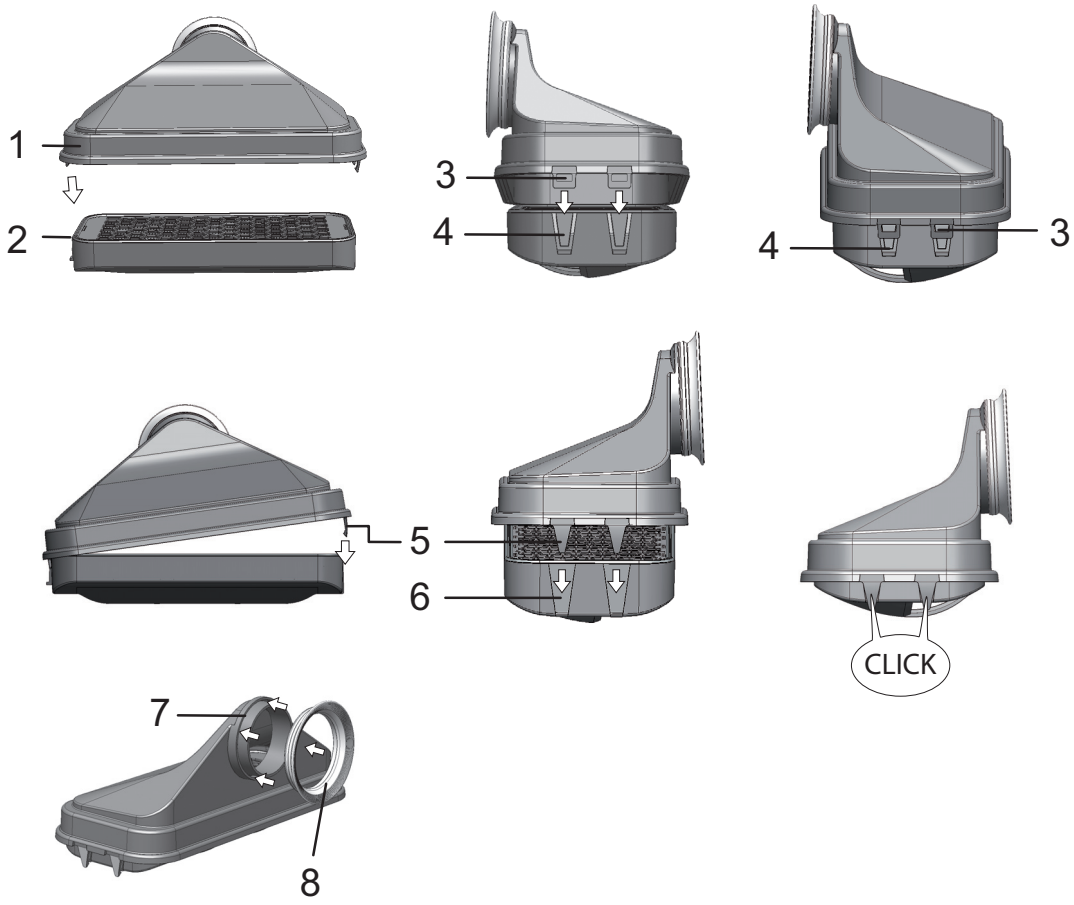


Figure 4-5. Assembling the HEPA-Filter and the Airbox

1. Place the HEPA-filter (2/Figure 4-5) on a flat surface.
2. Tilt the airbox (1/Figure 4-5) to the left and insert the tabs on the left (3/Figure 4-5) into the corresponding slots provided in the HEPA-filter (4/Figure 4-5).
3. Insert the tabs (5/Figure 4-5) on the right side of the airbox into the HEPA-filter catches (6/Figure 4-5).
4. Place the seal (8/Figure 4-5) into the groove (7/Figure 4-5) provided at the airbox tubing and press it down evenly.

5. Place the airbox (1/Figure 4-6) onto its seat (2/Figure 4-6) on the water reservoir cover panel.

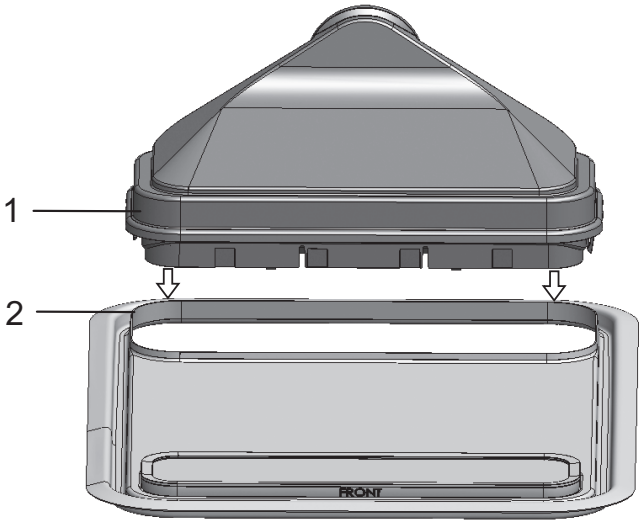


Figure 4-6. Place the Airbox onto the Water Reservoir Cover Panel

6. Mount the water reservoir cover panel on the bottom of the workspace.
7. Lift the water reservoir cover at the front side and push it towards the rear wall (1/Figure 4-7).

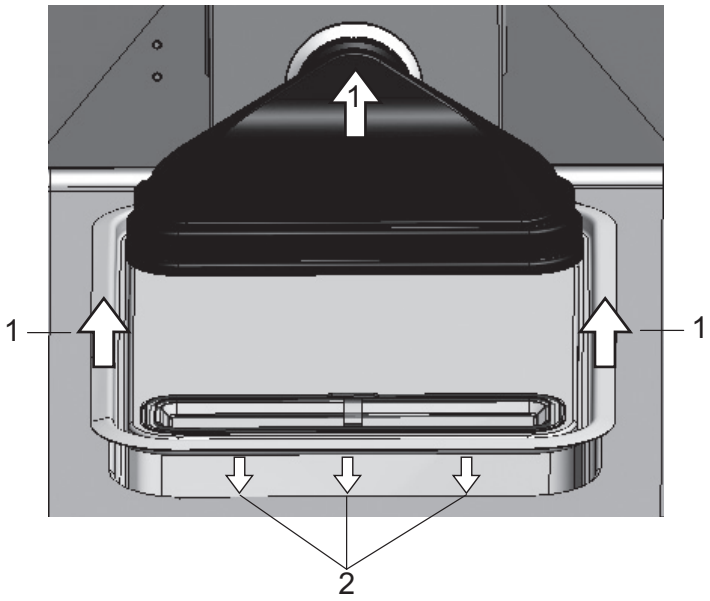


Figure 4-7. Installing the Airbox

8. Push the water reservoir cover panel all the way towards the rear wall. Doing so lets the cover panel slide into its final position in the reservoir and the tube end of the airbox into the fan outlet.
9. Let the front edge of the water reservoir cover slide into the water reservoir (2/Figure 4-7). The airbox tubing slides into the fan outlet.

Installing the Shelf System

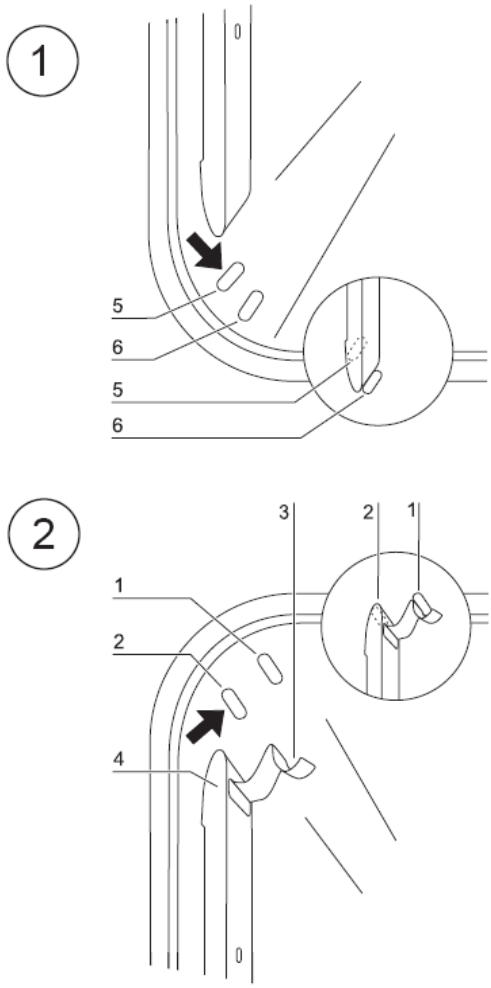


Figure 4-8. Support Rail Installation/Removal

Tools are not required for the installation of the shelf system. The support rails are secured using spring pressure. After the support hooks have been inserted into the rail, the shelves are pushed onto the support hooks.

Installation/Removal of the Support Rail

The support rails are guided and held in place by the embossings. The locksprings of the support rails must point upwards.

1. Position the support rail onto the lower embossing and tilt it toward the workspace side wall so that the rail is positioned over the two embossings.
2. Clamp the lockspring behind the upper embossing.
3. To remove the support rails, pull the lockspring tab down out of the embossing and remove the rail.

Shelf Support Installation

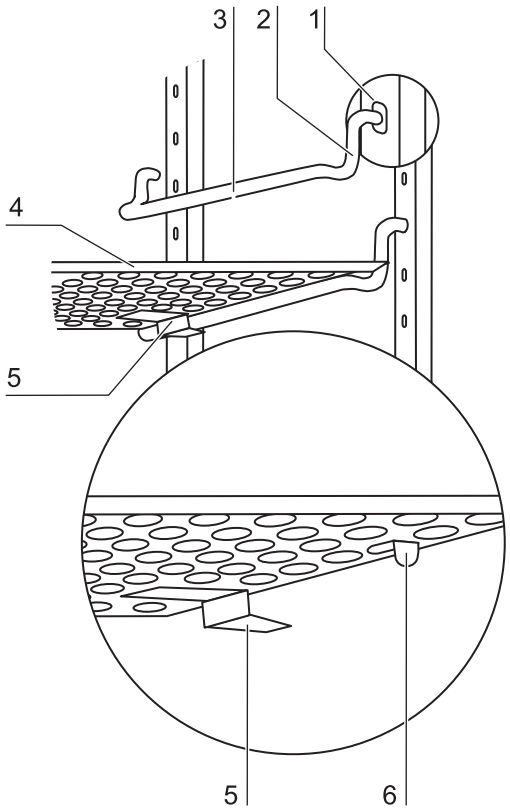


Figure 4-9. Shelf Support Installation

1. Insert the shelf supports into the perforations of the support rail with the bar facing down.
2. Make sure that the two vertical elements of the shelf support are flush with the support rail.

Installing the Shelves:

1. Slide the shelves tilt with the protection device (5/Figure 4-9) ahead onto the shelf support. The tilt protection is also used as a guide for the shelf.
2. Slightly raise the shelf so that the withdrawal stop (6/Figure 4-9) can be routed over the shelf supports.
3. Make sure that the shelf support is positioned in the two tilt protections in a way that allows it to move freely.

Note With the ***HERACELL VIOS 160i LK*** incubator be sure to install the insert with the cut-out for refilling at the bottom position only.
For 6-fold gas tight screen the shelf supports are installed in the rectangular holes only, installing the shelves, see Appendix.

Levelling the Device

1. Position a bubble level onto the center shelf or onto the roller holder.

2. Rotate the adjustable device stands using the supplied 24 mm (0.94 inch) wrench until the shelf is positioned horizontally in all directions. Perform the height adjustment of the device stands from left to right and from rear to front.

Mount the Split Inserts (Optional) into the *HERACELL VIOS 250i LK*

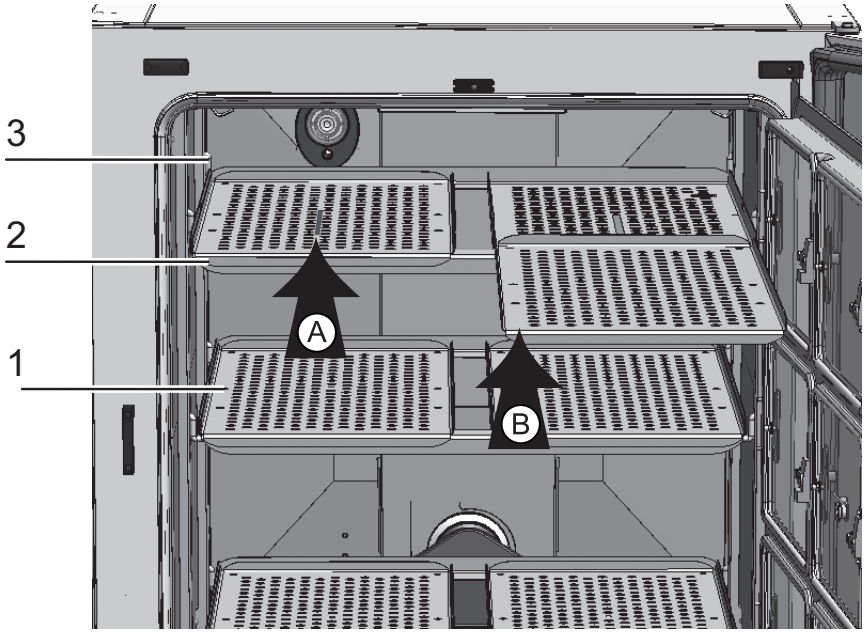


Figure 4-10. Installation of Split Inserts

For a ***HERACELL VIOS 250i LK*** equipped with an optional six-fold gas screen and 6-segment split inserts, three support frames with two shelves each are placed onto the shelf supports of the lateral support rails instead of the one-piece shelves of the standard version.

1. Place both these shelves (1/Figure 4-10) onto the support frame (2/Figure 4-10) (step A).
2. Suspend the support frame (2/Figure 4-10) in the shelf supports (3/Figure 4-10) (step B).

Gas Connection

Note Gas quality:
The gases must have one of the following qualities:

- Purity 99.5 % min
- medical gas quality.

CAUTION Overpressure!
The operating pressure of the gas applied to the device must not exceed 1 bar (14.5 psi). If the gas is supplied at a higher pressure, the valves integral to the device may not close correctly and the gas supply control may be impaired.
Set the gas supply to a range between 0.8 bar (11.6 psi) min. and 1.0 bar (14.5 psi) max. and make sure that this pressure setting cannot be changed!

Installing Gas Pressure Hoses

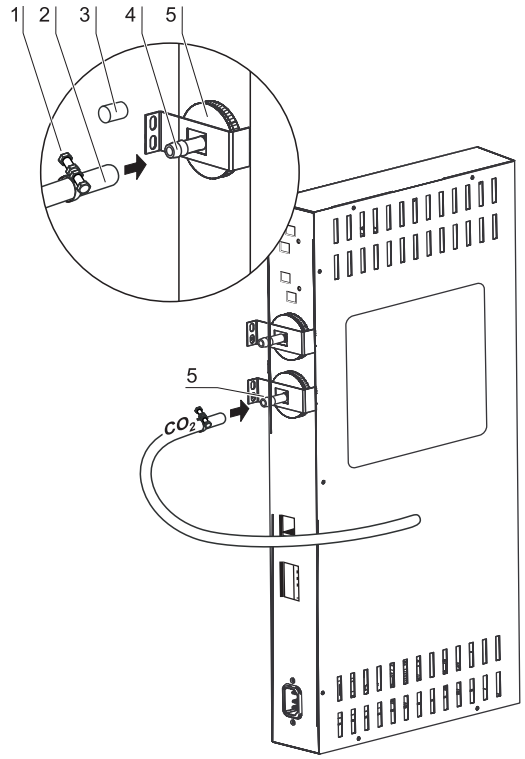


Figure 4-11. Installing Gas Pressure Hoses

The gas supply from the gas supply system to the device is established using the supplied flexible gas pressure hoses:

1. Connect the gas pressure hose to the sleeve of the gas supply system.
2. Remove the protective cap (3/Figure 4-11) from the sterile filter.
3. Slide the hose clamp (1/Figure 4-11) onto the gas pressure hose (2/Figure 4-11) and connect hose to the sleeve (4/Figure 4-11) of the sterile filter (5/Figure 4-11).
4. Secure the gas pressure hose to the sleeve of the sterile filter using the hose clamp.

CAUTION Pressure compensation opening

To ensure permanent pressure compensation, the pressure compensation opening must not be connected to an exhaust air system. The pipe of the pressure compensation opening must not be extended or redirected.

Gas Connection without Gas Monitoring System

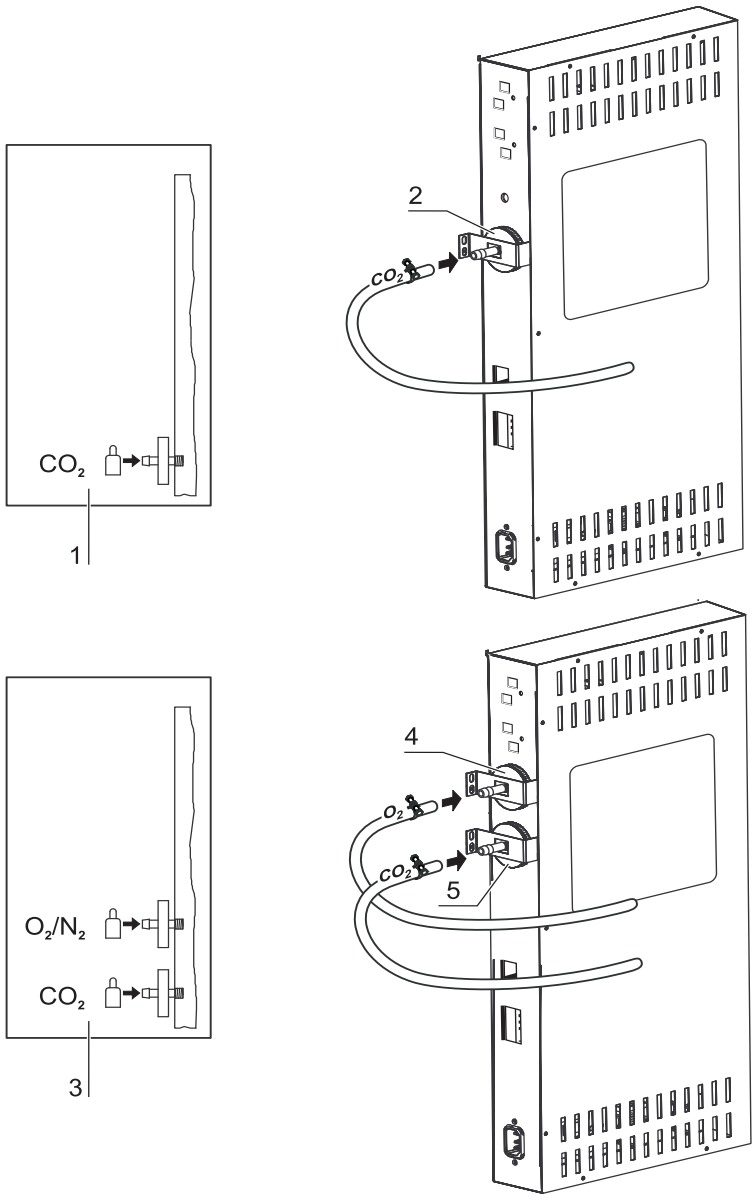


Figure 4-12. Gas Connection without Gas Monitoring System

The gas supply from the gas supply system to the device is established using the supplied flexible gas pressure hoses:

CO_2 Connection:

- For a device with CO_2 connection, connect the gas supply to the gas inlet filter (2/Figure 4-12) in accordance with the connection diagram (1/Figure 4-12).

Combined CO_2 and O_2-/N_2 Connection (Optional):

On units with a combined CO_2 /O_2 /N_2 connection, the gas supply tubes must be routed according to the following connection diagram (3/Figure 4-12):

- connect the O_2/N_2 supply line to the upper gas inlet filter (4/Figure 4-12),
- connect the CO_2 supply line to the lower gas inlet filter (5/Figure 4-12).

Note Manual gas monitoring:

On devices without the optional gas monitoring system, there is no automatic gas monitoring. Therefore, the filling level of the gas bottles must be checked every day.

CO_2 Connection with Gas Monitoring System (Optional)

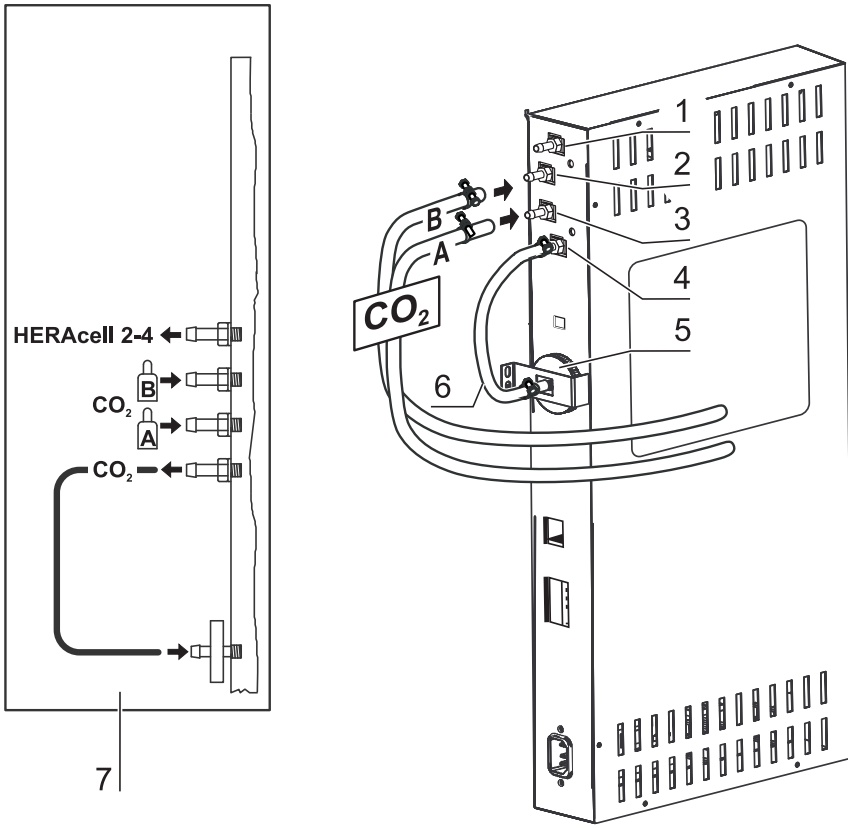


Figure 4-13. CO_2 Connection with Gas Monitoring System (Optional)
The supplied gas pressure hoses feed the gas from the central gas supply system to the device. Devices with CO_2 connections that are equipped with the optional gas monitoring system are connected according to the connection diagram (7/Figure 4-13).

CO_2 Connection:

For a device that is operated with process gas CO_2 and equipped with the optional gas monitoring system, connect the gas supply lines as follows:

- Item 1/Figure 4-13: Distributor connection for the CO_2 gas supply for up to three additional devices. For looping the gas supply through, the devices must be interconnected with a gas pressure hose.
- Item 2/Figure 4-13: Connect the gas container B to the upper connection of the gas monitoring system.

- Item 3/Figure 4-13: Connect the gas container A to the lower connection of the gas monitoring system.
- Items 4 & 5/Figure 4-13: The outlet of the gas monitoring system is connected at the factory to the gas inlet filter by a short gas pressure hose (item 6/Figure 4-13).

Note Looping the gas supply through:
By looping the gas supply through, up to 4 devices can be supplied by a CO_2 gas supply.

Combined CO_2 and O_2/N_2 Connection with Gas Monitoring System (Optional)

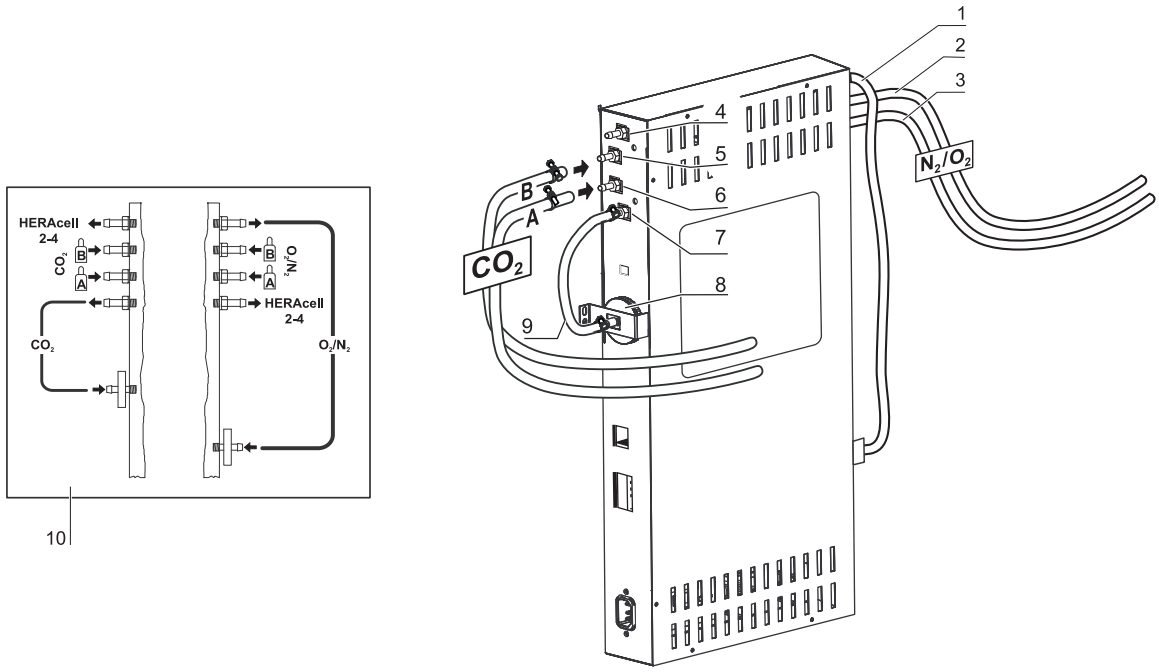


Figure 4-14. Combined $CO_2/O_2/N_2$ Connection with Gas Monitoring System (Optional)

The supplied gas pressure hoses feed the gas from the central gas supply system to the device.

Devices with combined $CO_2/O_2/N_2$ connections that are equipped with the optional gas monitoring system are connected according to the connection diagram (10/Figure 4-14).

O_2/N_2 Supply:

- Distributor connection for the O_2-/N_2 gas supply for up to three additional devices (hidden in Figure 4-14). For looping the gas supply through, the devices must be interconnected with a gas pressure hose.
- Item 2/Figure 4-14: Connect the gas container B to the connection of the gas monitoring system,
- Item 3/Figure 4-14: Connect the gas container A to the connection of the gas monitoring system.
- Item 1/Figure 4-14: The outlet of the gas monitoring system is connected at the factory to the gas inlet filter (item 8/Figure 4-14) by a short gas pressure hose.

CO_2 Supply:

- Item 4/Figure 4-14: Distributor connection for the CO_2 gas supply for up to three additional devices. For looping the gas supply through, the devices must be interconnected with a gas pressure hose.
- Item 5/Figure 4-14: Connect the gas container B to the connection of the gas monitoring system,
- Item 6/Figure 4-14: Connect the gas container A to the connection of the gas monitoring system.
- Item 7/Figure 4-14: The outlet of the gas monitoring system is connected at the factory to the gas inlet filter by a short gas pressure hose.

Note Looping the gas supply through:

By looping the gas supply through, up to 4 devices (independent of device type) can be supplied by a CO_2 gas supply or a O_2-/N_2 gas supply.

Power Supply Connection

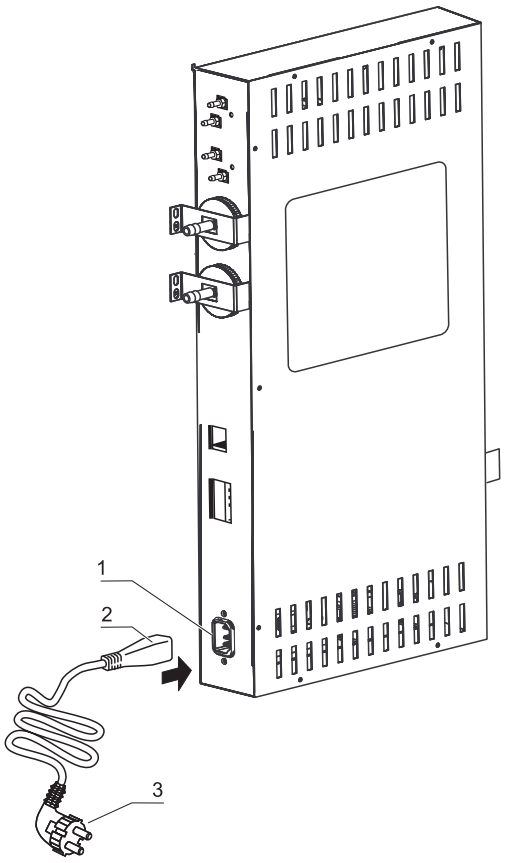


Figure 4-15. Power Supply Connection



WARNING Electric shock!
Contact with current-carrying components may cause a lethal electric shock.
Before connecting the device to the power supply, check plug and power supply cable for damage.
Do not use damaged components when connecting the device to the power supply!

Connect the unit to a correctly installed and grounded power supply source fused with a B 16 circuit breaker.

Connection to the Power Supply System:

1. Before connecting the device to the power supply, check to see if the voltage of the power outlet corresponds with the specifications on the nameplate to the left of the power switch. If the ratings given for voltage (V) and current (A) are not correct, the device must not be connected to the power supply.
2. Connect the IEC connector to the socket of the control box of the device.
3. Connect the grounding plug of the power supply cable to a correctly grounded and fused socket.
4. Make sure the power supply cable is not subjected to tensile or compressive force.
5. Mains connection: The mains socket must be easily identifiable by the user and freely accessible at all times. The power cord plug is the all-pole disconnecting device from the mains supply.

Note
To ensure safe operation of the unit, use the original power cord. For questions and requirements, contact your Thermo Fisher service organization!

Connecting the USB Interface:

The units come equipped with a USB interface as a standard feature. The connection to the PC is made using a commercially available USB 1 or USB 2 cable (incubator side: USB male connector of Type B, PC side: USB male connector of Type A.

The USB interface complies with Standard USB 1.1 and is compatible with Standard USB 2.0 and 3.0 (full speed). Data communication between the PC and incubator across the USB interface requires that suitable driver software be installed on the PC, unless such software is provided by the currently installed Windows-version. The installation of the driver software is described in “Data Communication“ on page 12-1.

The bit rate of the interface can be changed within the pre-set Baud rates limits (9.600, 19.200, 38.400, 57.600 Baud). Baud rate adjustment is described in section “USB Interface Baud Rate Setting“ on page 6-23.

Connecting the Alarm Contact:

Note Skilled work:
Thermo Scientific warrants the operational safety and the operativeness of the device only if installation and repairs are performed properly.
The connection of the device to an external alarm system must only be carried out by adequately trained and authorized expert electrical/telecommunication personnel!

Function:
When system errors and failures occur in the temperature or gas control circuits, an alarm message is issued to the connected alarm/monitoring system. The potential-free contact (1 changeover contact) has been designed for the following circuits:

Alarm relay:

Circuit	Mains Voltage	External fusing
Circuits with AC mains voltage	250 V ~ max.	6 A max.
SELV – circuits (cf. VDE 0100, part 410)	25 V ~	2 A max.
	60 V =	1 A max.
SELV E – circuits (cf. VDE 0100, part 410)	50 V ~	1 A max.
	120 V =	0.5 A max.

Operating states	Contact 3 - 2	Contact 3 - 1
Operating state power failure “OFF”	X	O
Operating state power failure “ON”	O	X
Error power failure “OFF”	O	X
Error power failure “ON”	X	O
Key: X: Contact closed / O: Contact open		

Note Switching structure:
The alarm relay switches for all failures reported by the control loops (see “Error Messages“ on page 6-45).

Connection Example:

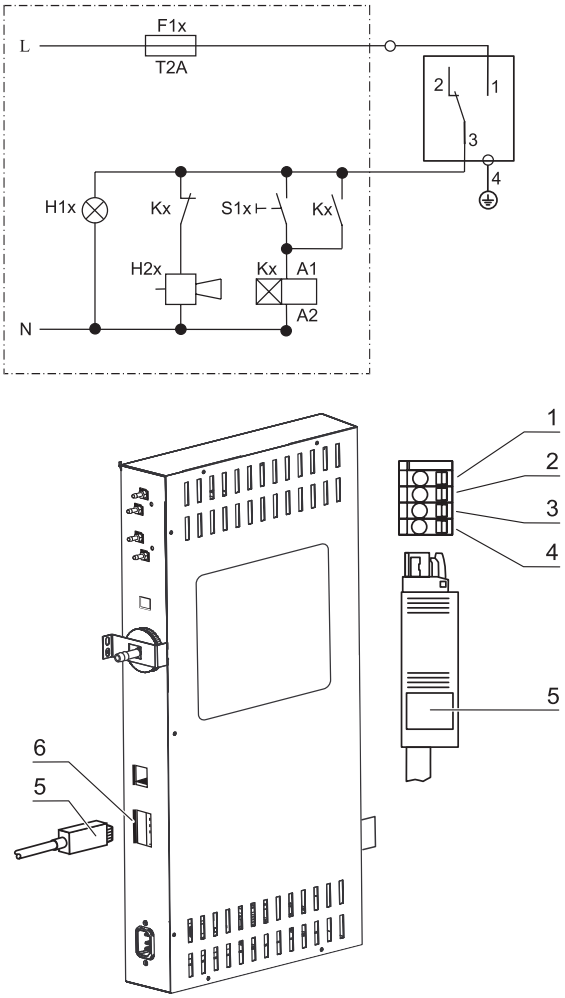


Figure 4-16. Connection Example Alarm Contact

The connector for connecting the interface cable is not included in the scope of delivery and must be ordered separately. Specifications for the operating voltage and the fusing of external alarm circuitry are given in the table above.

1. Wire the individual conductors as shown in the wiring diagram.
2. Connect the connector of the alarm system connecting cable to the interface at the control box at the rear panel of the device.

Connecting the 4-20 mA Interface:

The following illustration shows the pin-out of the 4-20mA data interface:

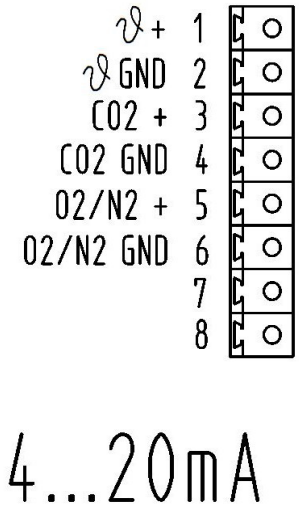


Figure 4-17. Pin-out of the 4-20 mA Interface

Note Skilled work:
Thermo Scientific warrants the operational safety and the operativeness of the device only if installation and repairs are performed properly.
The connection of the device to an external alarm system must only be carried out by adequately trained and authorized expert electrical/telecommunication personnel!

Retrofitting of the 4-20 mA data interface is reserved exclusively to Thermo Fisher Scientific Technical Field Service staff.

Operation

Table of Contents

- "Preparing the Device" on page 5-1
- "Starting Operation" on page 5-2

Preparing the Device

The device must not be released for operation before all major start-up activities (see "Start-up" on page 4-1) have been completed.

Device Check:

Prior to starting operation, the following device components must be checked for their correct function

- Gas hoses must be seated tight on the connecting filter and must be secured using a hose clamp.
- The access port must be capped.
- The pressure compensation opening must be permeable, its insert must be installed in the workspace.
- The glass door seal must not be damaged.
- The glass door/gas-tight screen measurement opening must be capped.
- The shelf system components must be installed safely.
- The airbox with the HEPA-filter and the air duct must be installed according to the instructions.

Decontaminating the Device Workspace:



CAUTION Limited operating temperature Cell locker!
Before a "Decontamination run" the Cell lockers must be removed. The max. operating temperature is 121°C/250 °F.

- Run the steri-run decontamination routine (see "Steri-Run Decontamination Routine" on page 8-7) or decontaminate the workspace according to the hygiene regulations set forth by the operator.

Note Hygiene regulations:
Prior to any operation, the user must clean and disinfect the workspace in accordance with the hygiene regulations set forth by the operator to protect the cultures.

Water supply: see "Relative Humidity:" on page 3-6.

When the filling level drops below a minimum value, it must be possible to top up water during the work process.

Fill volume for ***HERACELL VIOS 160i LK*** and ***HERACELL VIOS 250i LK***: 3 l

Starting Operation

1. Open glass door or gas-tight screen.
2. Remove pre-filter (2/Figure 5-1).
3. Insert with cut-out for refilling (***HERACELL VIOS 160i LK***): Open flap (3/Figure 5-1).
   Single-piece insert (***HERACELL VIOS 250i LK***): Remove bottom insert if there is not enough space for the container used for filling.
4. Fill reservoir with sufficiently purified water (beneath cover item 1 in Figure 5-1) of the workspace.

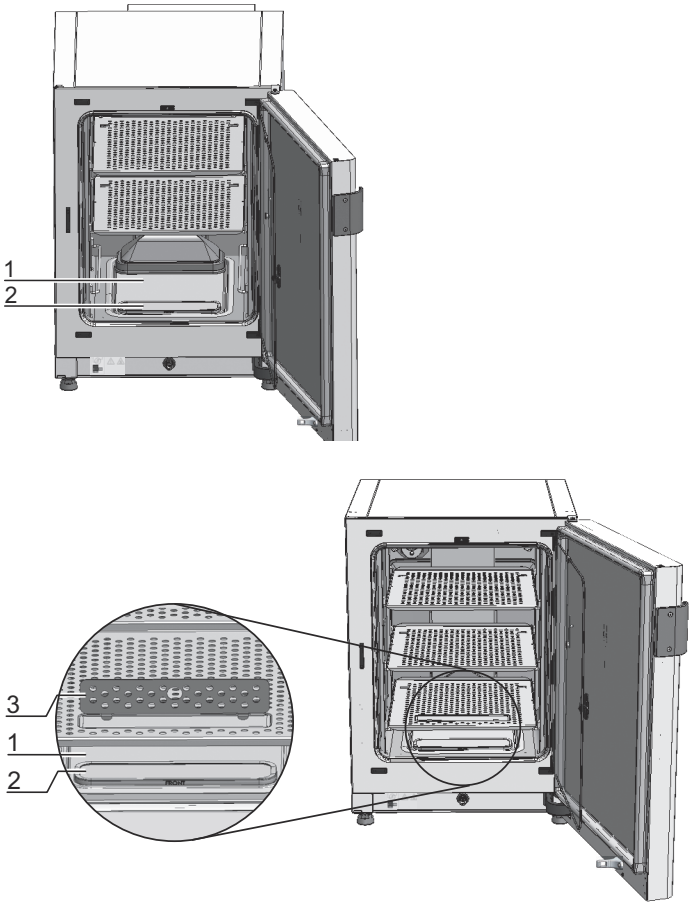


Figure 5-1. Water Reservoir

Water Filling

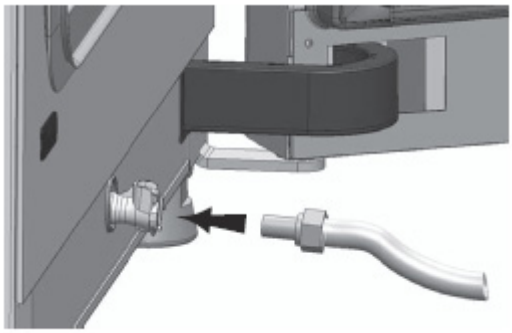


Figure 5-2. Fill and Drain Valve Incubator

Through the water valve at the incubator, water can be filled with a re-filling funnel.

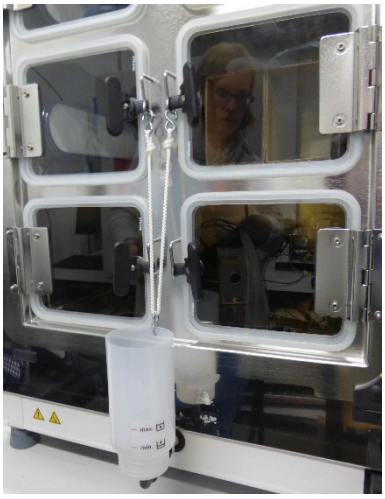


Figure 5-3. Refill Funnel

Hang-in the hooks of the refill device in the locks of the glass doors as shown above.
Connect the hose to the fill and drain valve.

The refill funnel determines the height difference of the water level in the incubator, according to the principle of the communicating tubes.
Min. level is 0.5 L, max. level 3.5 L. The funnel contains approximately 0.4 L water.

- Insert the funnel in the water drain, wait for it to stabilize to show the approximate level of water.
- Fill the funnel to the top to facilitate gravity to fill with sterile distilled water. This may take up to several times.
- Keep adding until the maximum level indicator is reached.

5. Do not exceed the maximum level mark “MAX” (1/Figure 5-4). The maximum fill volume of the water reservoir (5/Figure 5-4) is 3 l.

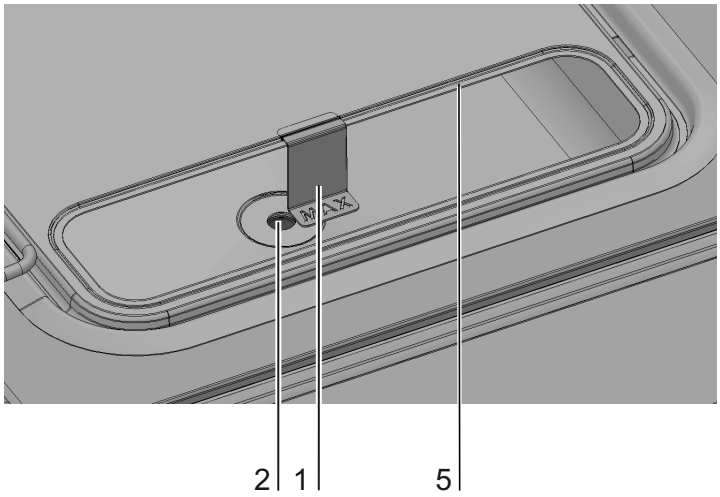


Figure 5-4. “MAX” Fill Level Indicator

6. Wipe off excess water from the cover of the water reservoir.
7. Reinstall pre-filter (2/Figure 5-1).
8. Reinstall the bottom shelf or close flap over cut-out for filling.
9. Make sure that the valves of the CO_2 /O_2 /N_2 supply system are open.
10. Turn on the device using the power switch.
11. Adjust set values for temperature and CO_2 /O_2 concentration on the iCan™ touchscreen.

Starting the Device:

12. Start the device with the auto-start routine (see “Activating the Auto-Start Routine“ on page 6-14).
13. The auto-start progress indicator appears on the display, and the automatic start routine is run.
14. The temperature control adjusts the temperature to the selected set value, humidity rises.
15. When temperature and relative humidity are constant, the automatic adjustment of the CO_2-/O_2 measuring system is performed.
16. The CO_2-/O_2 control supplies the set amount of CO_2-/O_2.
17. If the auto-start routine has been completed, the progress indicator is hidden, and the main menu is displayed. The device is operational.

Loading the Device:

18. Load the workspace with cultures.

Note
Duration of the auto-start routine:
When the device is cold and when the ambient temperature is low, the auto-start routine may take up to 10 hours.

Loading:
To ensure sufficient air circulation and even heating of the samples, the loading surface within the workspace should be used up to 70% max. Bulky objects in the workspace that dissipate heat may impair heat distribution. Bulky objects in the use able space that dissipate heat may impair heat distribution.

Handling and Control

Table of Contents

- "Power Switch" on page 6-2
- "Operating Panel and Operating Structure" on page 6-3
- "Factory Presettings of the iCan™ Touchscreen Controls" on page 6-7
- "Heat-up Phase of the Control Loop Sensors" on page 6-7
- "Behavior of Keys during Adjustments" on page 6-8
- "Setting the Temperature Set Value" on page 6-8
- "Setting the CO2 Set Value" on page 6-9
- "Setting the O2 Set Value" on page 6-10
- "Auto-Start Function" on page 6-12
- "Launching Steri-Run" on page 6-16
- "User Configuration" on page 6-17
- "Trend Display Scaling" on page 6-43
- "Error Messages" on page 6-45
- "Measures After Power Outage" on page 6-47

Power Switch

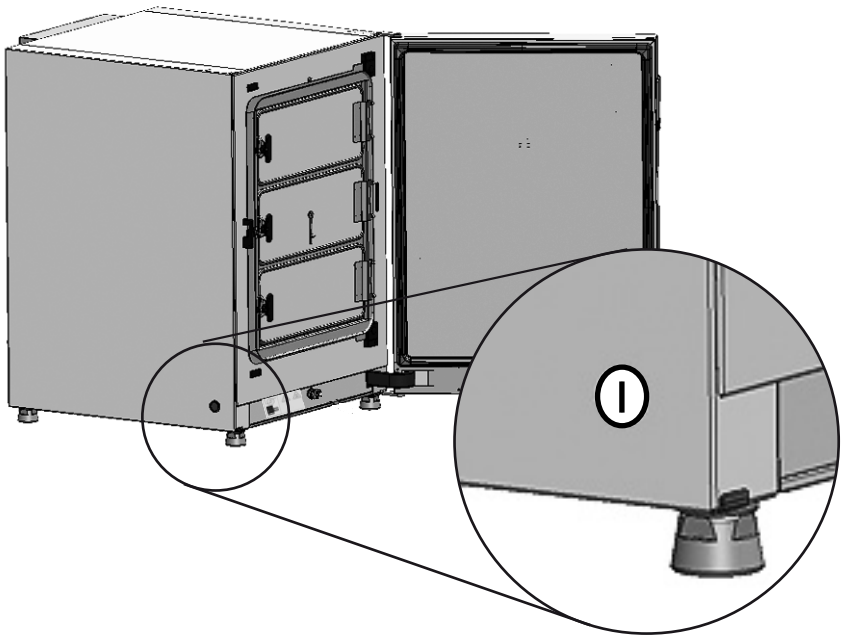


Figure 6-1. Power Switch

The power switch is mounted in the side panel of the unit.

- Powering up: Press the power switch; the switch illumination comes on.
  - After a short beep the blank screen vanishes and the touchscreen is displayed.
  - The control loop sensors pass the heat-up phase (“Heat-up Phase of the Control Loop Sensors“ on page 6-7).
- Powering down: Press the power switch; the switch illumination goes off.

Operating Panel and Operating Structure

The control panel works as a touchscreen (iCan™ Touchscreen) and can be controlled performing light pressure using a finger or a blunt pin.

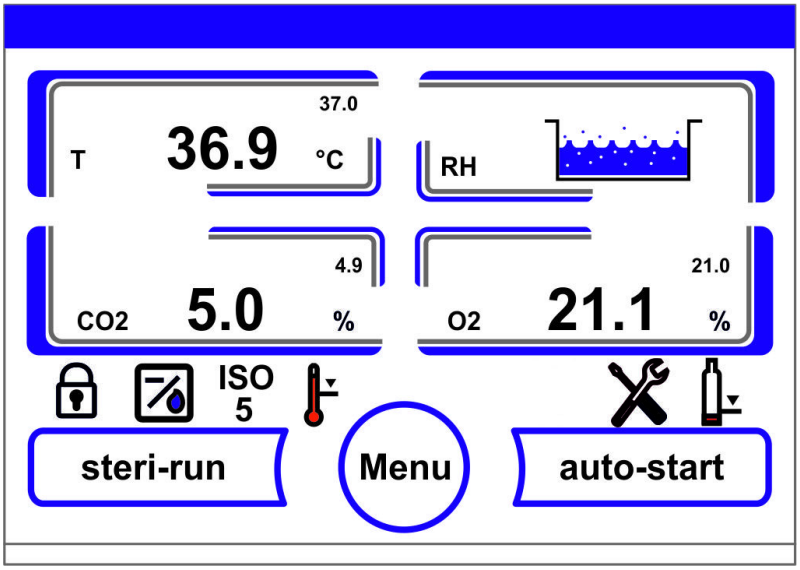


Figure 6-2. Main Screen: Touch-Sensitive Screen Areas

The following screen areas of the operating panel are touch-sensitive and accept operating commands:

- Temperature display T,
- CO_2 display CO_2,
- Display field water level RH,
- O_2 display (optional),
- Icon bar with symbolic representations of operating states, allowing direct access to installed options (see also “Icon Description“ on page 6-40),
- **steri-run** key,
- Menu key,
- **auto-start** key.

,

Note Extended pressure-sensitive area:
To accept a failure message, the entire touchscreen can be used as a pressure-sensitive area.

Versions without O_2/N_2 Control

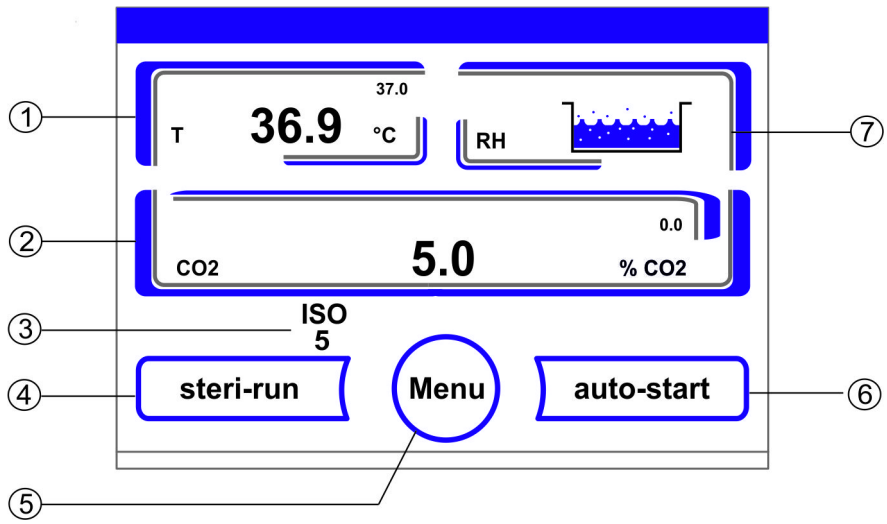


Figure 6-3. iCan™ Touchscreen without O_2/N_2 Gas Supply

Function keys and actual value readouts on the operating panel for versions without O_2/N_2 gas supply source:

1. Workspace temperature display field with actual value (large numeric readout at center), set value (small numeric readout top right) and physical unit (bottom right)
2. $CO2$ concentration display field with actual value (large numeric readout at center), set value (small numeric readout top right) and physical unit (bottom right)
3. HEPA-filter activity display (icons for further options see “Icon Description“ on page 6-40)
4. Key for starting the steri-run decontamination routine
5. Key for opening the menu navigation
6. Key for starting the auto-start routine
7. Display field water level **RH**

Version with Combined $CO_2/O_2/N_2$ Control (Optional)

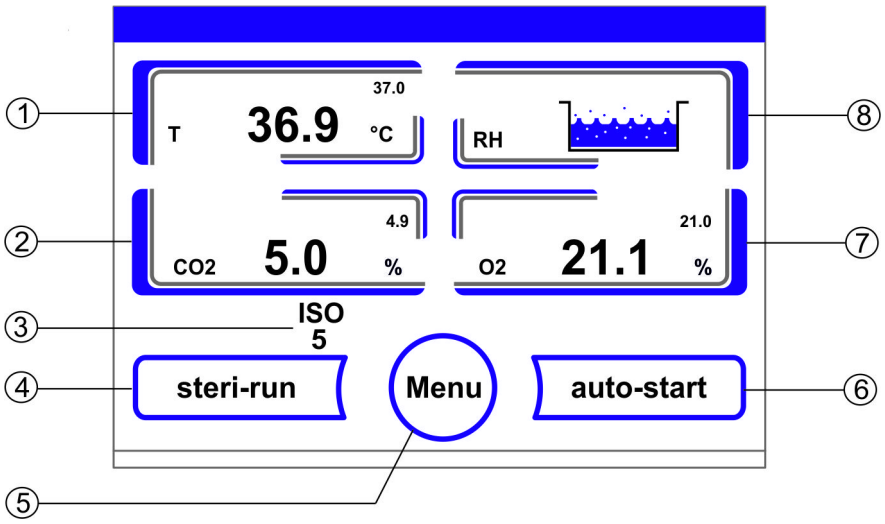


Figure 6-4. iCan™ Touchscreen with Combined Gas Connection

Function keys and actual value readouts on the operating panel for versions with a combined $CO_2/O_2/N_2$ gas supply source:

1. Workspace temperature display field with actual value (large numeric readout at center), set value (small numeric readout top right) and unit (bottom right)
2. CO_2 concentration display field with actual value (large numeric readout at center), set value (small numeric readout top right) and unit (bottom right)
3. HEPA-filter activity display (icons for further options see “Icon Description“ on page 6-40)
4. Key for starting the steri-run decontamination routine
5. Key for opening the menu navigation
6. Key for starting the auto-start routine
7. O_2 concentration display field with actual value (large numeric readout at center), set value (small numeric readout top right) and physical unit (bottom right)
8. Display field water level **RH**

Structure of the Operating Levels

Operation is divided into three levels:

- A: Direct access to the control loop settings: Temperature, CO_2, O_2-setpoint,
- B: Starting the Steri-Run or auto-start routine of the unit,
- C: Navigation through the submenus for device configuration.

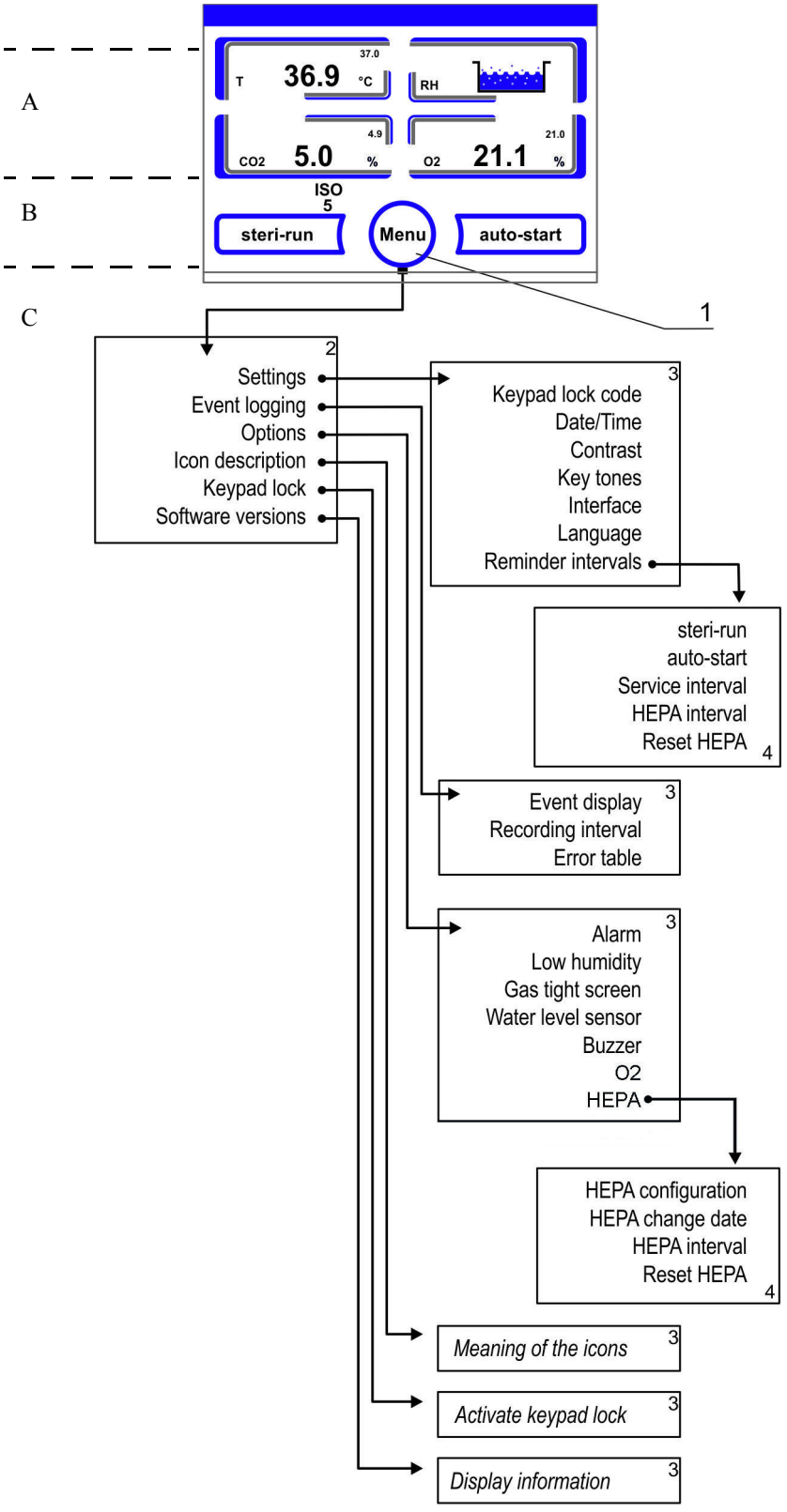


Figure 6-5. Menu Structure Overview

Factory Presettings of the iCan™ Touchscreen Controls

Upon delivery of the device, the following set values have been preset:

- Temperature: 37 °C
- CO_2-content: 5,0 %
- O_2-content (optional): 21,0 %

Note CO_2-/O_2 control:
Since the CO_2 concentration of the air is nearly 0%, the CO_2 control and the control loop error monitoring system are disabled at a set value of 0%.
Since the O_2 concentration of the air is 21%, the O_2 control and the control loop error monitoring system are disabled at a set value of 21%.

Heat-up Phase of the Control Loop Sensors

When the device has been switched on, the control loop sensors pass through a heat-up phase of varying duration during the start process:

1. Temperature control loop: 10 s
2. CO_2 sensor heat-up period (TCD and IR): 5 min
3. O_2 control loop: 5 min

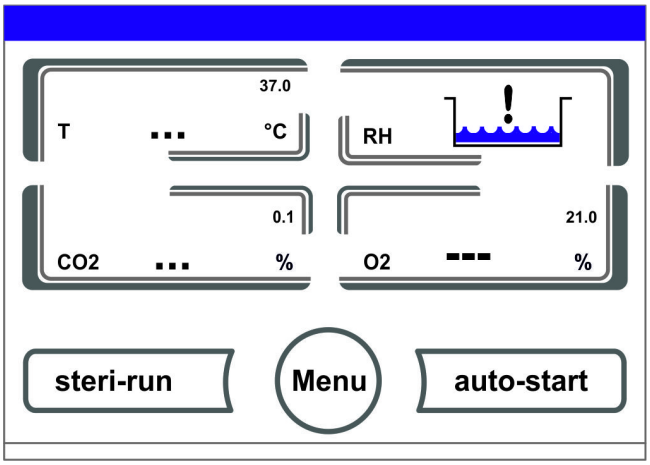


Figure 6-6. Heat-up Phase Display

The start process is indicated by an audible signal. During the heat-up phase, the displays show dots (...) instead of values:

- Temperature display,
- CO_2 display and
- O_2 display field

After the heat-up phase has been completed, the control loop actual values are indicated.

Note CO_2 gas supply:
During the 5-minute heat-up phase of the O_2 control circuit, the CO_2 supply to the workspace and monitoring of the CO_2 control circuit are suspended.

Behavior of Keys during Adjustments

Pressing a key can increase or reduce a value gradually:

- Keeping the "–" or "+" key depressed switches to rapid scan mode,
- after the key has been kept depressed for more than 3 seconds, the quick run speed increases.

Note Saving the settings:
To save changed values, press the **Enter** key.

Resetting the settings:
Unless a user action (contact with the pressure-sensitive areas and keys) occurs within 30 seconds, the system automatically exits the menu and the most recently confirmed setting defaults.

Setting the Temperature Set Value

1. Press the **Temperature** key.
- The Temperature menu (Figure 6-7) is displayed.

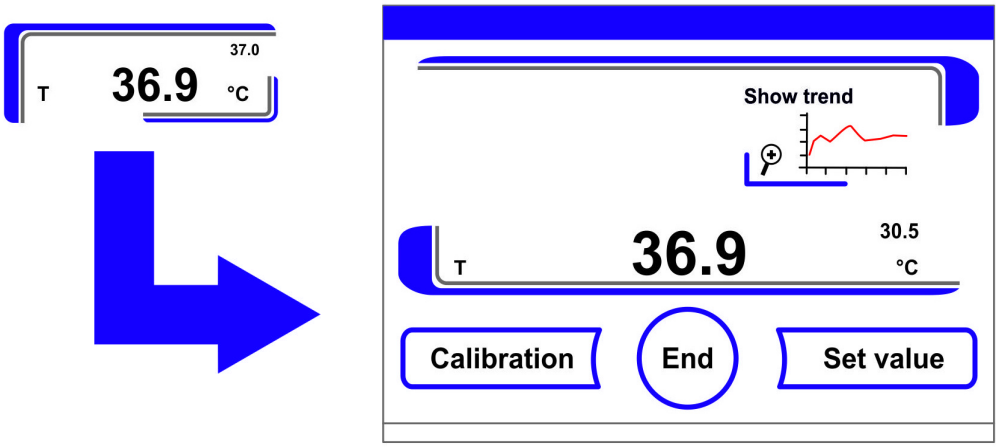


Figure 6-7. Temperature Display Field and Temperature Selection Menu

2. To exit the Temperature menu:
- Press the **End** key [3].

3. To set the temperature set value:
- Press the **Set value** key.

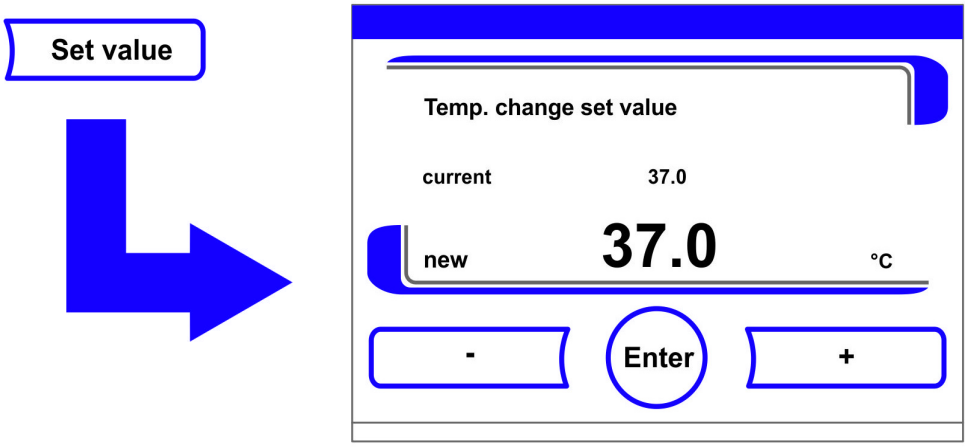


Figure 6-8. Setting the Temperature Set Value

To increase the set value:
- Press the + key.

To reduce the set value:
- Press the - key.

4. To accept and save the set value:
- Press the **Enter** key.
- The system returns to the main menu. The temperature displays shows the actual value currently measured in the workspace.

Setting the CO_2 Set Value

1. Press the CO_2 display key.
- The CO_2 menu is displayed.

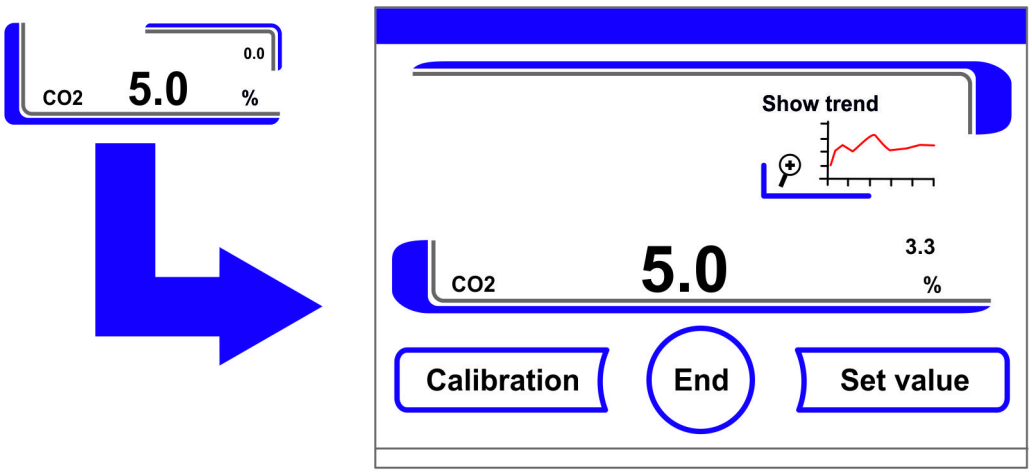


Figure 6-9. CO_2 Display and CO_2 Menu

2. To exit the CO_2 menu:
- Press the **End** key [3].

3. To set the CO_2 set value:
   - Press the **Set value** key.

To increase the set value:
- Press the + key.

To reduce the set value:
- Press the - key.

4. To accept and save the set value:
   - Press the **Enter** key.
   - The system returns to the main menu. The CO_2 display shows the actual value currently measured in the workspace.

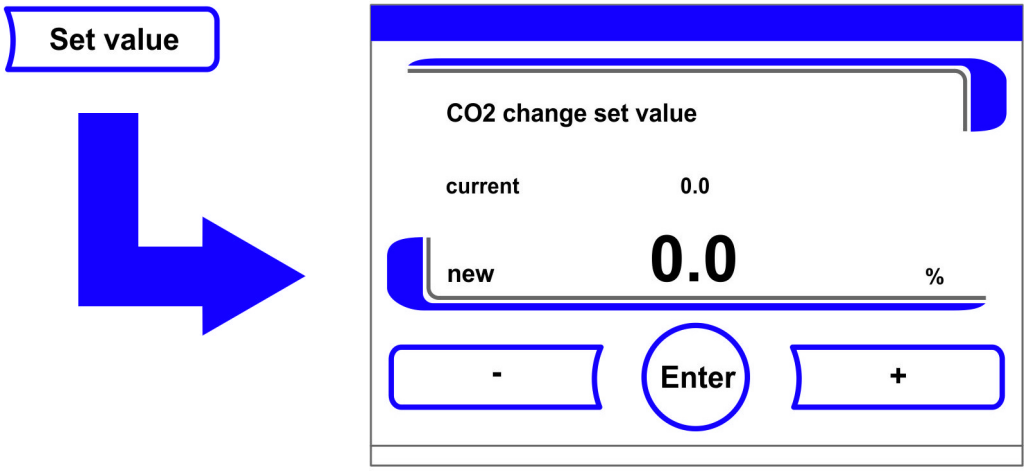


Figure 6-10. Setting the CO_2 Set Value

Note Deactivating the CO_2 control loop:
To deactivate the CO_2 control, the set value is set to 0 %.
If the control loop is deactivated, error monitoring is enabled as well.

Gas monitoring:
The switching state of the CO_2 control loop does not affect the function of the optional gas monitoring system. The gas monitoring system remains active even when the CO_2 control is switched off.

Note
Ventilate the inner chamber after changing the CO_2 setpoints so that no alarm occurs.

Setting the O_2 Set Value

This setting is possible only on versions with the optional O_2-/N_2 control.

1. Press the O_2 display key.
   - The O_2 menu is displayed.

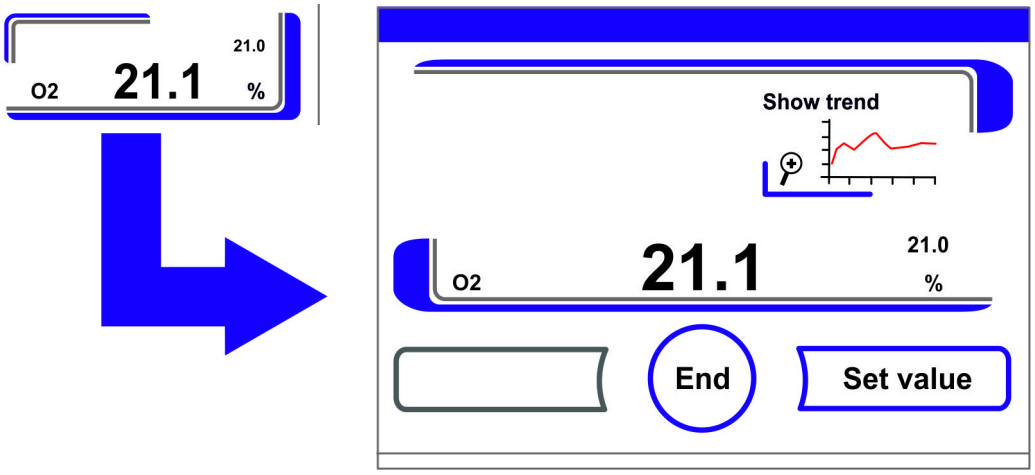


Figure 6-11. O_2 Display and O_2 Menu

2. To exit the O_2 menu:
   - Press the **End** key.
3. To set the O_2 set value:
   - Press the **Set value** key.

To increase the set value:
- Press the + key.

To reduce the set value:
- Press the - key.

4. To accept and save the set value:
   - Press the **Enter** key.
   - The system returns to the main menu. The O_2 display shows the actual value currently measured in the workspace.

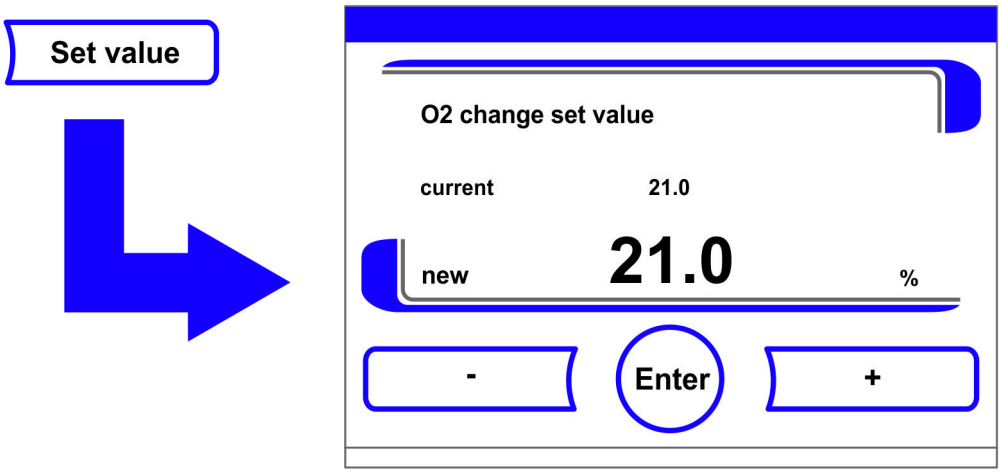


Figure 6-12. Setting the O_2 Set Value

Note
Ventilate the inner chamber after changing the O_2 setpoint so that no alarm occurs.

Note Factory settings:
Depending on the type of the O_2 sensor, one of the two O_2 control ranges has been preset at the factory:
Control range I: 1 % - 21 %
Control range II: 5 % - 90 %

Usage of the process gases:

For set values below 21 % O_2, the device must be connected to a nitrogen supply system.
For set values above 21 % O_2, the device must be connected to an oxygen supply system.
For set values of 21 % O_2, the O2 control is switched off and error monitoring is disabled as well. The control loop error monitoring system (optional) is enabled.

Note

Please make sure that the sensor has been correctly plugged into the socket. Improper installation of the sensor may cause corrosion at the contacts and calibration errors during the auto-start routine. You can verify the proper function by simply activating the sensor. When no error message occurs within 10 minutes, the unit is ready for the auto-start routine.

Auto-Start Function

The auto-start function is a fully automated routine for startup and subsequent adjustment of the CO_2 sensing circuits. After the start, the device control adjusts the temperature to the set value while humidity is generated. When temperature and relative humidity have reached constant values, the CO_2 measuring system is automatically adjusted to these values, and the workspace is supplied with the preset quantity of CO_2.

Notes on using the auto-start routine:

To ensure that the specified accuracy of the CO_2 measuring system is maintained, the device should always be started using the auto-start routine if:

- a difference of more than 1 °C is entered upon setting the temperature set value,
- the Low Humidity function is enabled/disabled,
- the device is restarted after an extended interruption of operation.

The auto-start routine should be run at least every three months on the occasion of cleaning and maintenance works.

Duration of the auto-start routine:

Running the auto-start-routine usually takes 5 to 7 hours. At low room temperatures and when the device is cold, it may take up to 10 hours until the auto-start routine has been completed. If the glass door is opened or if the power supply of the device is interrupted while the auto-start routine is running, the routine is interrupted and rerun after the glass door has been closed or the power supply has been reestablished.

Start conditions for the auto-start routine:

Prior to running the auto-start routine, set the CO_2 and O_2 set values to the desired values and make sure that the atmosphere in the work space only consists of ambient air. The water reservoir in the workspace must be filled sufficiently with water.

Inhibition of the auto-start routine:

The auto-start routine will not start if any of the following error conditions exists.

Temperature control loop:

- Sensor breakage,
- Actual value high, exceeding set value (excessive deviation),
- Actual value low, falling short of set value (excessive deviation),
- Actual value not plausible
- calibration values too high or too low,
- No communication with sensor.

Gas supply CO_2 control loop:

- No communication with sensor.
  In this case, the auto-start key is dimmed and its function is not available.

Auto-start routine aborted due to error:

The auto-start routine is aborted if:

- an error is detected in the temperature control loop,
- an error is sensed in the CO_2 control circuit,
- the water filling level is insufficient,
- the CO_2 value to be set is out of tolerance.

Dry execution of auto-start routine:

If the routine is to be run dry (without water in the water reservoir of the workspace), the water level sensor must be disabled prior to its start (chapter “Options“ on page 6-31).

Activating the Auto-Start Routine

Preparations for the start:

1. Make sure that the valves of the CO_2 /O_2 /N_2 gas supply system are open.
2. Fill the reservoir with purified water. Do not exceed the upper level mark.

Launching the auto-start routine:

1. Press the auto-start key.
- The auto-start instruction menu is displayed.

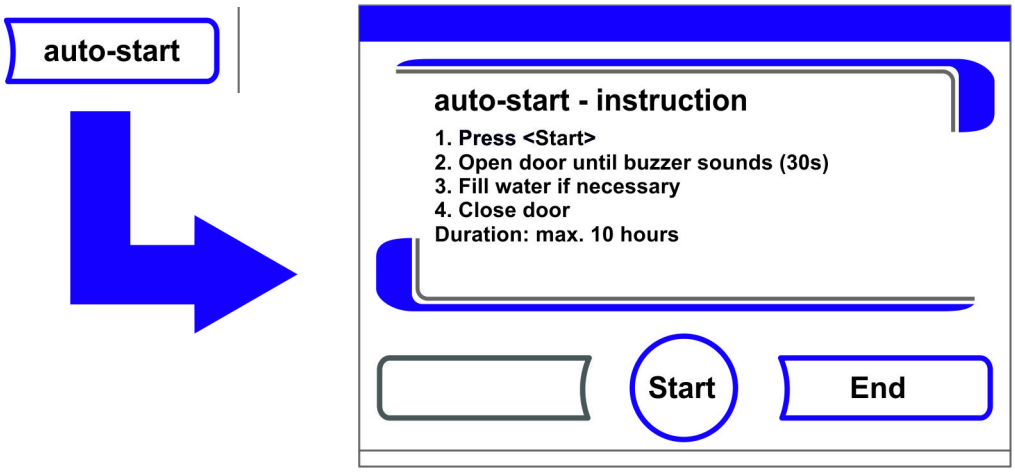


Figure 6-13. Activating the Auto-Start Routine

2. To exit from the auto-start instruction menu and stop auto-start:
- Press the **End** key [3].
3. Refill water, if necessary.
4. Activate the auto-start routine:
- Press the **Start** key.
5. To air the workspace, open both device doors. When the audible alarm sounds after 30 seconds,

6. Close both device doors.
- A status display window showing data on the process is displayed.

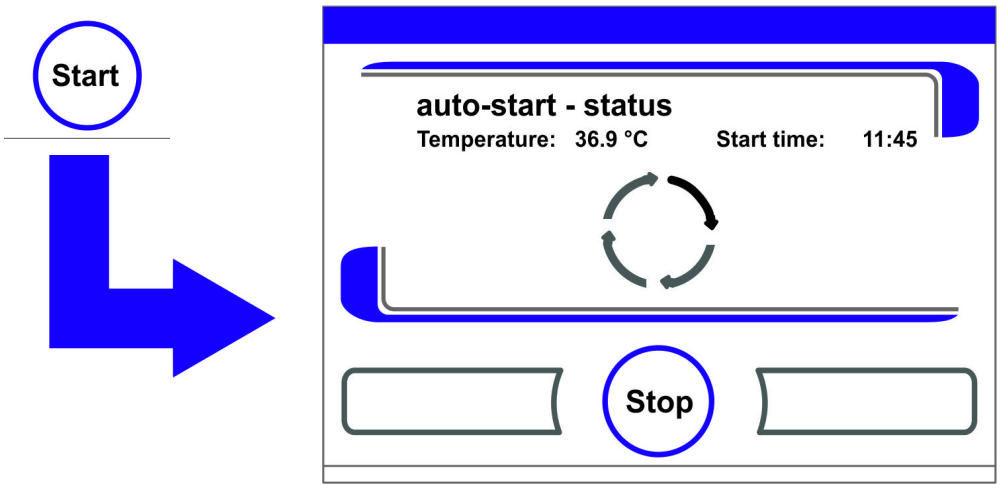


Figure 6-14. Auto-Start-Status Display Window

Note Cancellation:
The auto-start routine can be canceled at any time!
Press the **Stop** key.

Automatic restart:
The auto-start routine is restarted automatically if the routine is canceled due to one of the following events:

- the glass door is opened,
- the outer door is opened on a device with optional gas-tight screen,
- the power supply is interrupted.

Interrupting the Auto-Start Routine

If the **Stop** key in the status display is depressed, the auto-start routine is interrupted and the auto-start stop dialog box is displayed for a safety scan. The routine can now be permanently canceled or resumed.

1. To resume the auto-start routine:
- Press the **Back** key.
- The system returns to the status display, and the auto-start routine is resumed.

2. To cancel the auto-start routine:
- Press the **End** key [3].
- The warning triangle is displayed as a failure message together with the audible signal.

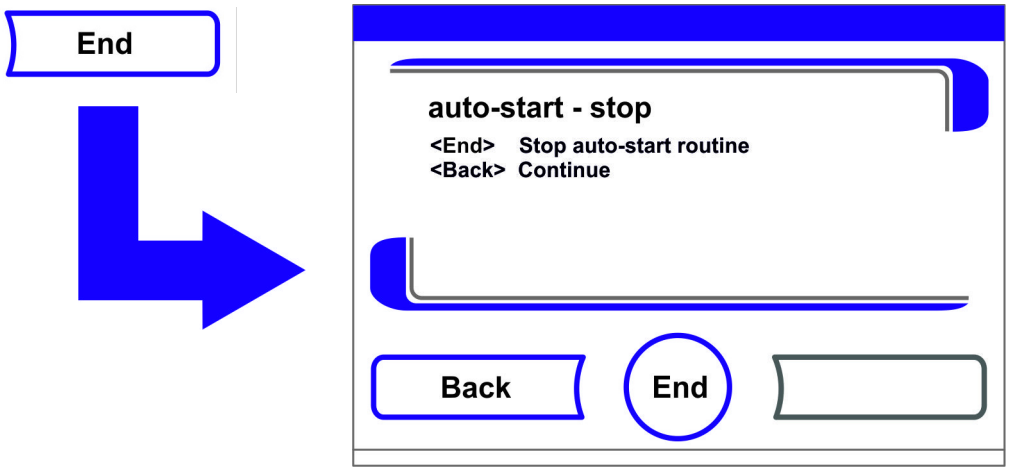


Figure 6-15. Interrupting the Auto-Start Routine

3. To accept the failure message:
- Press any position on the display.
- The **Error** dialog box with the description of the error is displayed.

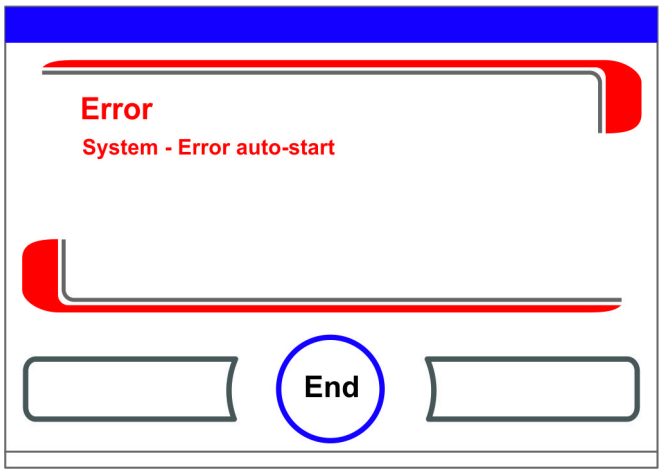


Figure 6-16. Error Message Subsequent to Aborted Auto-Start

4. To accept the failure message:
- Press the **End** key [3].
- The system returns to the main menu.

Launching Steri-Run

The steri-run decontamination routine is used to decontaminate the complete workspace. The steri-run decontamination routine uses an automated program cycle to decontaminate the complete workspace including the shelf system and the sensors. An in-depth description of the function is given in the chapter Cleaning and disinfection (Chapter 8, page 1).

User Configuration

The user configuration settings allow the user interface and the additional device functions to be adjusted to the requirements of everyday operation.The user configuration selection menu (Figure 6-17) is invoked by pressing the Menu key on the main screen.

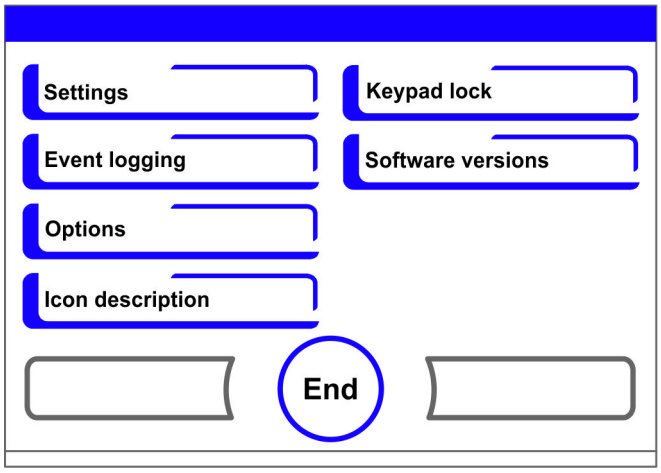


Figure 6-17. User Configuration Menu

The user configuration menu is split into six categories:

- Settings,
- Event logging,
- Options,
- Icon description,
- Keypad lock,
- Software versions.

To make a user-specific setting in a dialog box, navigate through the submenus listed in the illustrations and open the dialog box.

Settings / Setup

The **Settings** selection menu (Figure 6-18) allows for accessing a series of dialog windows with adjustment options for customizing the user interface:

- Changing the keypad lock code,
- Date/time setting,
- Adjusting display brightness,
- Key tone setting,
- Interface configuration,
- User display screen language setting,
- Reminder interval setting.

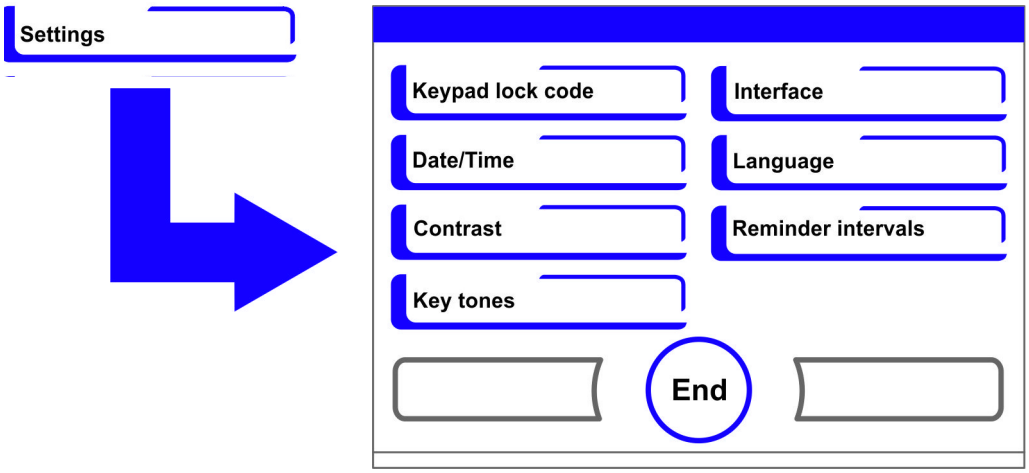


Figure 6-18. Settings/Setup Menu

Changing the Keypad Lock Code

The keypad lock prevents the unauthorized changing of the operational settings. Only those keys are locked where values can be entered.
The keypad is locked by entering four numbers.

- Upon delivery, the default code is: 0000.

This default can be changed into a user-defined code that is then enabled using the KEYPAD LOCK dialog box (“Enabling/Disabling the Keypad Lock“ on page 6-42).

Changing the keypad lock code:

1. Press the **Menu** key.
2. Select the menu command Keypad lock code.
   - The input dialog shown in Figure 6-19 is displayed.

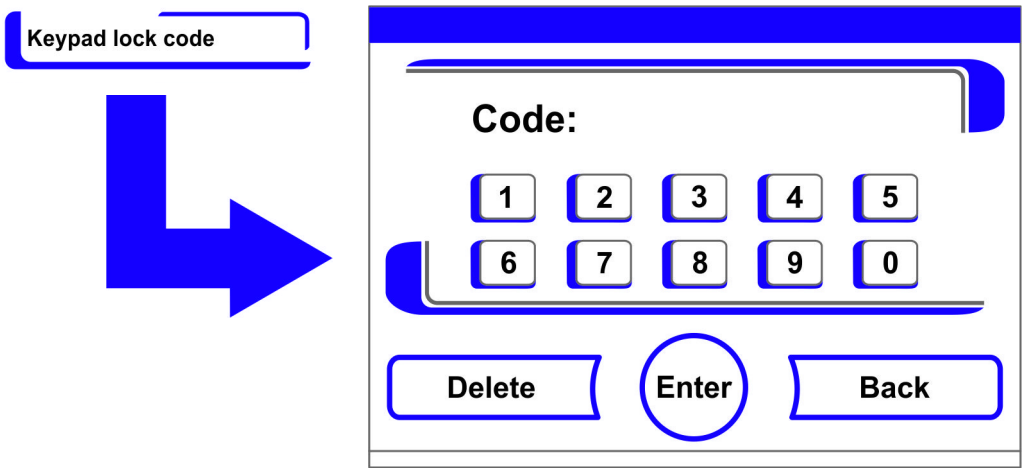


Figure 6-19. Changing the Keypad Lock Code

3. To enter the default **0000**:
   - Press the corresponding numeric keys.
   - The number combination is displayed as encrypted text in the input box.

4. Confirm your input:
- Press the **Enter** key.
- The Code new prompt appears in the display. Four blanks indicate that a new key code may be entered.

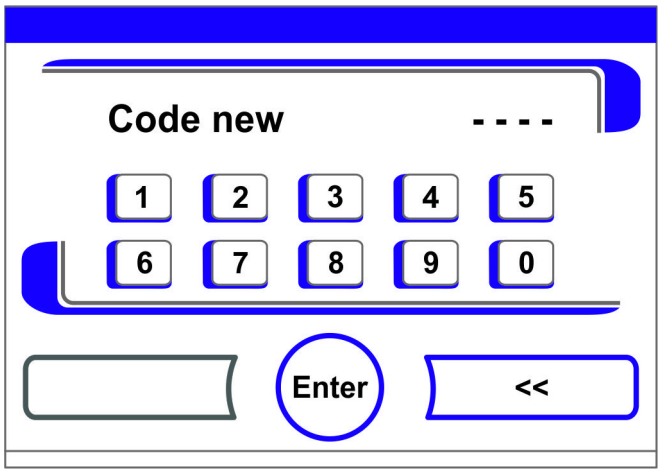


Figure 6-20. Changing the Keypad Lock Code

Entering the new 4-digit code:
- Press the corresponding numeric keys.
- The number combination is displayed in the input box.

5. To set the cursor to the left to overwrite a value:
- Press the **Backspace** (<<) key.

6. To accept and save the input value:
- Press the **Enter** key.
- The system returns to the **Settings/Setup** menu.
- A padlock icon appears on the Icon bar in the main menu (Figure 6-2 on page 3) as an activity indicator for the keypad lock.

Note Changing the user-defined code:
The user-defined code can be changed as often as required using the same procedure:

- Activate the recoding function by entering the valid code,
- enter the new code and confirm it.

Date/Time Setting

The input dialog allows date and time to be set to the required time zone.

1. Press the **Menu** key.

2. Select the menu command **Date / Time**.
- The selection dialog shown in Figure 6-21 is displayed.

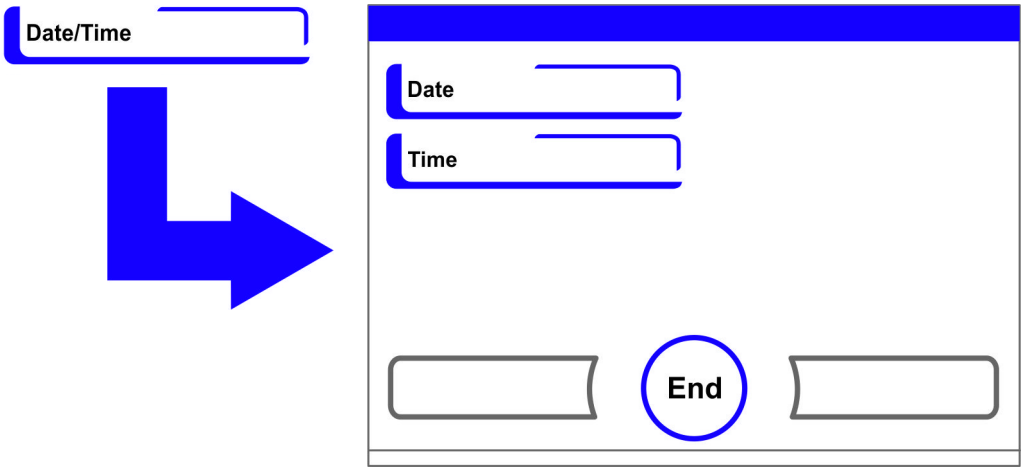


Figure 6-21. Date/Time Menu

3. For changing the date, choose the **Date** option.
   - The input dialog shown in Figure 6-22 is displayed.

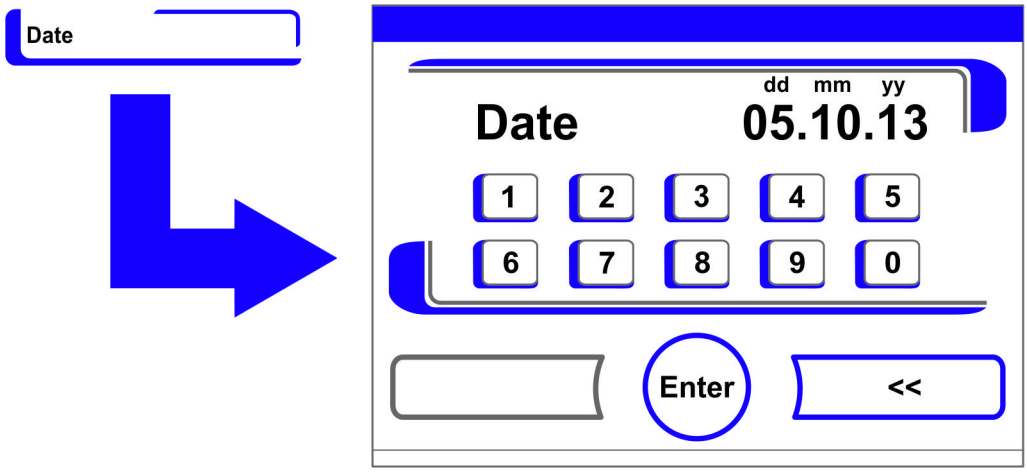


Figure 6-22. Setting the Date

4. To enter the date:
   - Press the numeric keys.
   - The input numbers are displayed in the input box.
5. To set the cursor to the left to overwrite a value:
   - Press the **Backspace** (<<) key.
6. To accept and save the input value:
   - Press the **Enter** key.
7. The system returns to the **Date/Time menu**.
8. For changing the time, choose the **Time** option.
   - The input dialog shown in Figure 6-23 is displayed.

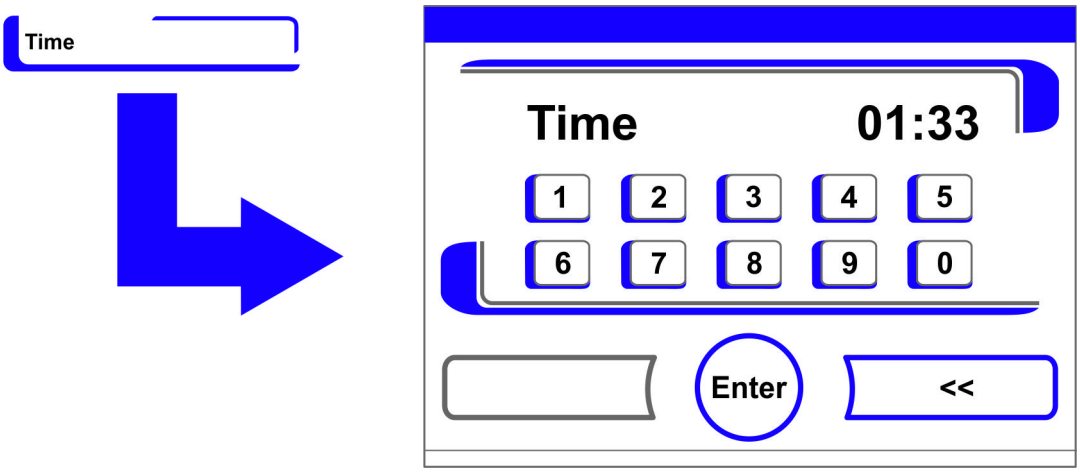


Figure 6-23. Setting the Time

9. To enter the time:
   - Press the numeric keys.
   - The input numbers are displayed in the input box.
10. To set the cursor to the left to overwrite a value:
    - Press the **Backspace** (<<) key.
11. To accept and save the input value:
    - Press the **Enter** key.
12. The system returns to the **Date/Time menu**.

Adjusting Display Brightness

The selection menu allows for adjusting the brightness of the operating panel over a range from 1 to 100 %.

Setting the Contrast

1. Press the **Menu** key.
2. Select the menu command **Settings / Setup**.
3. Select the option **Display contrast**.
   - The input dialog shown in Figure 6-24 is displayed.

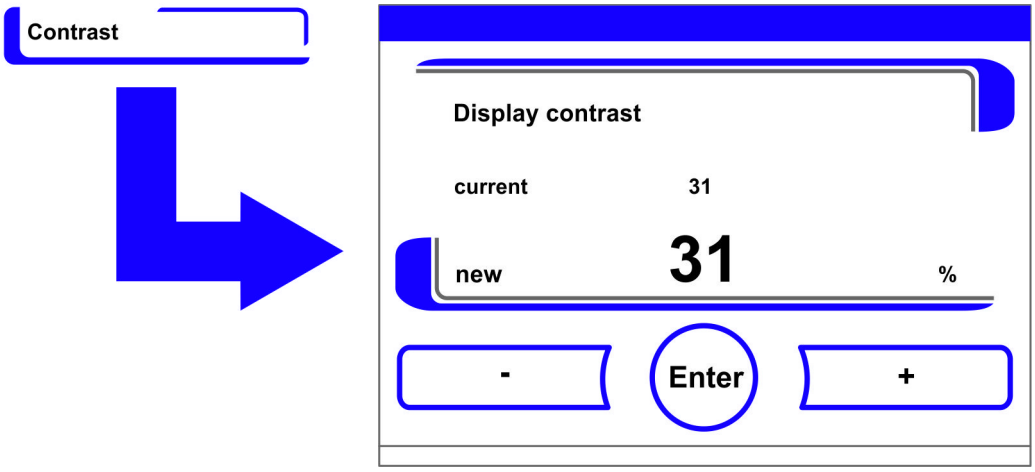


Figure 6-24. Adjusting Display Brightness

4. To increase the value:
   - Press the + key.
5. To reduce the value:
   - Press the - key.
6. The value change appears in the display. The **New** message indicates that the selection has been changed, but not saved yet.
7. To accept and save the change:
   - Press the **Enter** key.
   - The system returns to the **Settings/Setup** menu.

Key Tone Setting

The input dialog allows the loudness of the key tone that sounds whenever a key is depressed to be set. The value range is 0 to 100. The change occurs in increments of 5.

Adjusting Key Tone Volume

1. Press the **Menu** key.
2. Select the menu command **Settings / Setup**.
3. Select the option Key tones.
   - The input dialog shown in Figure 6-25 is displayed.

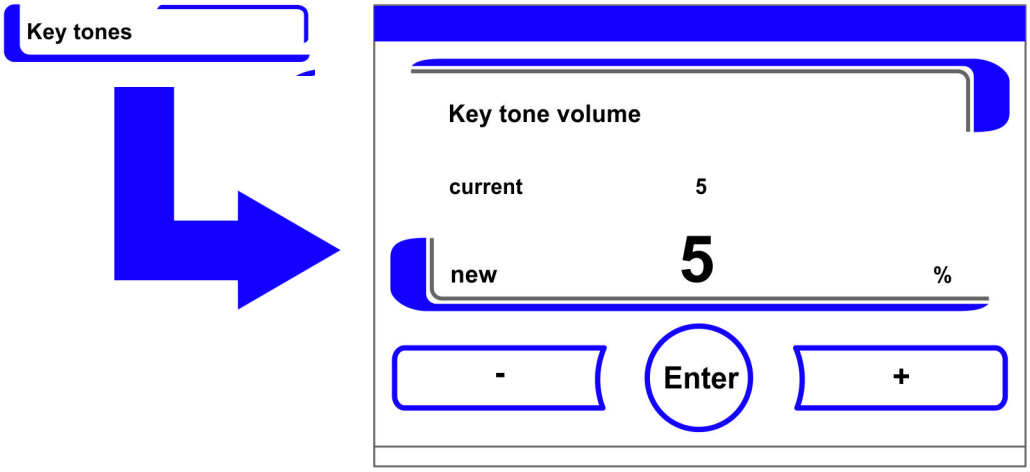


Figure 6-25. Adjusting Key Tone Volume

1. To increase the value:
   - Press the + key.
2. To reduce the value:
   - Press the - key.
3. The value change appears in the display. The **New** message indicates that the selection has been changed, but not saved yet.
4. To accept and save the change:
   - Press the **Enter** key.
   - The system returns to the **Settings/Setup** menu.

USB Interface Baud Rate Setting

This selection menu allows for adjusting the data rate of the USB interface:

The baud rate can be changed within the defined baud rates (9,600, 19,200, 38,400, 57,600 baud).

Setting the Baud Rate

1. Press the **Menu** key.
2. Select the menu command **Settings / Setup**.
   - The selection dialog shown in Figure 6-26 is displayed.

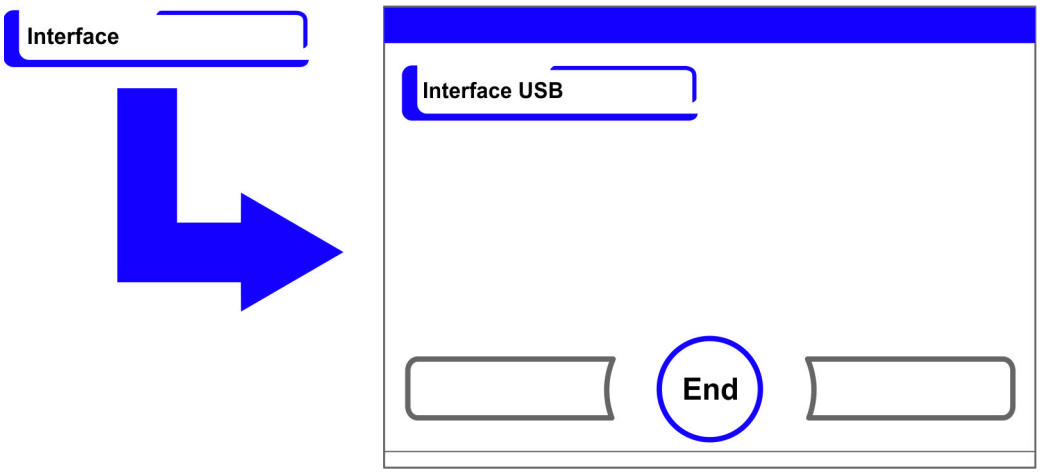


Figure 6-26. Interface USB Menu

3. Select the option **Interface USB** (Figure 6-26).
- The input dialog shown in Figure 6-27 is displayed.

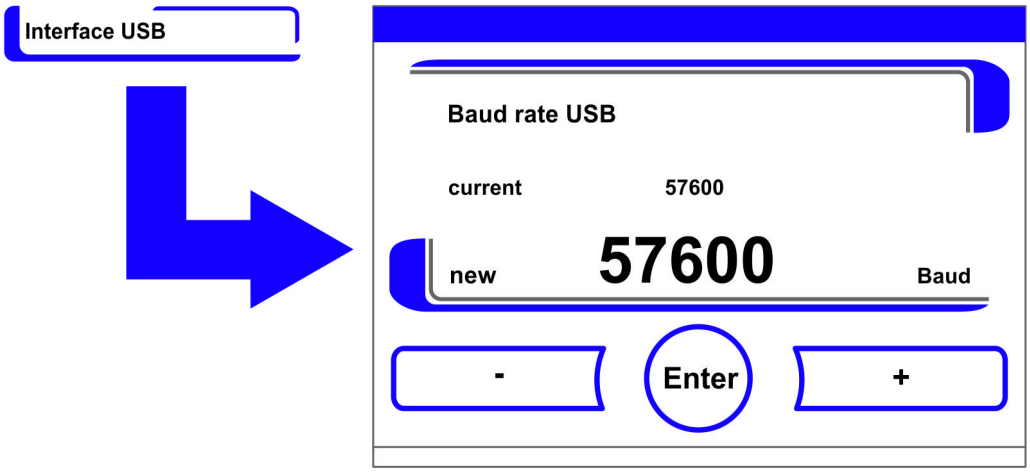


Figure 6-27. USB Interface Baud Rate Setting

4. Press the + or key to set the Baud rate of the USB interface (Figure 6-27).
- To increase the baud rate: Press the + key.
- To reduce the baud rate: Press the - key.

5. The value change appears in the display. The **New** message indicates that the selection has been changed, but not saved yet.

6. To accept and save the change:
- Press the **Enter** key.
- The display returns to **Interface USB** selection menu.

7. To activate the new settings:
- Browse back to the main menu.
- Wait for approx. 10 seconds and perform a reset by switching the device off and on using the power switch.

Setting the Language of the Display Screen

The input dialog allows the language of the display screen to be set. Seven languages are available:

- German,
- English,
- Spanish,
- French,
- Italian,
- Chinese,
- Japanese.

Selecting the display language:

1. Press the **Menu** key.
2. Select the menu command Language.
   - The input dialog shown in Figure 6-28 is displayed.

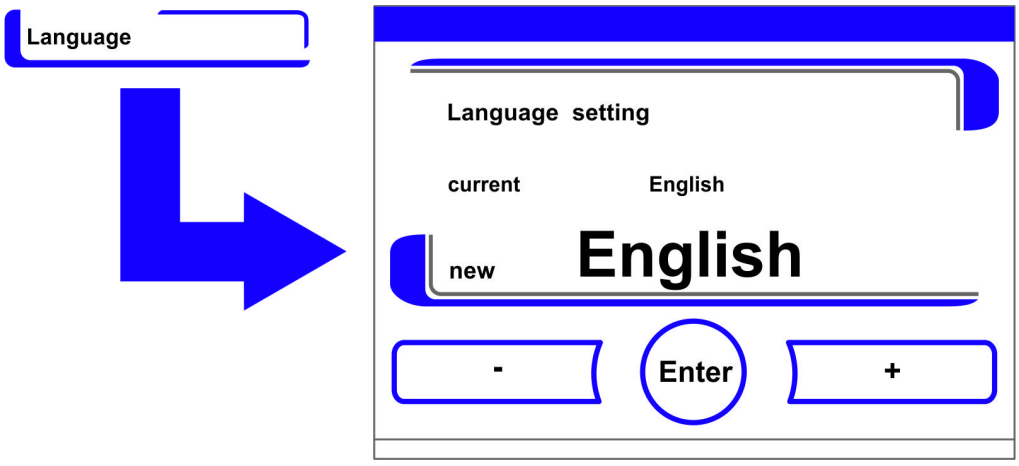


Figure 6-28. Language Setting

3. To browse upward in the selection:
   - Press the + key.
4. To browse downward in the selection:
   - Press the - key.
5. The new language appears in the display. The **New** message indicates that the selection has been changed, but not saved yet.
6. To accept and save the selection:
   - Press the **Enter** key.
   - The system returns to the **Settings/Setup** menu.

Reminder Interval Setting

The reminder intervals are integral components of the alarm and monitoring system of the device control. For the two essential functions steri-run and auto-start as well as for routine service work, the user can set dates that trigger an alarm whenever they occur.
The counting begins at 00:00 hrs of the day on which the previously set reminder interval has elapsed.

On the due date, the display shows a reminder message for the activated reminder interval:

- Steri-run: Please run Steri-Run routine.
- auto-start: Please run auto-start routine. Appears upon successful completion of the Steri-Run decontamination routine.
- Service interval: Request service. The service message can be confirmed. In this case, the Request Service icon is displayed.

After the routines have been run successfully, the reminder messages are hidden.

Factory Settings

Steri-run decontamination routine	90 days
auto-start routine	Off
Service interval	Off
HEPA interval	365 days

Reminder Interval Setting

1. Press the **Menu** key.
2. Select the Reminder intervals menu option.
   - The selection dialog shown in Figure 6-29 is displayed.

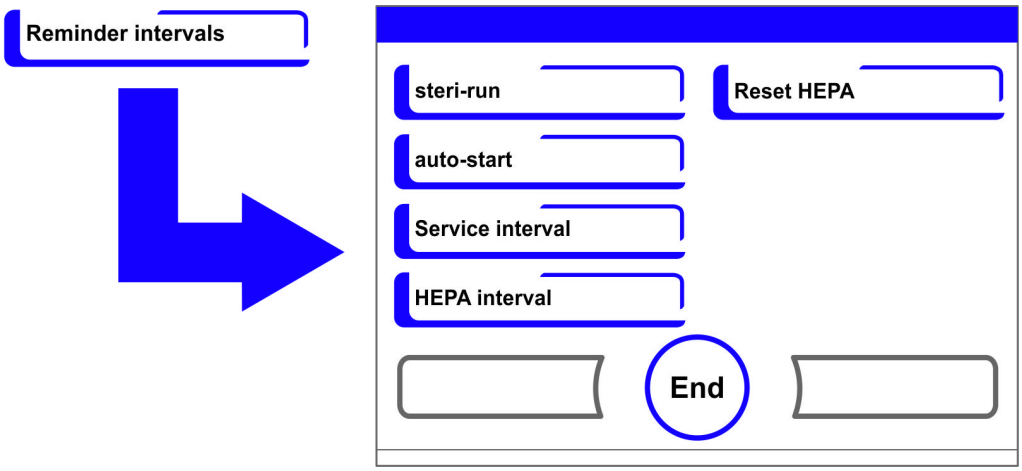


Figure 6-29. Choose the Desired Reminder Interval Function.

3. Select the appropriate menu option, for example **Steri-run**.
   - The input dialog shown in Figure 6-29 is displayed.

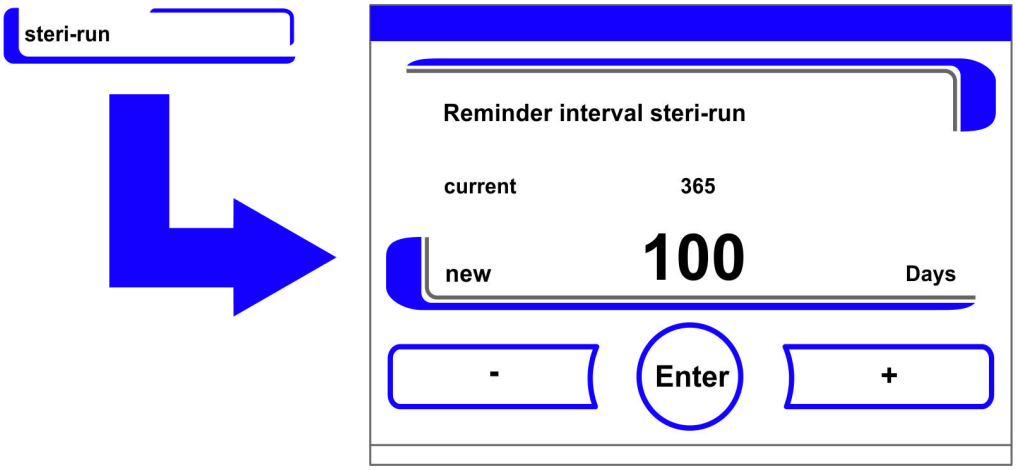


Figure 6-30. Setting the Reminder Interval for Steri-Run

1. To increase the number of days:
   - Press the + key.
2. To reduce the number of days:
   - Press the - key.
3. The value change appears in the display. The **New** message indicates that the selection has been changed, but not saved yet.
4. To deactivate the reminder interval:
   - Set the value to **Off**.
   - Press the - key.
5. To accept and save the change:
   - Press the **Enter** key.
   - The display returns to the reminder intervals selection menu.

Data Logging

The Event logging selection menu (Figure 6-31) allows for accessing dialog screens for logging and displaying events that occur during ongoing operation of the unit:

- Event display,
- Recording interval,
- Error table.

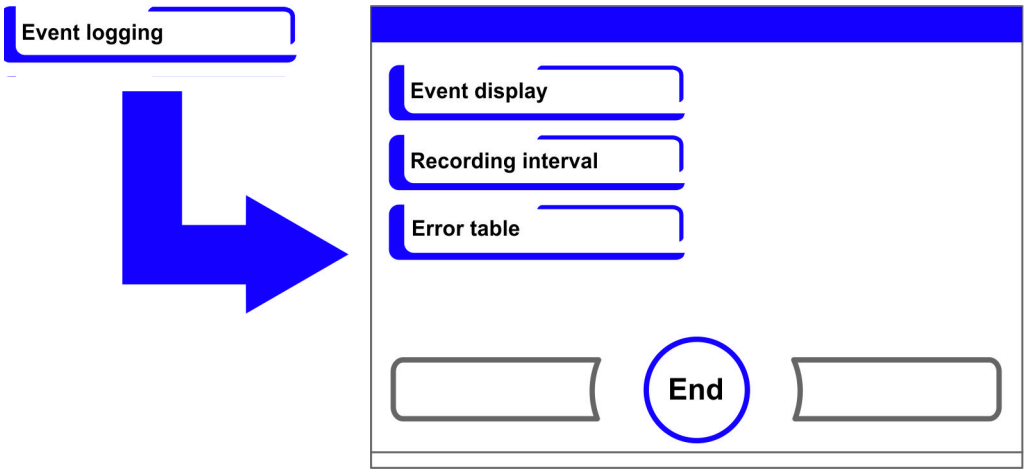


Figure 6-31. Event Logging Menu

Event Display

The event display uses short, single-line entries specifying date and time to report the events that were logged during the operation of the device.
The entries are listed in chronological order with the most recent event at the top position. The list can be displayed but not edited. If the event display consists of several pages, the user can browse through the list. The status indicator indicates which page of the total number of pages is currently being displayed.

Invoking the Event Log

1. Press the **Menu** key.
2. Select the menu command Event logging.
   - The selection dialog shown in Figure 6-31 is displayed.
3. Select the menu command Event display.
   - The list shown in Figure 6-32 appears on the display.

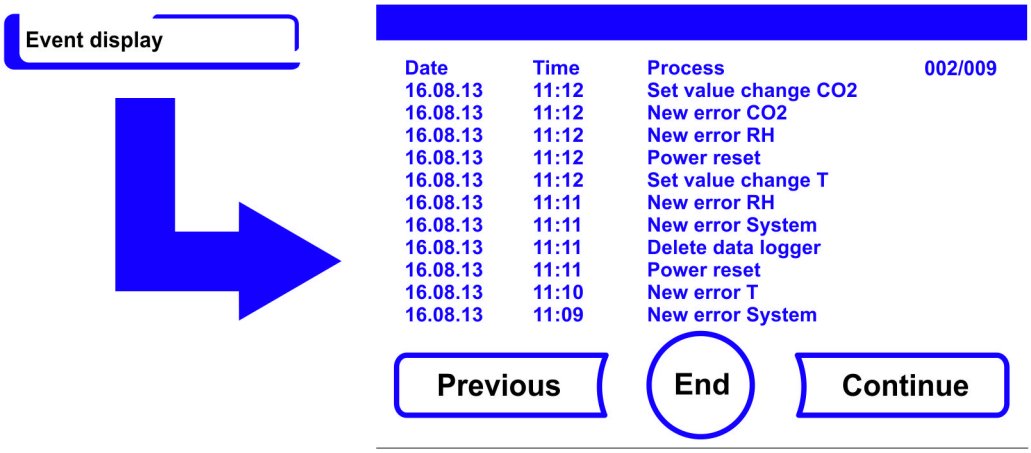


Figure 6-32. Event Display

1. To browse forward in the list:
   - Press the **Continue** key.
2. To browse backward in the list:
   - Press the **Previous** key.
3. Exit the display:
   - Press the **End** key [3].
   - The system returns to the Event logging menu.

Changing the Logging Cycle Time:

Due to limited memory resources, the oldest entries are deleted as new entries are logged. The period from which the displayed entries originate depends largely on the selected logging cycle time.

Invoking the Event Log

1. Press the **Menu** key.
2. Select the menu command Event logging.
   - The selection dialog shown in Figure 6-31 is displayed.
3. Select the menu command Recording interval.
   - The input dialog shown in Figure 6-33 is displayed.

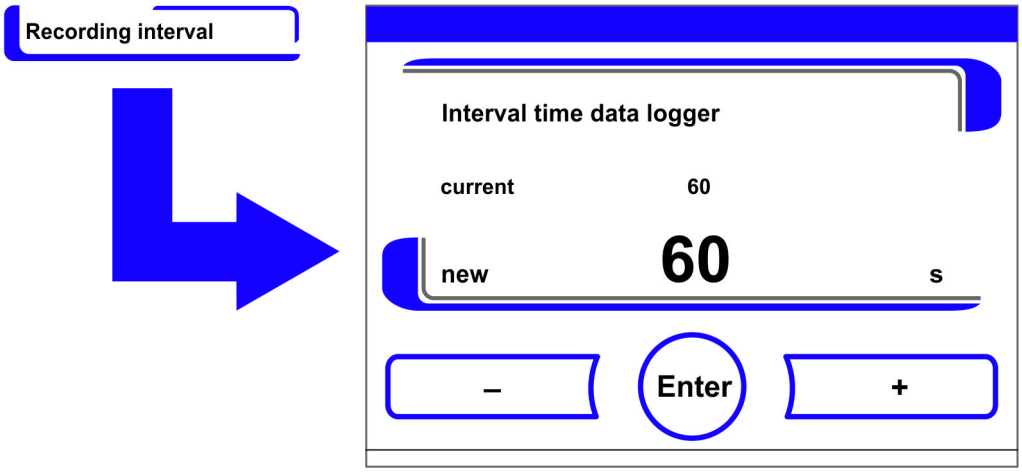


Figure 6-33. Logging Cycle Setting

Logging cycle	Maximum period displayed
10 s	22.5 hours
30 s	2.8 days
60 s	5.6 days
120 s	11.2 days
180 s	16.8 days
3600 s	336 days

The setting controls the logging cycle in sections of seconds during which the control loop measured values are logged during the operation of the device and displayed by the trend display ("Trend Display Scaling" on page 6-43).

The settings can be made within the value range of 10 seconds to 3600 seconds.

1. To increase the value:
   - Press the + key.
2. To reduce the value:
   - Press the - key.
3. The value change appears in the display. The **New** message indicates that the selection has been changed, but not saved yet.
4. To accept and save the change:
   - Press the **Enter** key.
   - The system returns to the **Event logging** menu.

Note Event logger interval time:
The logging cycle time does not affect the entries of the error table.

Displaying the Error Table

The error table lists the errors detected by the device-integral monitoring system in descending chronological order. The most recently detected error is listed at the top position of 22 possible entries. An entry consists of the control loop in which the error occurred, the date, the time, and an error description. The error table can be displayed but not edited. If the event display consists of two pages, the user can browse through the list. The status indicator **001/002 or 002/002** indicates which page of the two pages is currently being displayed.

Displaying the Error Table

1. Press the **Menu** key.
2. Select the menu command Event logging.
   - The selection dialog shown in Figure 6-31 is displayed.
3. Select the menu command Event display.
   - The list shown in Figure 6-34 appears on the display.

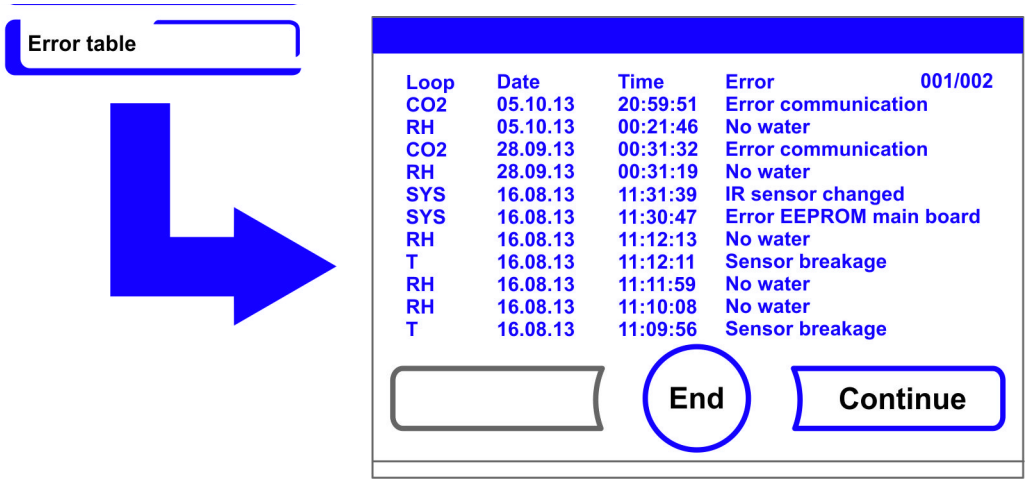


Figure 6-34. Displaying the Error Table

Note Troubleshooting:
For a detailed overview of causes for errors and their correction, please refer to the end of this chapter!

1. To browse forward in the error table:
   - Press the **Continue** key.
2. To browse backward in the list:
   - Press the **Previous** key.
3. Exit the display:
   - Press the **End** key [3].
   - The system returns to the **Event logging** menu.

Options

The **Options** selection menu (Figure 6-35) allows for accessing all selection dialogs for the functional options of the unit:

- Alarm,
- Low humidity,
- Gas-tight screen (optional),
- Humidity sensor,
- Audible alarm,
- O_2 gas supply (optional),
- HEPA-filter.

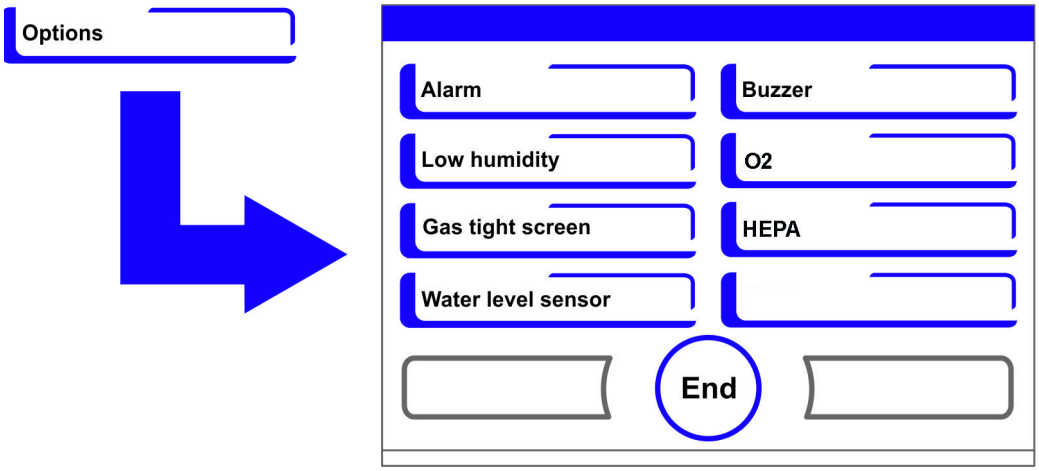


Figure 6-35. Options Menu

Alarm Relay Setting

The alarm relay is the electrical interface for wiring the internal control subsystem of the unit to an external power monitoring system. Depending on the required input signal of the external monitoring system, network monitoring can be enabled or disabled. If network monitoring is enabled, a power failure is detected as an error. Wiring details for the alarm relay are described in the section"Connecting the Alarm Contact:" on page 4-18.

1. Press the **Menu** key.
2. Select the menu command **Options**.
   - The selection dialog shown in Figure 6-35 is displayed.
3. Select the menu command Alarm.
   - The selection dialog shown in Figure 6-36 is displayed.

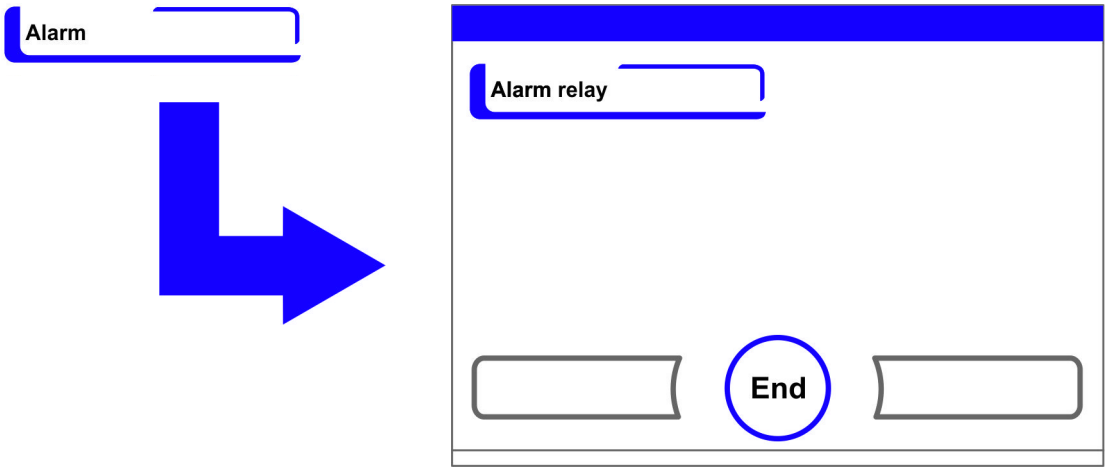


Figure 6-36. Alarm Menu

4. Select the menu command **Alarm relay**.
   - The input dialog shown in Figure 6-37 is displayed.

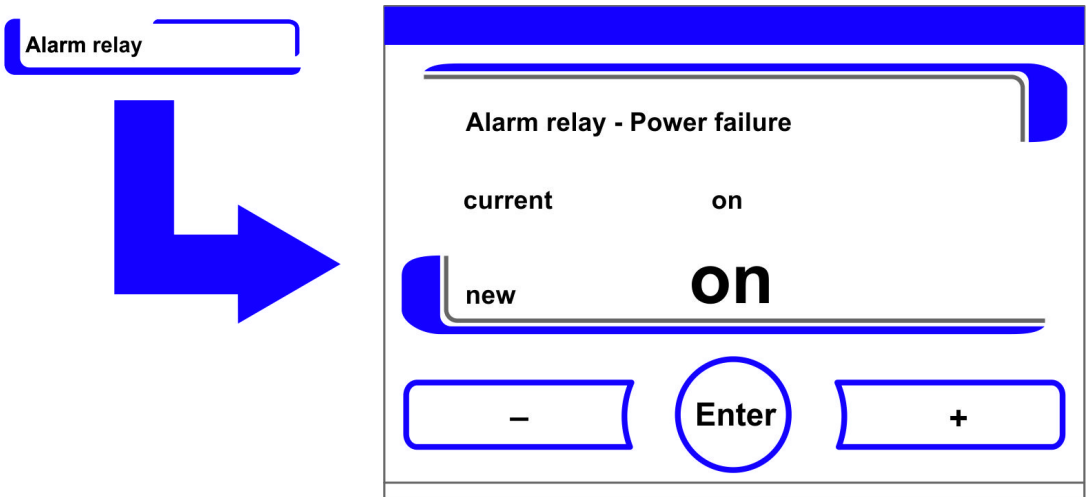


Figure 6-37. Alarm Relay Setting

1. To toggle between two states:
   - Press the + key.
     or
   - Press the - key.

2. To accept and save the change:
   - Press the **Enter** key.
   - The system returns to the **Options** menu.

Low Humidity Setting

If condensation occurs on the culture containers due to high relative humidity, the humidity in the workspace can be set to a lower level. At the factory, the device control is preset to high humidity (approx. 93% relative humidity.
The relative humidity in the workspace is lowered from approx. 93% to approx. 90%.
The modification requires an extended adaption phase. To ensure that it effectively prevents dew formation on culture containers, it must be used as a permanent setting.

Reducing Humidity in the Workspace

1. Press the **Menu** key.

2. Select the menu command **Options**.
   - The selection dialog shown in Figure 6-35 is displayed.

3. Select the menu command Low humidity.
   - The input dialog shown in Figure 6-38 is displayed.

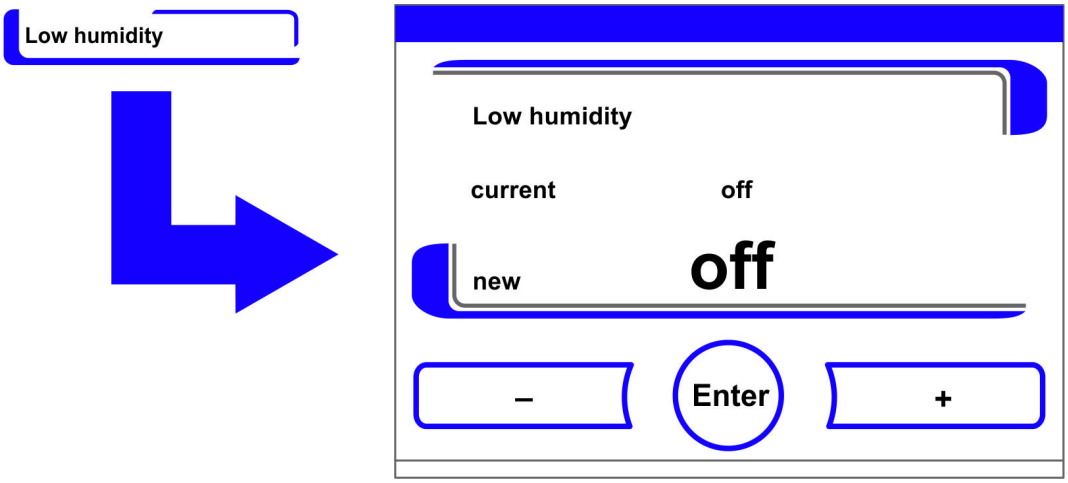


Figure 6-38. Low Humidity Setting

1. To toggle between two states:
   - Press the + key.
     or
   - Press the - key.
2. To accept and save the change:
   - Press the **Enter** key.

The system returns to the **Options** menu.

Upon return to the main menu the **Low humidity** icon appears.

Note Low humidity:
The enabling/disabling of the Low humidity function is entered into the event list.

Gas Tight Screen Setting

As the aperture cross-sections are smaller when accessing the samples, devices equipped with the optional gas-tight screen achieve shorter recovery times for the incubation parameters:

- Workspace temperature,
- CO_2 concentration,
- O_2 concentration,
- relative humidity.

After conversion of the device, the device control system must be adjusted to the gas-tight screen option.

Note Malfunction:
The conversion to gas-tight screen causes a change of the control parameters.
Failure to set the gas-tight screen function in accordance with the actually installed door version may impair the incubation performance.

Gas Tight Screen Setting

1. Press the **Menu** key.
2. Select the menu command **Options**.
   - The selection dialog shown in Figure 6-35 is displayed.

3. Select the menu command Gas tight screen.
- The input dialog shown in Figure 6-39 is displayed.

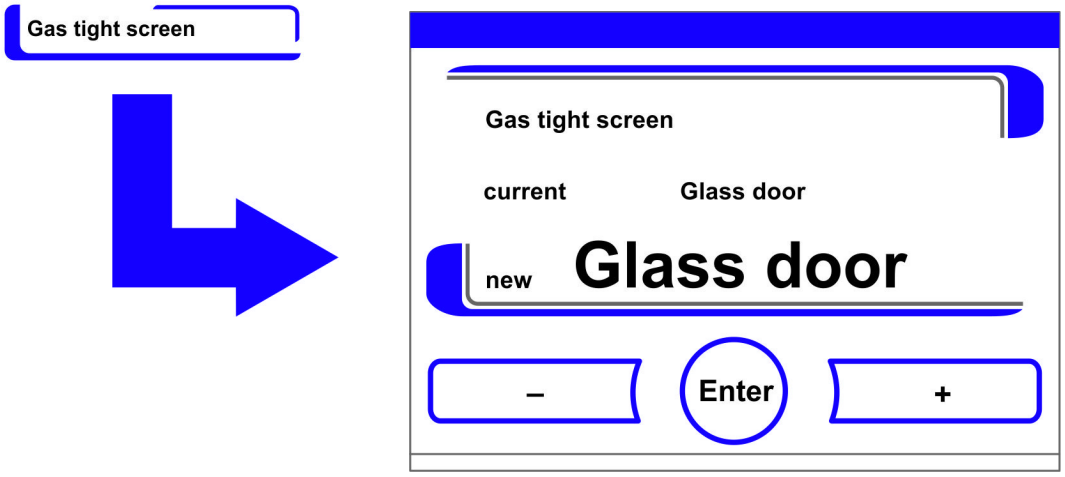


Figure 6-39. Gas Tight Screen Setting

1. To toggle between two options:
- Press the + key.
  or
- Press the - key.

2. To accept and save the change:
- Press the **Enter** key.
- The system returns to the **Options** menu.

Activating/De-activating the Water Level Sensor

For incubation operation with ambient humidity or if the auto-start routine is to be run dry (without water), the water level sensor can be switched off. This prevents alarm messages for the water level sensor by the device-integral monitoring system from being issued:



WARNING When the water level sensor is de-activated, the steri-run routine can be started despite of the presence of a water fill in the water reservoir. This is improper usage and may destroy the fan motor.

1. Press the **Menu** key.

2. Select the menu command **Options**.
- The selection dialog shown in Figure 6-35 is displayed.

3. Select the menu command Water level sensor.
- The input dialog shown in Figure 6-40 is displayed.

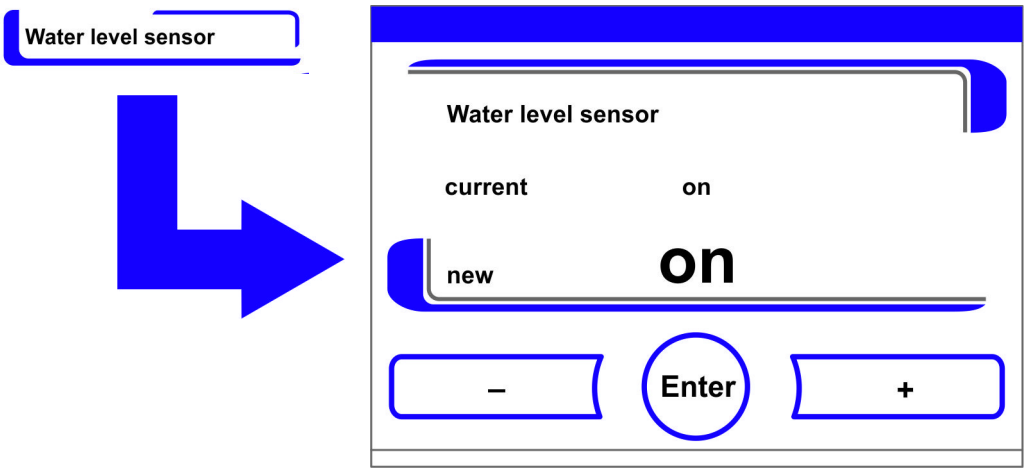


Figure 6-40. Setting the Water Level Sensor

1. To toggle between two states:
- Press the + key.
  or
- Press the - key.

2. To accept and save the change:
- Press the **Enter** key.
- The system returns to the **Options** menu.

Switching the Audible Alarm on/off:

If the device-integral monitoring system detects an error:
- an audible alarm sounds in addition to
- the visual error message and the switching of the alarm relay.

The audible alarm can be permanently disabled.

1. Press the **Menu** key.

2. Select the menu command **Options**.
- The selection dialog shown in Figure 6-35 is displayed.

3. Select the menu command Buzzer.
- The input dialog shown in Figure 6-41 is displayed.

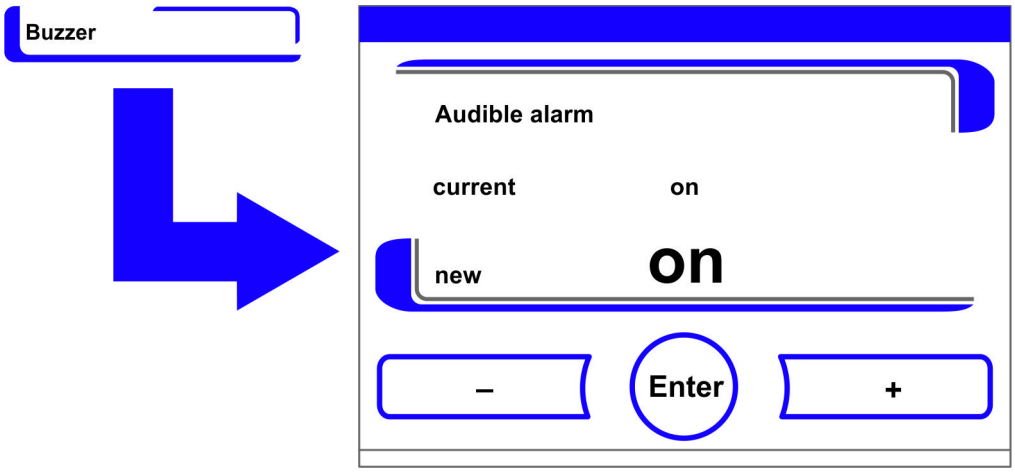


Figure 6-41. Alarm Relay Setting

1. To toggle between two states:
   - Press the + key.
     or
   - Press the - key.
2. To accept and save the change:
   - Press the **Enter** key.
   - The system returns to the **Options** menu.

Switching the O_2 Control on and off

Depending on the requirements to the work process, the O_2 control can be switched on and off. This setting is possible only on versions with the optional O_2/N_2 control.

1. Press the **Menu** key.
2. Select the menu command **Options**.
   - The selection dialog shown in Figure 6-35 is displayed.
3. Select the menu command O_2.
   - The input dialog shown in Figure 6-42 is displayed.

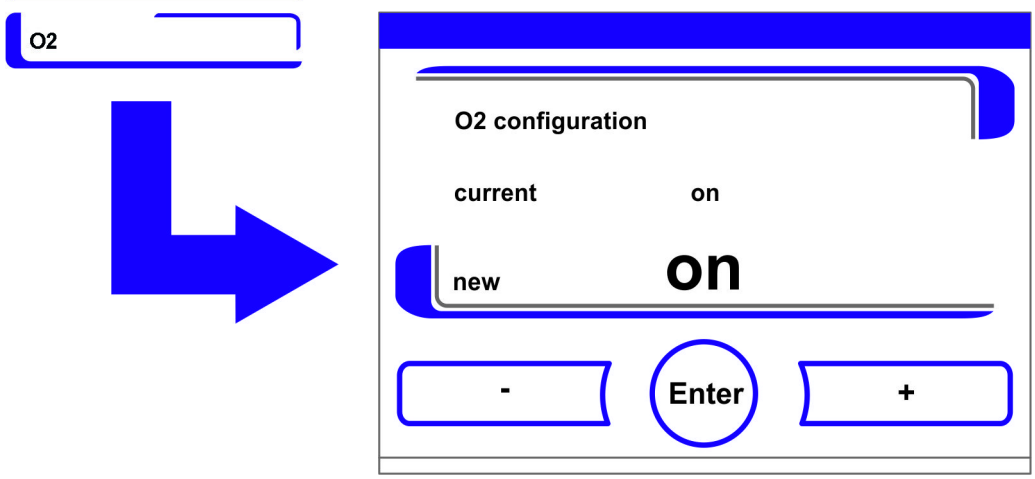


Figure 6-42. Switching the O_2 Control on and off

1. To toggle between two states of the O_2 control:
   - Press the + key.
     or
   - Press the - key.
2. The value change appears in the display. The New message indicates that the selection has been changed, but not saved yet.
3. To accept and save the setting:
   - Press the **Enter** key.
   - The system returns to the **Options** menu.

Note Display of O_2 value:
When O_2 control is de-activated, the actual value readout shows three dashes (- - -) in the O_2 display field.
This procedure provides protection for the O_2 sensor. If the set value is set to 21%, the O_2 control loop is not monitored. This is true for both O_2 control ranges:
- Control range I: 1 % - 21 %
- Control range II: 5 % - 90 %

In this case, the O_2 display shows the actual value.

Airing the Workspace

If the unit is operated with an O_2 or N_2 supply, the workspace must be vented after de-activating O_2-control.

Gas Monitoring

The switching state of the O_2 control loop does not affect the function of the optional gas monitoring system. The gas monitoring system remains active even when the O_2control is switched off or the O_2-sensor is disabled.

Activating / De-Activating the HEPA-Filter:

If the unit is to be operated without the built-in HEPA-filter, the latter must be de-activated in the configuration menu to avoid malfunctions.

1. Press the **Menu** key.
2. Select the menu command **Options**.
   - The selection dialog shown in Figure 6-35 is displayed.
3. Select the menu command HEPA.
   - The selection dialog shown in Figure 6-43 is displayed.

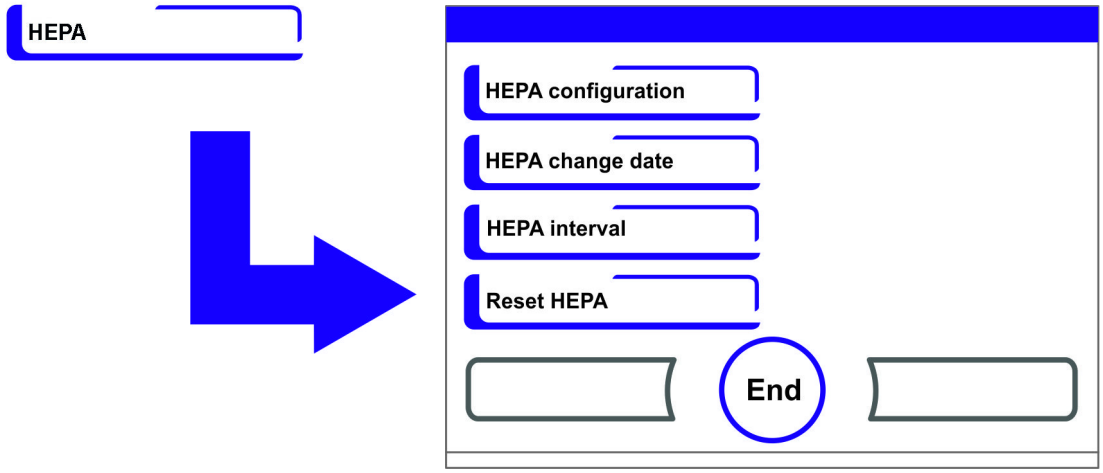


Figure 6-43. HEPA Configuration

4. Select the menu command HEPA configuration.
   - The input dialog shown in Figure 6-44 is displayed.

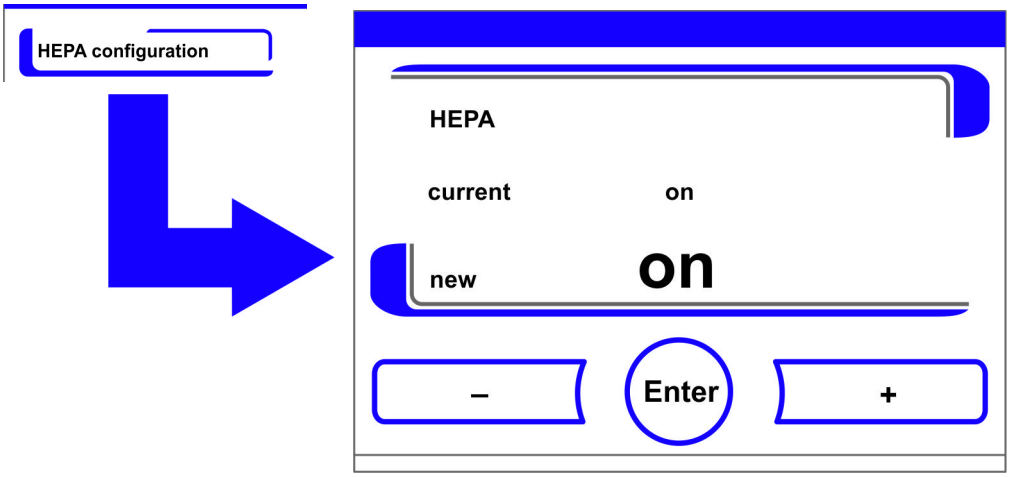


Figure 6-44. Activating / De-Activating the HEPA-Filter

1. To toggle between two states:
   - Press the + key.
     or
   - Press the - key.
2. To accept and save the change:

- Press the **Enter** key.
- The system returns to the **Options** menu.
- After 5 minutes the activity indicator **ISO 5** for the HEPA-filter appears in the icon bar on the main menu (Figure 6-2 on page 3).

ISO 5

Icon Description

Essential operating states or error messages, e.g. keypad lock or low humidity are displayed as icons in the touchscreen main menu in addition to the entries in the event or in the error table. The Icon description dialog box explains the meaning of the individual icons.

Invoking the Icon Description

1. Press the **Menu** key.
2. Select the menu command Icon description.
- The information dialog shown in Figure 6-45 is displayed.

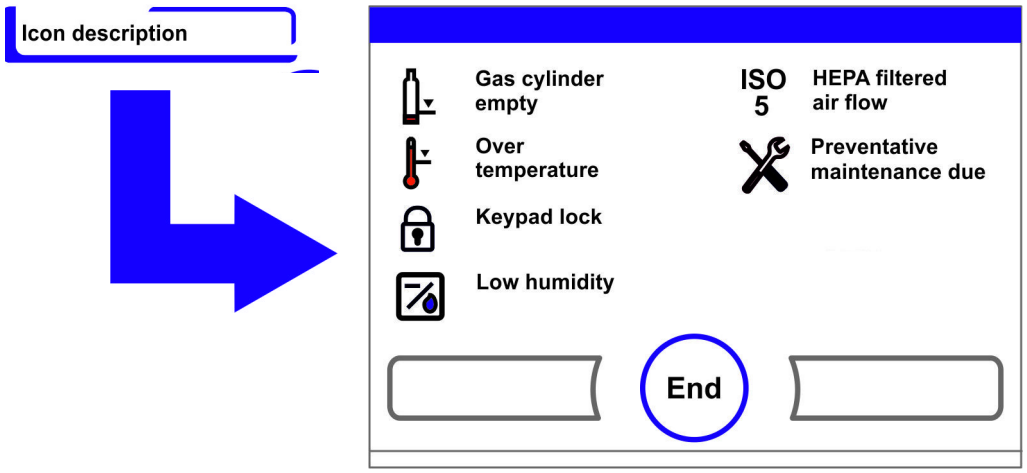


Figure 6-45. Icon Description

- Exit the display:
- Press the **End** key [3].
- The system returns to the **User configuration** menu.

Function of the Individual Icons:

Cylinder Empty:



Error message, indicating, that the filling level of one or of several gas cylinders is too low to ensure regular gas supply.
The monitoring function is available only for device versions with the optional gas monitoring system.

Overtemperature:



This error indicator shows that the device control has activated the overtemperature protection and has switched to backup control.

Keypad Lock:

This function indicator shows that the keypad lock has been activated so that currently the settings cannot be changed (see “Enabling/Disabling the Keypad Lock“ on page 6-42).

Low Humidity:

This function indicator shows that the relative humidity in the workspace has been lowered from approx. 93% to approx. 90 (see “Low Humidity Setting“ on page 6-33).

HEPA-Filter Active:

ISO 5

Activity indicator showing the enabled state of the HEPA-filter in the workspace (see “Activating / De-Activating the HEPA-Filter:“ on page 6-39 for instructions).

Request Service:

This indicator shows that the routine service is due. The display of the icon is controlled by the time entry in the Reminder Interval dialog box and it appears after the reminder message has been confirmed.

Gas Cylinder Filling Level Display (Optional):

If the device is equipped with the optional gas monitoring system the icons for gas cylinder A and gas cylinder B appear in the corresponding CO_2- / O_2 display. The icons indicate the gas cylinder filling level (full / empty). The icon with the blue frame indicates the cylinder not in use that will be switched over to continue the supply.

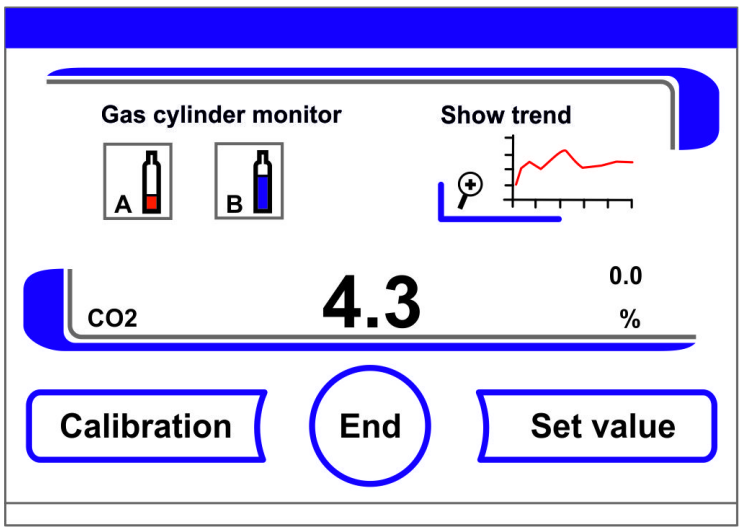


Figure 6-46. Gas Monitoring Icons

- Manual changeover to a full gas cylinder is possible.
- Press the cylinder icon with the blue frame.
  or
- changeover can occur automatically, if:
- the cylinder pressure drops below 0.6 bar (8.7 psi).

After a manual or automatic changeover of the gas supply, another changeover is inhibited for 30 seconds. It takes approximately 2 minutes before the filling level of the new cylinder has been determined and can be displayed.
The gas monitoring system monitors the filling state of the two connected gas cylinders.
If one bottle is empty:

- no audible alarm is sounded,
- an error message is displayed,
- an entry is written into the event list.

If both bottles are empty:

- an audible alarm sounds and the alarm relay switches,
- an error message is displayed,
- an entry is written into the error table,
- an entry is written into the event list.

Note Cylinder changeover:
A manual or automatic changeover of a gas cylinder is entered into the event display.

Enabling/Disabling the Keypad Lock

This input dialog box allows the keypad lock to be enabled or disabled. At the factory, the keypad lock is preset to the standard code 0000.

1. Enter the 4-digit code using the keypad. The input appears encrypted in the display.
2. To delete complete incorrect input:
   - Press the **Delete** key.
3. To break off the input:
   - Press the **Back** key.
   - The system returns to the **User configuration** menu.
4. Confirm your input:
   - Press the **End** key [3].
   - The system returns to the **User configuration** menu.

Note Changing an existing code:
The currently valid code can be redefined in the Keypad Lock Code dialog box of the Settings/Setup menu (“Changing the Keypad Lock Code“ on page 6-18).

Resetting the code:
If the keypad lock code is no longer available, the code must be reset to the standard code by the Technical Support of Thermo Fisher Scientific.

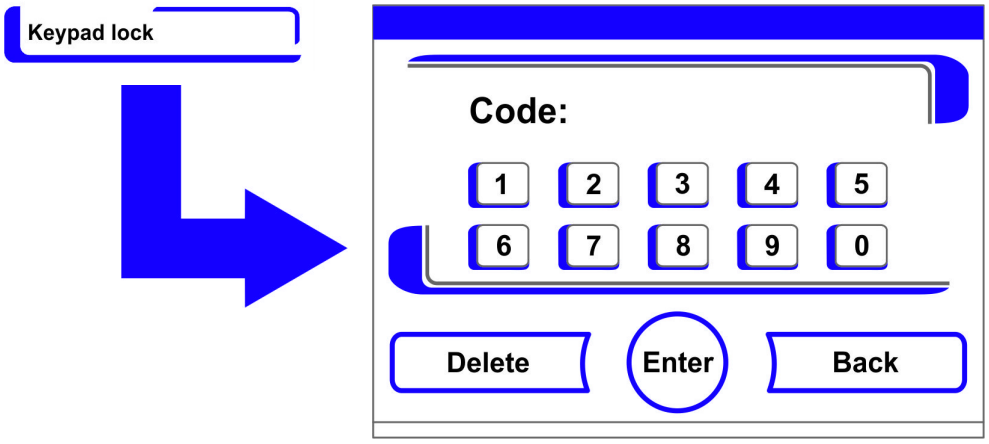


Figure 6-47. Enabling/Disabling the Keypad Lock

Software Versions

This menu shows the unit software versions in the display.

- Exit the display:
- Press the **End** key [3].
- The system returns to the **User configuration** menu.

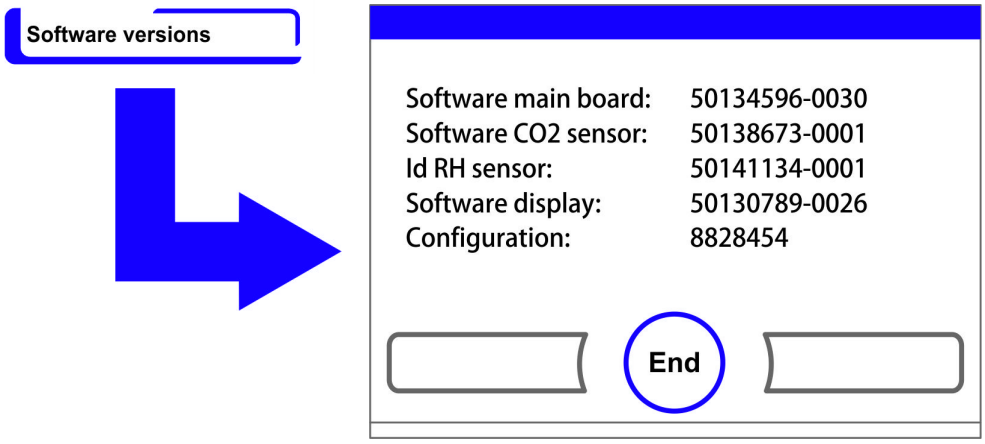


Figure 6-48. Software Versions

Trend Display Scaling

The trend display of the three control loops:

- temperature,
- 0...20% CO_2,
- 0...100% O_2,

can be scaled to two different versions.

1. Full screen display
- Press the **CO_2 display field** in the main menu.

- The CO_2-menu (Figure 6-9) menu is displayed.

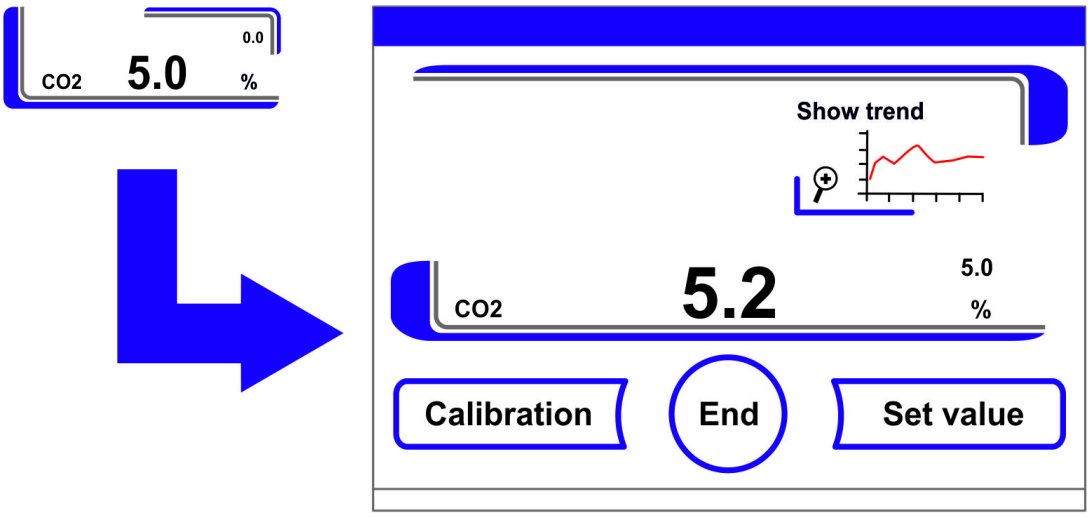


Figure 6-49. Invoking the CO_2 Concentration Graph Display

2. Press the **Show trend** icon.
- The progress indicator appears.

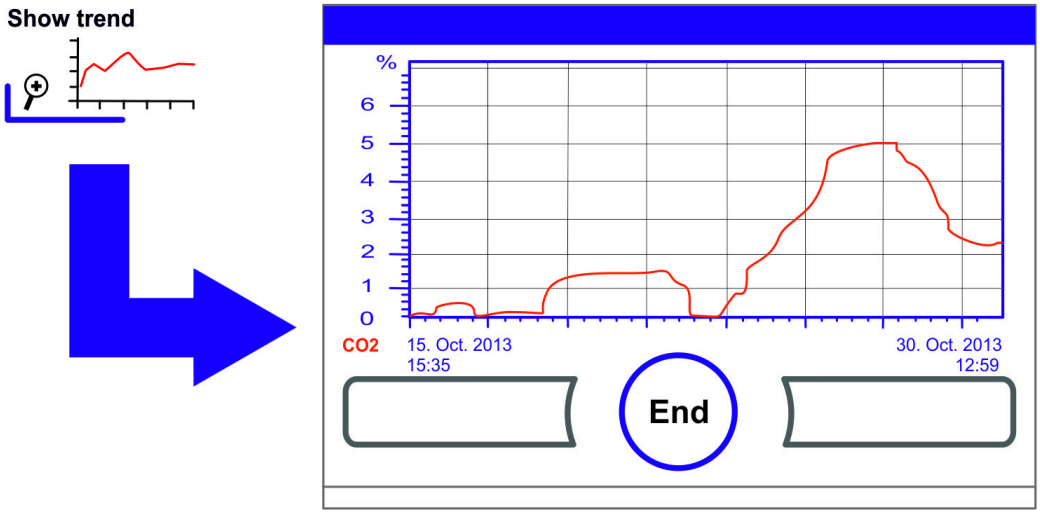


Figure 6-50. Invoking the CO_2 Concentration Graph Display

3. To display an enlarged section:
- Open a rectangular section in the desired area of the diagram using a finger or a pen. The size of the rectangle is determined by dragging a diagonal from the start (press onto screen at left of upper diagram frame) to the end (release at right of lower diagram frame.
- Press any position within the marked rectangle area. The section is now enlarged.
- This may be repeated as often as necessary, until the section of the graph is shown at the desired magnification or until the maximum magnification (max. 30 data logger elements, equivalent to 30 minutes of logging operation at a storage rate of 60 seconds) is attained.
- During zoom mode the trend display can be scrolled forward and back.

4. To return to the total trend:
- Open rectangle over a small diagram section and press any position outside the marked area.

5. To exit the trend display:
- Press the **End** key [3].
- The system returns to the main menu.

Note Logging cycle:
The time interval of the data logging cycle can be redefined in the **Recording interval** dialog box ("Changing the Logging Cycle Time:" on page 6-29).

Error Messages

The error detection system is an integral element of the device-internal control system. It monitors the control loops and their sensors. If an error is detected in the system, the alarm relay switches and issues the following signals and messages:

- An audible alarm sounds,
- The main menu is overlaid by a flashing warning triangle and the pertinent icon; the value indicators are no longer updated,
- the detected error is listed in the error table,
- the event is entered into the event display,
- When an error condition persists although it has been acknowledged, that error can be redisplayed by pressing a red key (T, CO_2, O_2, RH or system, Menu key).

Response to an Error Message Event

If the alarm relay was switched due to a user action, the switching state can be reset by accepting the error message (e.g. for the manual cancellation of the steri-run decontamination routine).
If the alarm relay was switched due to a technical defect, the switching state remains active until the defect has been corrected (e.g. low water level in workspace).

1. To accept the failure message:
- If the warning triangle is displayed, press any position on the touchscreen.
- The **Error** dialog box appears and the detected error is displayed,
- the audible alarm is switched off.

2. To exit the error display:
- Press the **End** key [3].
- The error message disappears.

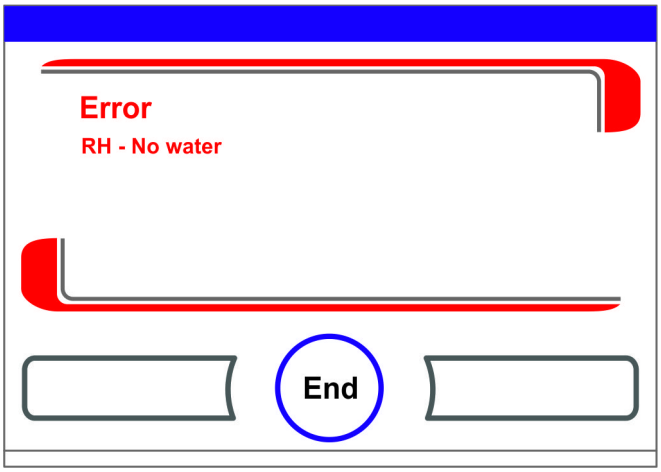


Figure 6-51. Event Error Messages

Resetting Overtemperature Protection

When the controller of the unit has activated overtemperature protection and switched over to emergency control mode, the main menu is overlaid by a flashing warning triangle and the pertinent icon.

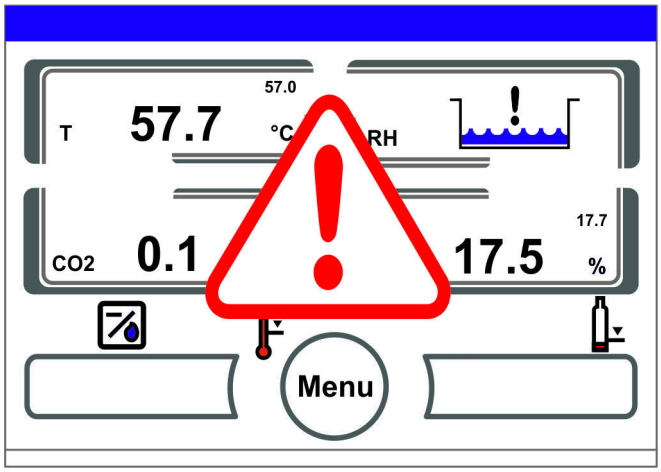


Figure 6-52. Failure Message Overtemperature

1. Displaying the cause of an error:
- Press anywhere on the touchscreen.
- The **Error** dialog box appears and the detected error is displayed.
- The audible alarm is switched off.

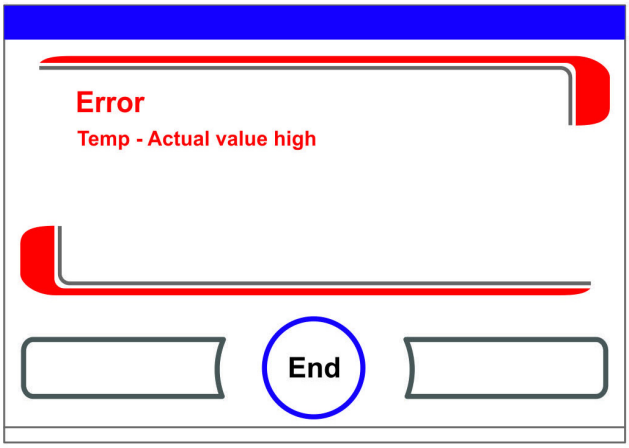


Figure 6-53. Failure Message Overtemperature

2. To exit the error display:
- Press the **End** key [3].
- The error message disappears.
- The temperature display field is displayed with a red bounding box.

3. Resetting the error message:
- Turn the device off.

4. Open the door and allow the workspace to cool down.

5. Turn the device on.

When overtemperature protection kicks back in although possible causes (see error log) have been remedied, shut down the unit and call technical field service.

Measures After Power Outage

After a power outage, the formation of condensation can occur at the sensors due to moisture. This can impair the sensor function and lead to erroneous values being displayed or to failure messages (sensor breakage, see “Troubleshooting“ on page 6-48).

The following measures must be taken to ensure safe operation:

1. Drain the water and wipe the interior dry.

2. Let the device warm up without water for 1 hour to 55 °C.

3. Then let the device cool down with the doors opened.

4. After this, start the device at incubation temperature according to Chapter “Start-up“ on page 4-1.

Alternatively, or when the above mentioned measures were not effective, start a disinfection run at 180 °C. Refer to Chapter “Steri-Run Decontamination Routine“ on page 8-7.

The disinfection routine can be interrupted after approx. 1 hour. The sensors should then have dried.

Troubleshooting

The error tables indicate source of error, cause of error, and possible corrections.
For any communication with the Technical Service of Thermo Fisher Scientific, please have the device data ready.

Control loop	Failure message	Cause	Remedy	Alarm relay	Audible alarm	Log
System	Device door open too long	Device door has been open for longer than 10 minutes	Close device door	X	X	X
	Error: Display	Display not communicating with the main board *1)	Reset unit. If the error occurs repeatedly, call service.	X	X	X
	Error: EEPROM main board	EEPROM on main board is defective	Reset unit. If the error occurs repeatedly, call service.	X	X	X
	Error: data logger	Error while writing to the memory of the data logger. Incubator is still operative.	Reset unit. If the error occurs repeatedly, call service.			
	Error: steri-run	Error in Steri-Run routine	Reset unit. If the error occurs repeatedly, call service.	X	X	X
	Power down during steri-run	Power failure during Steri-Run routine	Restart unit and re-launch Steri-Run.	X	X	X
	Error: auto-start	Error in auto-start routine	Re-launch auto-start. If the error occurs repeatedly, call service.	X	X	X
	Error: ADC	Measurement of reference resistance out of tolerance	Reset unit. If the error occurs repeatedly, call service.	X	X	X
	Error: Fan	Actual value of the fan is out of tolerance.	Reset unit. If the error occurs repeatedly, call service.	X	X	X
	IR sensor changed	New serial number detected	Acknowledge the alarm	X	X	X

Control loop	Failure message	Cause	Remedy	Alarm relay	Audible alarm	Log
Tempera-ture	Sensor breakage	Measured value exceeds accepted limit	Request service. Dry the heaters.	X	X	X
	Actual value above	Actual value > Set value + 1 °C *2) *4)	Do not exceed permissible ambient temperature / call field service.	X	X	X
	Actual value low	Actual value > Set value + 1 °C *3) *4)	If the error does not reset automatically, call field service.	X	X	X
	Actual value not plausible	Implausible temperature signal	Reset unit. If the error occurs repeatedly, call service.	X	X	X
	Calibration values too high/low	Max. adjust value for temperature exceeded / not attained	Acknowledge alarm, enter different target value.			X

Control loop	Failure message	Cause	Remedy	Alarm relay	Audible alarm	Log
0...20% CO_2	Sensor breakage	Measured value exceeds accepted limit	Run auto-start. When the error occurs again, troubleshoot the unit on the basis of Section "Measures After Power Outage" on page 6-47. When the error persists, request service.	X	X	X
	Actual value above	Actual value > Set value + 1% *4)	automatic	X	X	X
	Actual value below	Actual value < Set value - 1% *3) *4)	automatic	X	X	X
	RH Error communication	RH sensor not communicating with the main board	automatic	X	X	X
	Calibration values too high/low	Max. adjust value for CO_2 exceeded / not attained	Acknowledge the alarm			X
	Error communication	Sensor not communicating with the main board	automatic	X	X	X
	Error: Gas cylinder changeover switch	Gas cylinder changeover switch not communicating with the main board	automatic	X	X	X
	No gas	Both CO_2 cylinders are empty	Swap at least one CO_2 cylinder.	X	X	X
	RH sensor breakage	Measured value exceeds accepted limit	Request service. See also Chapter "Measures After Power Outage" on page 6-47.	X	X	X
	Cylinder A empty	Gas cylinder A is empty	Replace gas cylinder A			
	Cylinder B empty	Gas cylinder B is empty	Replace gas cylinder B			

Control loop	Failure message	Cause	Remedy	Alarm relay	Audible alarm	Log
0...100% O_2	Sensor breakage	Measured value exceeds accepted limit	Request service	X	X	X
	Actual value above	Actual value > Set value + 1% *4)	Check the gas supply source. Reduce primary pressure to 1 bar (14.5 psi) max.	X	X	X
	Actual value below	Actual value < Set value - 1% *4)	Check the gas supply source. Replace gas cylinder. Increase primary pressure to 1 bar (14.5 psi) max. Check feeding line.	X	X	X
	Error communication	Sensor not communicating with the main board	Request service	X	X	X
	Error: Gas cylinder changeover switch	Gas cylinder changeover switch not communicating with the main board	automatic	X	X	X
	No gas	Both O_2 gas cylinders are empty	Swap at least one O_2 cylinder.	X	X	X
	Cylinder A empty	Gas cylinder A is empty	Replace gas cylinder A			
	Cylinder B empty	Gas cylinder B is empty	Replace gas cylinder B			
rH	No water	Not enough water in water reservoir.	Refill water or, if dry operation is desired, de-activate the water level sensor. In case the failure message occurs again after filling, troubleshoot the device according to Section "Measures After Power Outage" on page 6-47. If the error persists, request service.	X	X	X

*1) This error appears on the display only; it is not entered in the error log.

*2) When this error occurs, a special control mode is activated to protect the samples. An icon appears to indicate this mode.

*3) waiting time before error message:
- 45 min. after a door was opened,
- 159 min. after a setpoint change.

*4) This setting can be changed by field service.

Shut-Down

Table of Contents

- „Shutting the Device Down“ on page 7-1

Shutting the Device Down

WARNING Contamination hazard!
If the workspace surfaces are contaminated, germs may spread to the environment of the oven.
In case of a shut-down, the device must be decontaminated!

1. Remove the culture containers and all accessories from the workspace.
2. Procure a collecting vessel of sufficient capacity.
3. Hold open end of hose into collecting vessel and lock drain hose valve safely into receptacle.
4. The water reservoir starts draining.

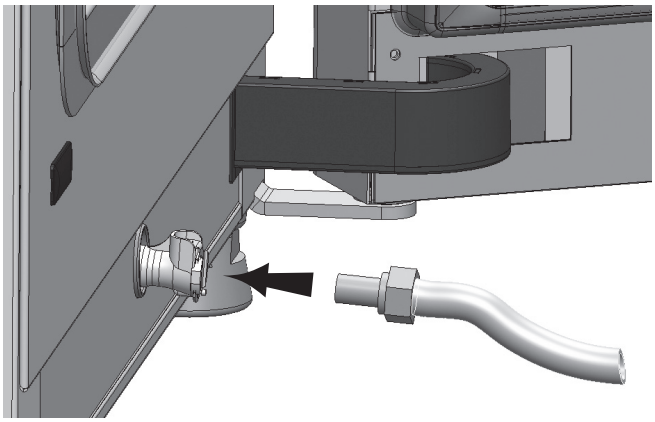


Figure 7-1. Fill and Drain Valve of Water Reservoir

5. Allow the water reservoir to drain completely into the collecting vessel.
6. Remove drain hose valve again.
7. Start the Steri-Run decontamination routine („Launching Steri-Run“ on page 6-16).

8. Turn the device off using the power switch when the steri-run decontamination routine has been completed.
9. Unplug the power connector and protect it against accidental reconnection.
10. Close shut-off valves of the CO_2 /O_2 /N_2 supply system.
11. Disconnect the gas pressure hoses from the sleeve at the rear of the device.
12. Until the device is shut down, the workspace must be continuously ventilated. Leave the glass door and the outer door open and secure them in this state.

Cleaning and Disinfection

Table of Contents

- "Cleaning," on page 8-1
- "Decontamination Procedures" on page 8-2
- "Preparing for Disinfection or Steri-Run" on page 8-2
- "Wipe/Spray Disinfection" on page 8-3
- "Steri-Run Decontamination Routine" on page 8-7

Cleaning,



CAUTION Incompatible cleaners!
Some device components are made of plastic. Solvents can dissolve plastics. Strong acids or caustic solutions can cause to become brittle of the plastic. For cleaning plastic components and surfaces, do not use solvents that contain hydrocarbons, solvents with an alcohol content of more than 10% or strong acids or caustic solutions!

Moisture-sensitive components!
Do not spray cleaning agent onto the touchscreen and the control box at the rear of the device. When wiping the device clean, always make sure that moisture does not enter into these components.

Cleaning Exterior Surfaces:

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 clear water.
3. Then, wipe the surfaces dry using a clean cloth.

Cleaning Display:



CAUTION Moisture-sensitive display!
Do not spray or wipe the display with cleaner.

- Clean display using a dry cloth of 100% micro fiber!

Decontamination Procedures

For Cell locker Cleaning and disinfection see separate Cell locker operating instructions in the Appendix.
The operator must prepare hygiene regulations for the decontamination of the device in accordance with the application of the device.
The following disinfection procedures are compatible with the device:

Wipe/spray Disinfection:

The wipe/spray disinfection is used as the standardized manual disinfection procedure for the device and for all accessories.

The steri-run decontamination routine uses an automated program cycle to decontaminate the complete workspace including the shelf system and the sensors.

Preparing for Disinfection or Steri-Run

1. Remove all samples from the workspace and store them in a safe place.
2. Procure a collecting vessel of sufficient capacity.
3. Place open end of hose into collecting vessel and lock drain hose valve safely into receptacle
4. The water reservoir starts draining.

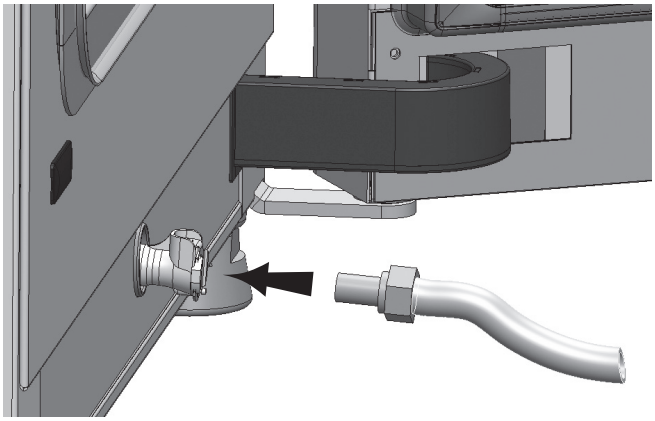


Figure 8-1. Fill and Drain Valve of Water Reservoir

5. Allow the water reservoir to drain completely into the collecting vessel.
6. Wipe up residual water with a cloth.
7. Pull airbox (1/Figure 8-2) out of its seat on the water reservoir cover panel and remove it.
8. Take HEPA-filter (2/Figure 8-2) out of airbox (1/Figure 8-2) and reinstall the airbox.

Wipe/Spray Disinfection

The manual wipe/spray disinfection is carried out in three stages:

- Predisinfection
- Cleaning,
- Final disinfection

CAUTION



- Alcoholic disinfectants!
  Disinfectants having an alcohol content of more than 10% may form, in combination with air, easily combustible and explosive gas mixtures.
  When using such disinfectants, avoid open flames or exposure to excessive heat during the entire disinfection process!
- Use such disinfectants only in adequately ventilated rooms.
- After the disinfectant has been allowed to react, wipe the cleaned device components thoroughly dry.
- Observe safety regulations to avoid fire and explosion hazard caused by alcohol-containing disinfectants.

CAUTION



Chloride-containing disinfectants!
Do not use chloride-containing disinfections.

WARNING Electric shock!



Contact with current-carrying components may cause a lethal electric shock.
Prior to cleaning and disinfection work, disconnect the device from the power supply!

- Turn the device off using the power switch.
- Unplug the power connector and protect it against accidental reconnection.
- Make sure the device is de-energized.





CAUTION Health hazard!

The surfaces of the workspace may be contaminated. Contact with contaminated cleaning liquids may cause infections. Disinfectants may contain harmful substances.
When cleaning and disinfecting, always observe the safety instructions and hygiene regulations!

- Wear safety gloves.
- Wear safety goggles.
- Wear mouth and respiratory system protection gear to protect your mucous membranes.
- Observe the safety instructions of the disinfectant's manufacturer and the hygiene supervisor.

Predisinfection:

1. Spray disinfectant onto the surfaces of the workspace and of the accessories and wipe the surfaces clean.



CAUTION Moisture-sensitive components!

Do not spray the CO_2 sensor and the O_2/N_2 sensor behind the air duct with disinfectant.

2. Let the disinfectant work on the surfaces/internals as detailed in the manufacturer's instructions.

Removing Accessories and Shelf System:

1. Remove the shelves, then remove the entire shelf system from the workspace. The installation and removal of the shelving system are described in the section "Installing the Shelf System" on page 4-9.
2. Remove the airbox and the HEPA-filter. The installation and removal of the airbox and the HEPA-filter are described in section "Replacing the HEPA-Filter" on page 9-7.

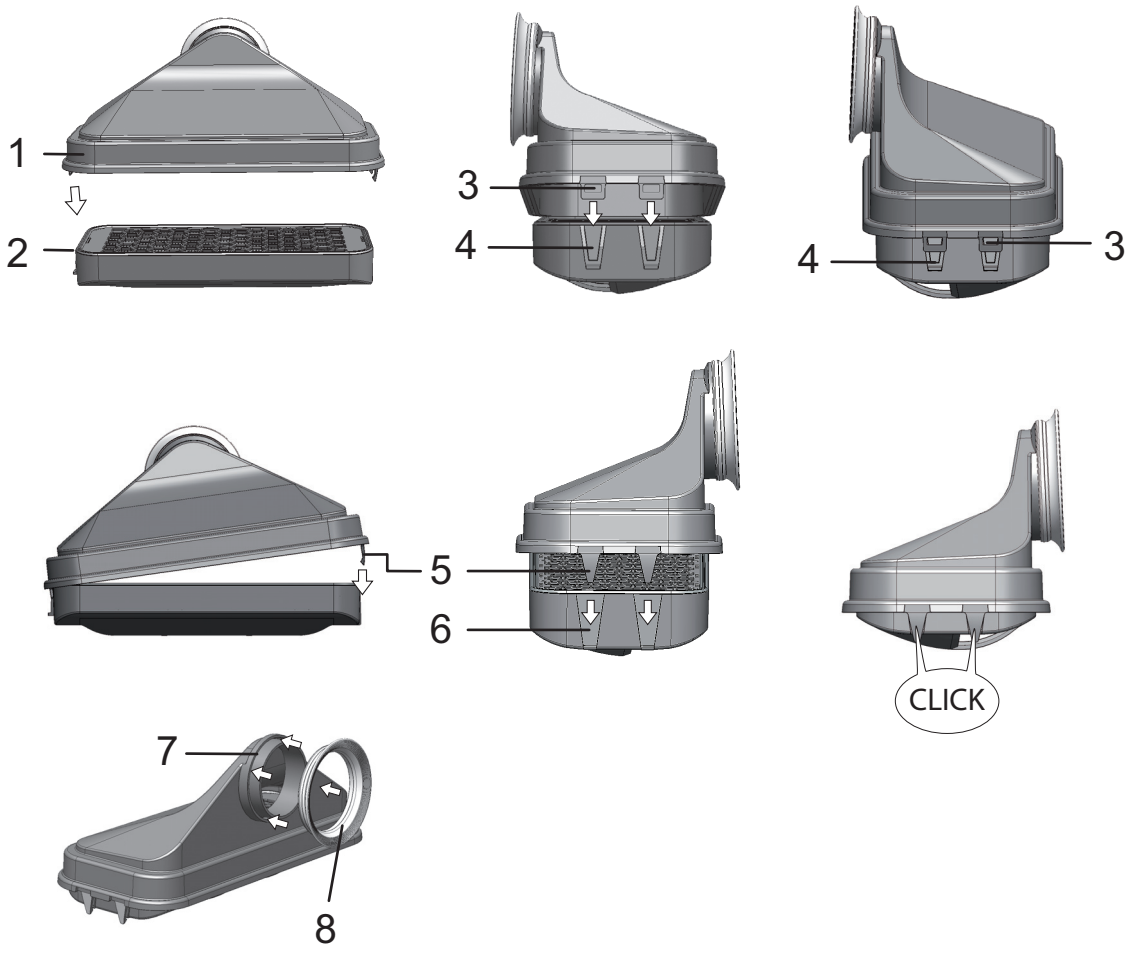


Figure 8-2. HEPA-Filter and Airbox

3. Pull top part the air duct (1/Figure 8-3) towards the front side of the unit, then lift out with a downward movement when the keyholes in the front-side mounting tabs clear the retaining pins in the workspace ceiling.
4. Separate the top part from the rear part of the air duct (2/Figure 8-3) and remove it from the workspace.

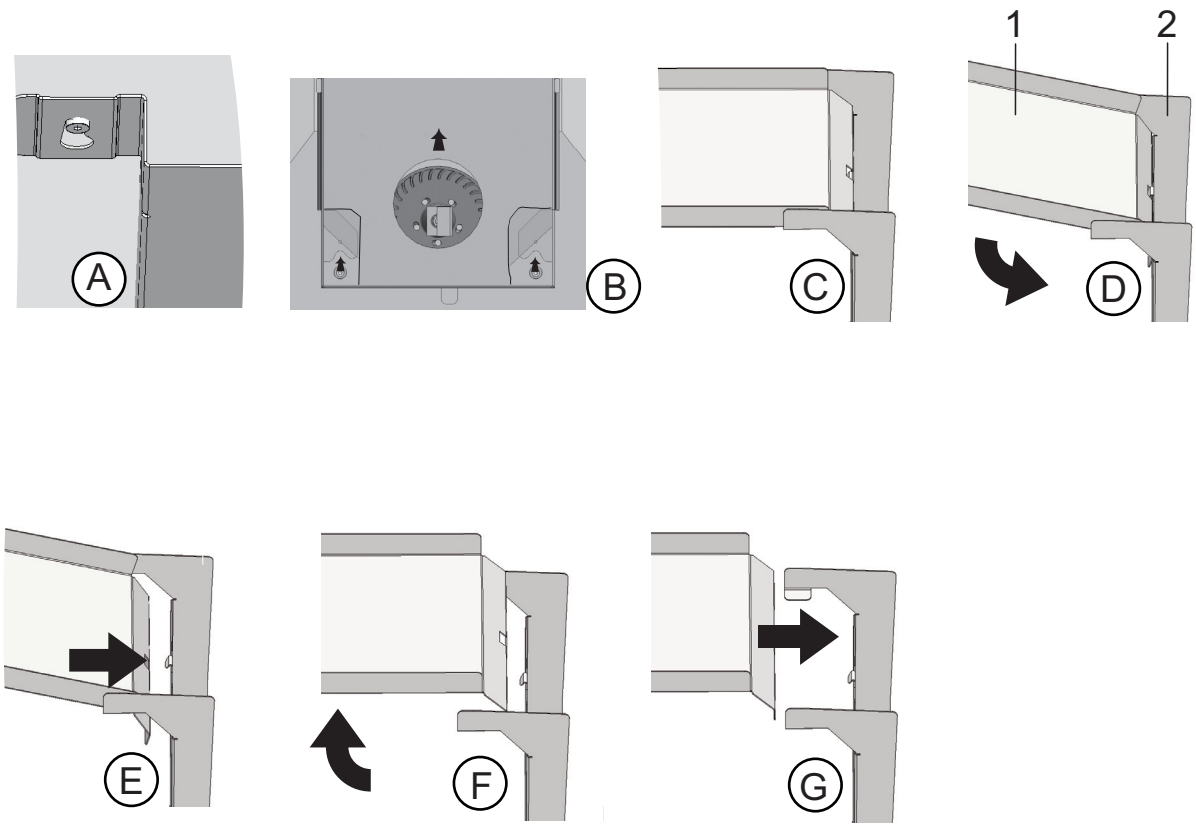


Figure 8-3. Air Duct

5. Unhinge the rear part of the air duct (2/Figure 8-3) from the rear wall and remove it.
6. Remove pre-filter (9/Figure 3-1).
   The pre-filter is autoclavable.
7. Remove the cover panel from the water reservoir.

Cleaning the Workspace and Accessories:

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 water reservoir and wipe all surfaces of the workspace thoroughly dry.
4. Wipe accessories thoroughly dry.

Final Disinfection:

1. Spray the surfaces of the workspace, the shelving system and parts removed in previous steps with disinfectant one more time and wipe dry.
2. Allow the disinfectant to react as specified by the manufacturer.
3. Reinstall the shelf system and the removed components.

Steri-Run Decontamination Routine

steri-run is an automated decontamination program cycle that works with a fixed nominal temperature and a software controlled routine for heating up, holding at the nominal temperature and cooling down.

The entire program cycle of the decontamination routine takes less than 12 hours to accomplish. During this routine, a hot and humid atmosphere at 180 °C with highly decontaminating effect is created in the workspace for 90 minutes. The effectiveness of the steri-run decontamination routine has been certified by independent institutes. The germ reduction efficiency achieved is equal to 10^6 (6-log reduction) to the ISO 11138 standard. On request, Thermo Scientific will supply information on the pertinent tests.

The electromechanical door lock provides steri-run with an extra degree of protection against the risk of burns. It locks the outer door when the working space temperature reaches 65°C, then keeps it locked as long as hazardous temperatures prevail, and finally releases the door lock when the working space temperature drops back below 65°C.

Once the program cycle has been completed, restart the unit by launching the auto-start routine.

Note Conditions that prevent the start of the Steri-Run decontamination routine:
The steri-run decontamination routine cannot be started if one of the following failure conditions exists.
Temperature control loop:

- Sensor breakage,
- Outer and/or inner door open (outer door open condition causes „Door open“ error message)
- Actual value high (excessive deviation from set value),
- Actual value low (excessive deviation from set value),
- Actual value not plausible,
- Error communication.
- Water has been detected.

Overtemperature protection:

If the overtemperature protection was enabled on the device, the steri-run decontamination routine cannot be started before the fault has been corrected or reset.

No gas is supplied during the steri-run decontamination routine on versions with the optional gas monitoring system:
If the error “no gas” occurs during the steri-run decontamination routine, the audible alarm is triggered. The alarm can be confirmed by pressing on any position on the display. In this case, the steri-run decontamination routine is not canceled. The alarm relay remains switched until the gas monitoring system detects a full gas cylinder again.



CAUTION Limited operating temperature for Cell locker!
Before a “Decontamination run” the Cell lockers must be removed. The max. operating temperature is 121°C/250 °F.

Progress of a Steri-Run Decontamination Routine:

1. Before starting the decontamination routine, switch the silicone plug from the inner chamber to the outer side of the access port.
2. After cleaning, reinstall the shelf system components into the workspace.
3. Turn on the device using the power switch.
4. Activate and start the decontamination routine.
5. After a steri-run routine, power the unit down.
6. Remove the airbox (1/Figure 8-2) and re-install the HEPA-filter. (2/Figure 8-2).
7. Restart operation using auto-start as appropriate.



CAUTION Hot surfaces!
The handle and the screen of the glass door, the interior panel of the outer door as well as the surfaces of the shelf system and of the workspace become extremely hot during the steri-run decontamination routine.
During the routine run or immediately after completion of the run, always wear safety gloves when touching these surfaces!
Incubators equipped with the door lock assembly deny access to their workspace as long as the inner surfaces are hot due to the action of the Steri-Run decontamination routine.



CAUTION Damage to the samples!

During the steri-run decontamination routine, the workspace is heated up to 180 °C. Make sure that:

- all samples are removed from the workspace,
- all accessories are removed from the workspace.

Operating Phases of Steri-Run Decontamination:

The remaining run time of the steri-run decontamination routine describes the time between the start or the current time status to the end of the cool-down phase. The indicated remaining run times are not measured values but merely used for orientation.
The routine is divided into three phases:

1. Heating phase,
2. decontamination phase,
3. cool-down.

Heating phase: approx. 2 h.
The workspace is heated up to 180 °C.
Incubators equipped with the electromagnetic door lock assembly lock the door when the workspace temperature surpasses 65°C.

Decontamination phase: approx. 1.5 h.
After the decontamination temperature has been created, the decontamination phase of approx. 90 minutes is started. The temperature is maintained at 180 °C.

Cool-down phase: approx. 8 h.
The device cools down until the originally set temperature set value is reached.
Incubators equipped with the electromagnetic door lock assembly release the door lock when the workspace temperature drops below 65°C.

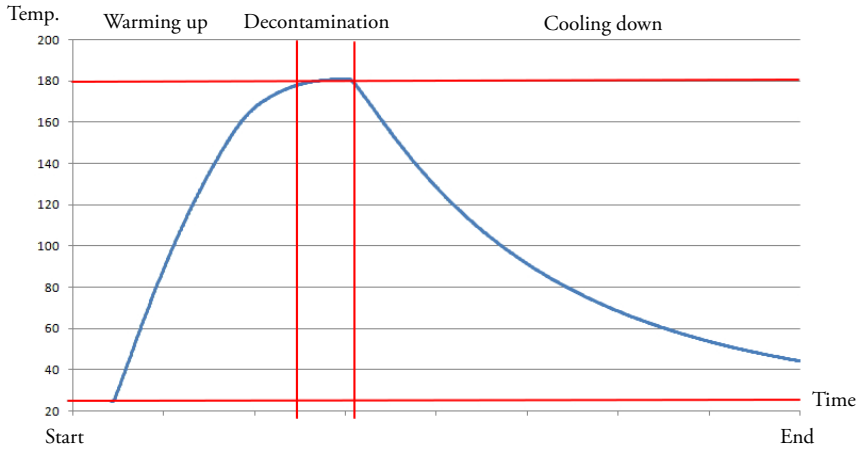


Figure 8-4. Decontamination Routine Phases

Activating Steri-Run

The steri-run decontamination routine is used to decontaminate the complete workspace.

1. Press the **steri-run** key.

Note
To avoid damage to the silicone, sure to remove the silicone plug from the inner chamber side and plug it into the outer side of the access port before starting the Steri-Run decontamination routine.

- The steri-run menu is displayed.

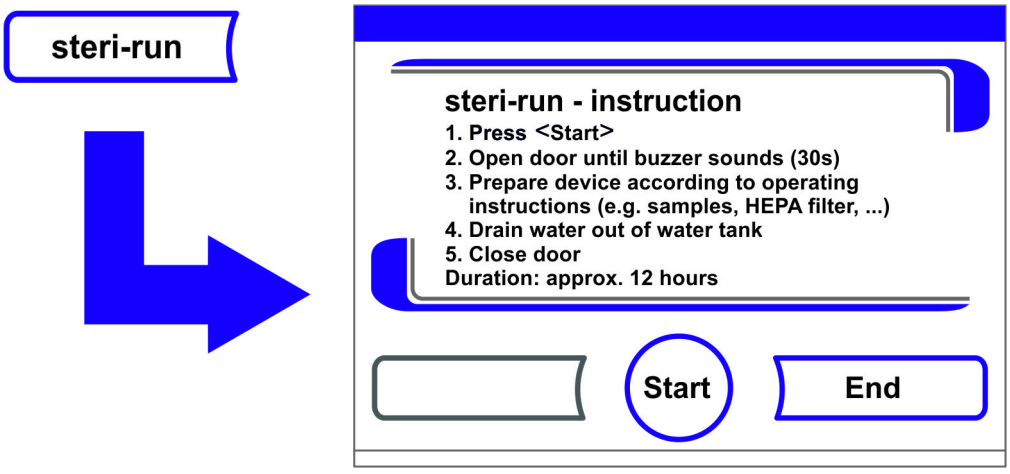


Figure 8-5. Steri-Run Menu - Progress

2. steri-run menu - Exit and stop steri-run:

- Press the **End** key.
- The system returns to the main menu.

3. Activating steri-run:
- Press the START key.
- The steri-run-Progress dialog window is displayed.

4. To air the workspace, open both device doors when the audible alarm sounds after 30 seconds.

5. Remove all samples from the workspace.

6. Drain water from the reservoir, wipe up any residual water.

7. When the audible timer alarm is sounded, close both device doors.
- Start steri-run.
- The run of the steri-run decontamination routine starts. The device heats up, and the electromechanical door lock engages at 65°C.
- While the steri-run decontamination routine is running, the display shows the current status and outputs the following information:
  - temperature,
  - start time,
  - phase,
  - remaining run time.

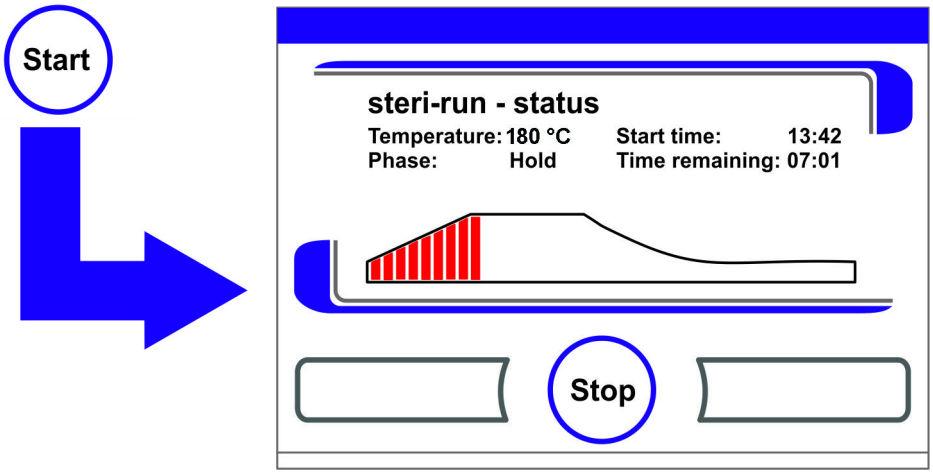


Figure 8-6. Activate Steri-Run

Canceling Steri-Run

The steri-run decontamination routine can be interrupted at any time.

1. Cancel steri-run:
- Press the **Stop** key.
  - If the **Stop** key in the status display is depressed, the steri-run stop dialog box is displayed for a safety scan. The routine can now be permanently canceled or resumed.

2. To stop steri-run:

- Press the **End** key.
- The error message is displayed.
- If the error message is confirmed, the system returns to the main menu.

3. To resume steri-run:
- Press the **Back** key.
- The system returns to the status display, and the decontamination routine is resumed.

4. To interrupt Steri-Run from the status display:
- Press the **Stop** key.
- As a safety scan, the steri-run - Stop dialog window appears. Proceed with work step 2 (see section above).

Steri-Run Interruption due to Error

If an error occurs while the decontamination routine is run, an error message is displayed and the following actions are initiated:

- the decontamination routine automatically changes to the cool-down phase,
- the audible alarm sounds.

1. To confirm the audible alarm:
- Press any position on the display.
- The audible alarm is switched off. The **End** key is displayed. If the decontamination routine is not canceled after this, cool-down to the set temperature occurs.

2. Cancel steri-run:
- Press the **End** key.
- The error message is displayed.
- If the error message is confirmed, the system returns to the main menu.

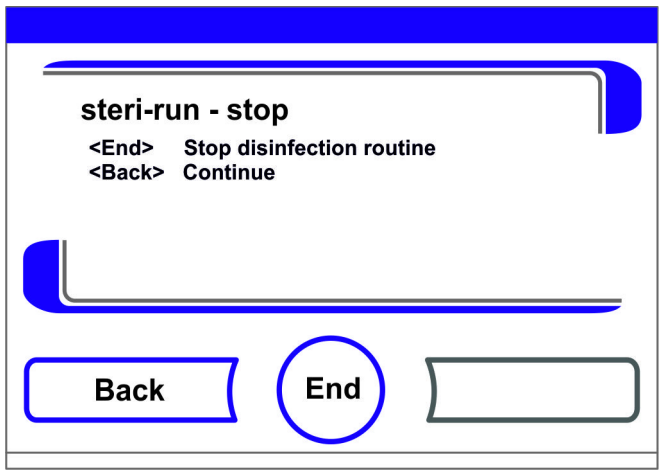


Figure 8-7. Interrupting / Canceling Steri-Run

Completing Steri-Run

When all three phases have been completed, the **Steri-Run End** (Figure 8-8) dialog window is displayed automatically. The decontamination routine must be stopped manually.

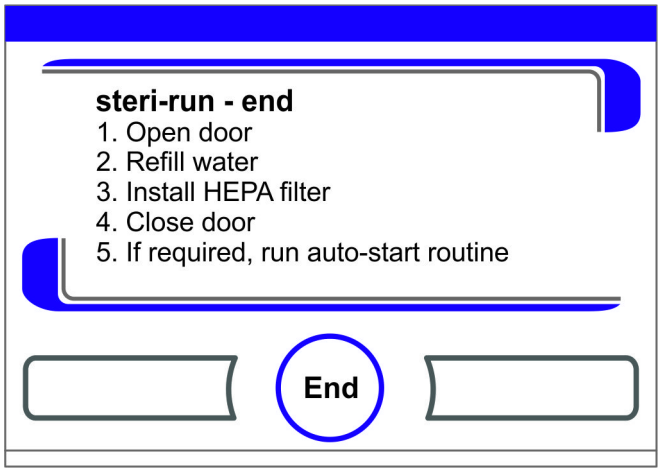


Figure 8-8. To stop Steri-Run

- To stop steri-run:
  - Press the **End** key [3].
  - The system returns to the main menu.

Note Opening door during steri-run decontamination:

If the door will be opened and closed again whilst steri-run decontamination is running, the routine returns to a phase which will ensure a continuation without faults.

Note
Risk of burns! Avoid opening the door unless in case of an emergency.

Opening the Door after Canceling Steri-Run

On devices equipped with the electromechanical door lock assembly, you cannot open the door right away after you have canceled the steri-run routine or after steri-run has aborted due to an error.

To release the outer door lock before the temperature has dropped to a non-hazardous level of 65°C, you must actuate the emergency release lever (item 3 in Figure 8-9):

- Locate the emergency release lever (3) at the bottom of the incubator. It is located on the left side of the device, approx. 5 centimeters inwards from the main power switch (4), as shown in Figure 8-9 below).

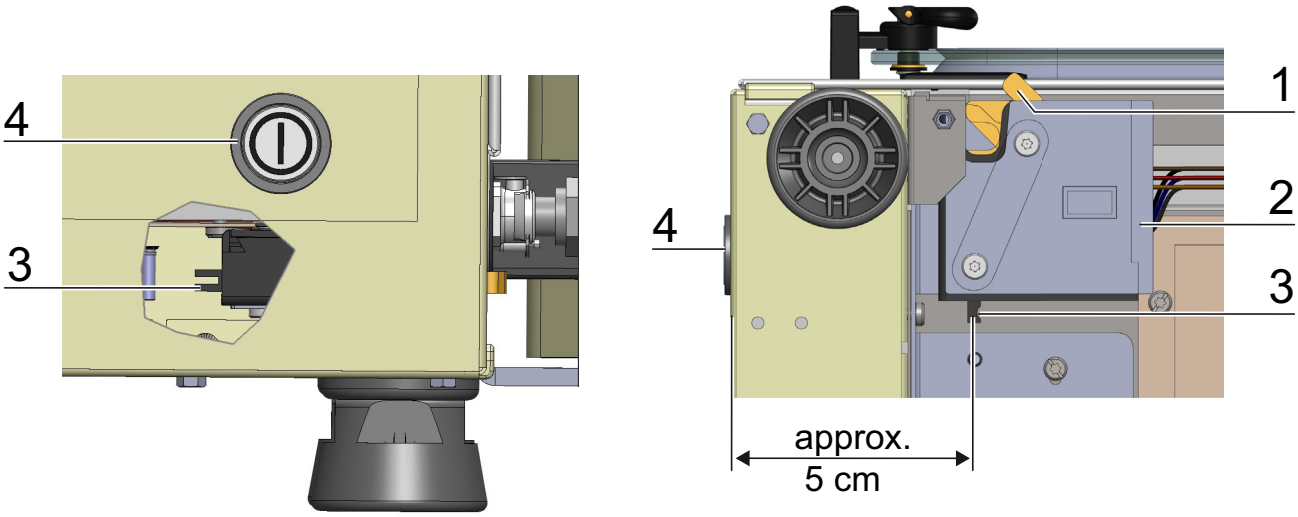


Figure 8-9. Door Lock Latch and Emergency Release on Underside of Incubator

- Reach beneath the bottom panel and pull the emergency release lever (3).
- The door lock disengages and releases the outer door for opening.



CAUTION Hot surfaces!
The handle and the screen of the glass door, the interior panel of the outer door as well as the surfaces of the shelf system and of the workspace become extremely hot during the steri-run decontamination routine.
During the routine run or immediately after completion of the run, always wear safety gloves when touching these surfaces!

Maintenance

Table of Contents

- "Inspections and Checks" on page 9-1
- "Service Intervals" on page 9-2
- "Preparing Temperature Calibration" on page 9-2
- "Temperature Calibration Procedure" on page 9-3
- "Preparing the CO2 Calibration" on page 9-5
- "CO2 Calibration Procedure" on page 9-6
- "Replacing the HEPA-Filter" on page 9-7
- "Replacing the Gas Inlet Filter" on page 9-9
- "Device Fusing Replacement" on page 9-10
- "Replacing the Door Seal" on page 9-10

Inspections and Checks

To ensure the operational performance and safety of the device, their functions and the components listed below must be checked at regular intervals.

For Cell locker Maintenance see separate Cell locker operating instructions in the Appendix.

Daily Check:

- Gas reserve of the CO_2 supply system.
- Gas reserve of the O_2-/N_2 supply system.

Annual Inspection:

- Tightness of the glass door seal.
- Permeability of the pressure compensation opening with insert.
- Perform functional check of the control panel and of the incubator's built-in controller.
- Electrical safety check in accordance with the relevant national regulations (e.g. BGV 3).

Note Functional check:
If safety devices were removed or disabled for inspections, the device must not be operated before the safety devices have been reinstalled and checked for their correct function.

Service Intervals

During running operation, the following service works must be performed:

3-Month Service:

- Run auto-start routine and steri-run decontamination routine.
- Perform temperature and CO_2-/O_2 comparison measurement.

6-Fold Gas Tight Screen:

- Check cover gasket every 6 months. Replace if necessary.
- For Cell locker membrane filters see operating instruction in the Appendix.

Annual Service:

- Replace gas inlet filter.
- Perform Technical Service service inspection.

Note Service contract:
Thermo Scientific offer a device-specific service contact that comprises all test and service works required.

Preparing Temperature Calibration

To determine the exact measured value of the incubator's integral temperature sensor, a temperature comparison measurement must be performed every three months. If a major temperature deviation is found during this check, temperature calibration is required. During this process, the temperature controller of the oven is set to the value measured during the temperature comparison measurement. Use a calibrated measuring instrument with an accuracy of < ± 0.1°C for this test.
To minimize temperature variations during the measurement, put the measuring sensor in an isothermal container (such as a bowl filled with glycerol) before placing it in the workspace. Use the center of the work space as the reference location for the comparison measurement.

Note Isothermal container:
Do not use a container filled with water as an isothermal container because the evaporation of water will result in a lower temperature reading.

Excessive workspace temperature:
Excessive workspace temperatures after the calibration can be reduced by leaving the doors open for approx. 30 seconds.

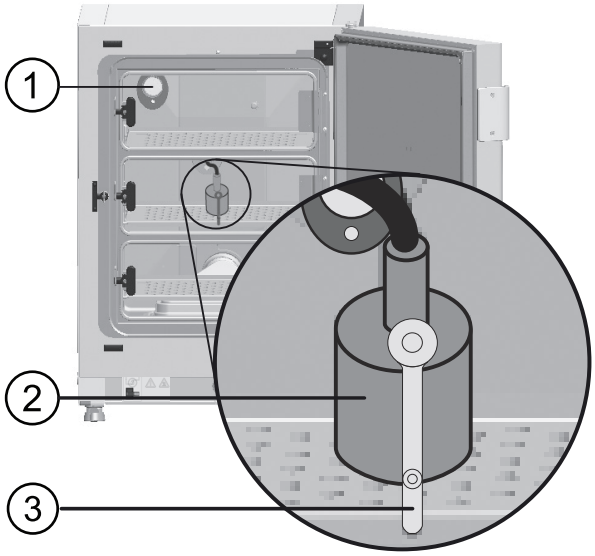


Figure 9-1. Preparing Temperature Calibration

Comparison Measurement Procedure:

1. Turn on the device using the power switch.
2. Set the temperature set value and allow the device to heat up. This may take several hours.
3. Place the measuring instrument (2) onto the center area of the workspace.
   Alternatively, a temperature sensor may be positioned in this location. Route the connecting cable either through the measurement opening in the glass door (3) or through the access port (1) in the rear panel of the device.
4. Close the doors.
5. Wait until the temperature value displayed on the measuring instrument has stabilized.
6. Temperature calibration procedure

Temperature Calibration Procedure

Measurement example:
- Temperature set value: 37 °C
  Reference temperature: 36.4 °C

1. Press the Temperature Display key.
- The Temperature menu (Figure 9-2) is displayed.

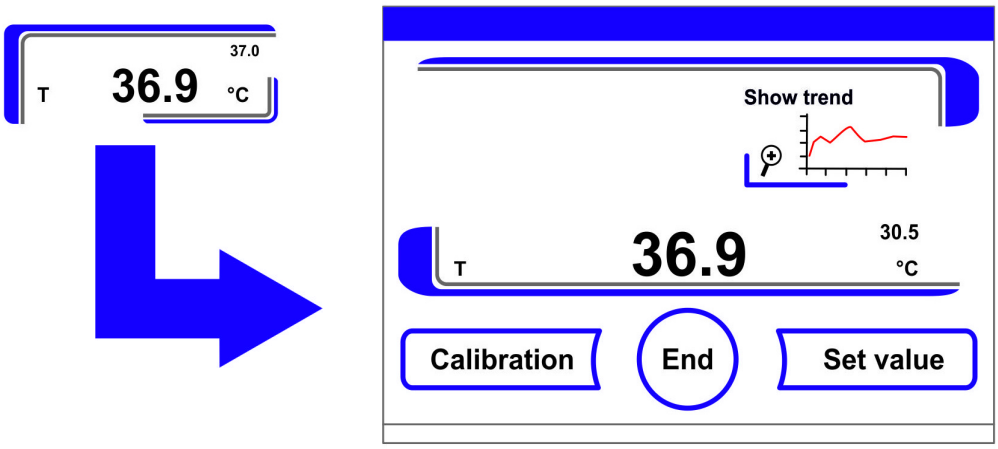


Figure 9-2. Temperature Display Field and Temperature Selection Menu

2. To exit the Temperature menu:
   - Press the **End** key [3].

3. To enter the Calibration submenu:
   - Press the **Calibration** key.

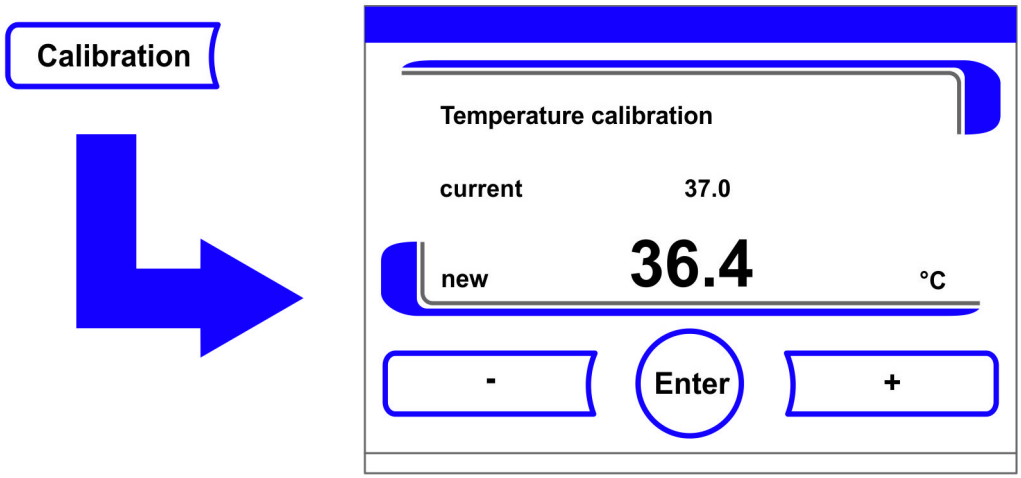


Figure 9-3. Temperature Calibration Procedure

4. Enter the measured value (target value):
   The targeting value can be increased or reduced in increments; if you keep the + key or the – key depressed, the function switches to a rapid increase/reduction; after approx. 3 seconds, another increase/reduction occurs.

To increase the targeting value:
- Press the + key.

To reduce the set value:
- Press the - key.

5. Accept and save the target value:
   - Press the **Enter** key.
   - Press the **Save** key.

- The system returns to the main menu. The temperature displays shows the actual value currently measured in the workspace.

Note Excessive workspace temperature:
Excessive workspace temperatures after the calibration can be reduced by leaving the doors open for approx. 30 seconds.

Value reset:

If the value isn't changed within the next 30 seconds, the system automatically exits the menu, and the most recently confirmed value is preserved.

Preparing the CO_2 Calibration

To determine the exact measured value of the device-integral CO_2 sensor, a CO_2 comparison measurement has to be performed every three months.
If a major deviation is found during this check, a CO_2 calibration is required.
During this process, the CO_2 control of the device is set to the value measured during the comparison measurement. Use a calibrated measuring instrument with an accuracy of < ± 0.3 % CO_2 for this test.

Suitable Instrument:

- Portable IR readout instrument.
  The measuring sample is withdrawn through the sealable measurement opening of the glass door.
  The comparison measurement must be performed when the device is completely heated up.

Comparison Measurement Procedure:

1. Turn on the device using the power switch.
2. Adjust the CO_2 set value and wait until the unit has fully heated up and developed the correct humidity level.
3. Insert the measuring instrument probe through the measurement opening into the workspace. Wait until the CO_2 value displayed by the instrument has stabilized.
4. For devices equipped with the optional gas-tight screen, the measurement opening is located:

- with ***HERACELL VIOS 160i LK*** in the center gas-tight screen,
- with ***HERACELL VIOS 250i LK*** in the left or center gas-tight screen.

5. Remove the measuring probe, plug the measurement opening and close the doors.
6. Calibrate the CO_2 control.

Note IR measuring cell:
For devices with infrared (IR) measuring cells, the $_2$ calibration can only be performed when the CO_2 concentration has been set to 4.0% CO_2 or more.
Calibration should be performed with the CO_2 set value designated for the work process (prospective work process value).

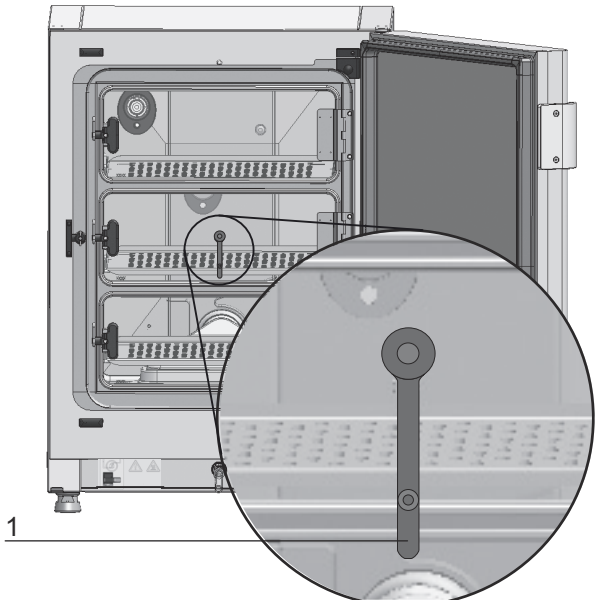


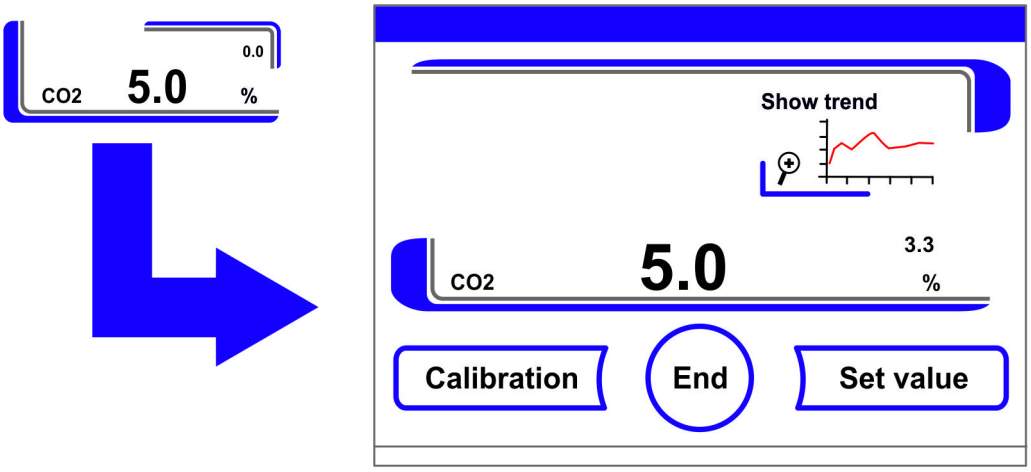
Figure 9-4. Gas-Tight Screen Measurement Opening

CO_2 Calibration Procedure

Measurement example:

- CO_2 set value: 5 %
  Reference value: 5.6 %

1. Press the CO_2 display key.
- The CO_2 menu is displayed.



2. To exit the CO_2 menu:
- Press the **End** key [3].

3. To enter the Calibration submenu:
- Press the **Calibration** key.

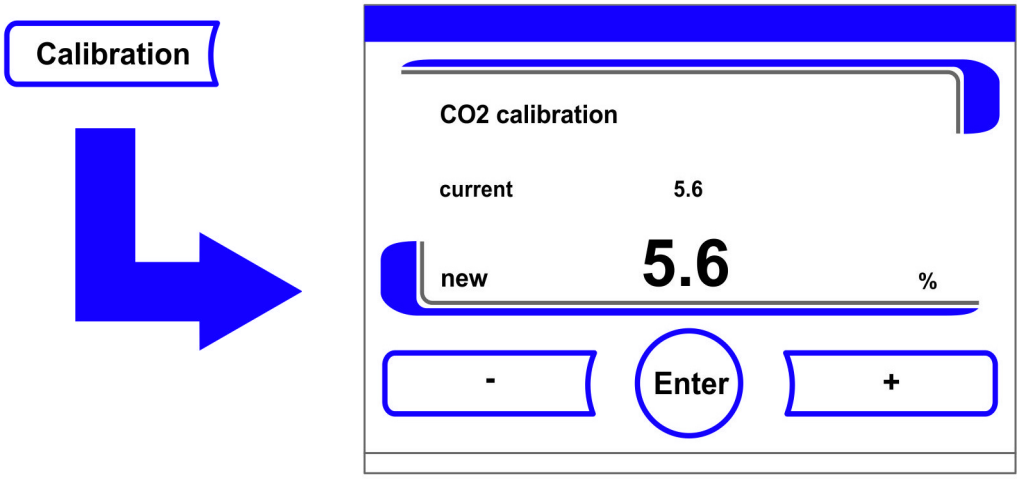


Figure 9-5. CO_2 Calibration Procedure

4. Enter the measured value (target value):
   The targeting value can be increased or reduced in increments; if you keep the + key or the – key depressed, the function switches to a rapid increase/reduction; after approx. 3 seconds, another increase/reduction occurs.

To increase the targeting value:
- Press the + key.

To reduce the set value:
- Press the - key.

5. Accept and save the target value:
- Press the **Enter** key.
- Press the **Save** key.
- The system returns to the main menu. The CO_2 display shows the actual value currently measured in the workspace.

Note Excessive CO_2 content:
Excessive CO_2 content after the calibration can be reduced by leaving the device doors open for approx. 30 seconds.

Value reset:
If the value isn't changed within the next 30 seconds, the system automatically exits the menu, and the most recently confirmed value is preserved.

Replacing the HEPA-Filter

The HEPA-filter is mounted under a plastic airbox at the bottom of the rear wall in the workspace.

Steps for replacing the HEPA-filter:

1. Power down the unit, shut off the gas supply and allow the workspace to vent.
2. Take the center and bottom insert out of the workspace.

3. Lift the water reservoir cover at the front side (1/Figure 9-6).

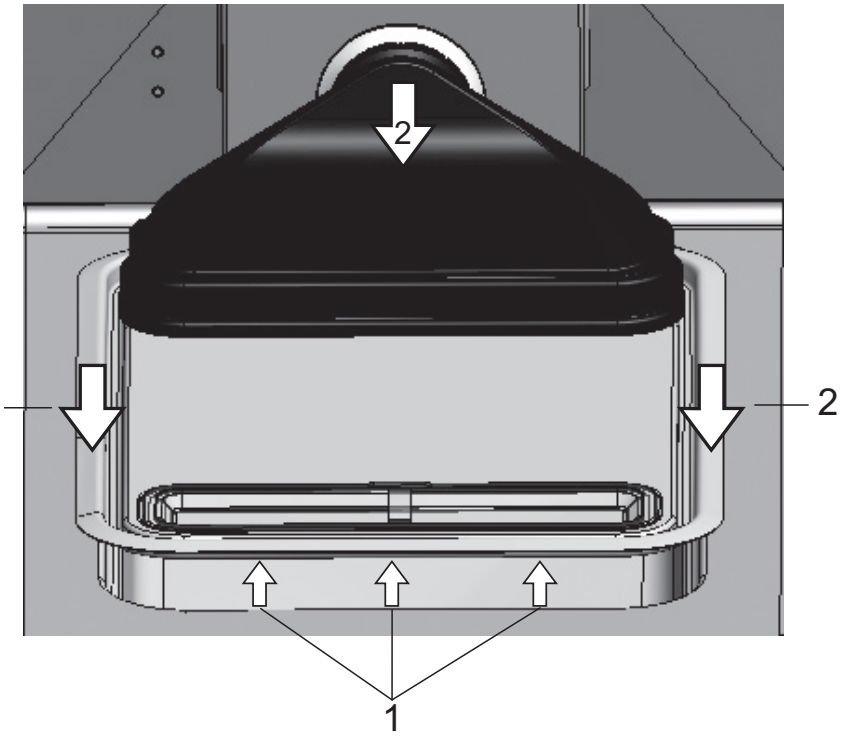


Figure 9-6. Removing the Airbox

4. Pull the water reservoir cover out at the front (2/Figure 9-6)
5. Remove the airbox with the HEPA filter.
6. Turn the airbox upside down, unlatch the tabs (5/Figure 9-7)on the left-hand side from the HEPA filter tabs (6/Figure 9-7).
7. Unlatch the tabs on the right-hand side (3/Figure 9-7) of the airbox (1/Figure 9-7) from the corresponding slots provided in the HEPA-Filter (4/Figure 9-7).

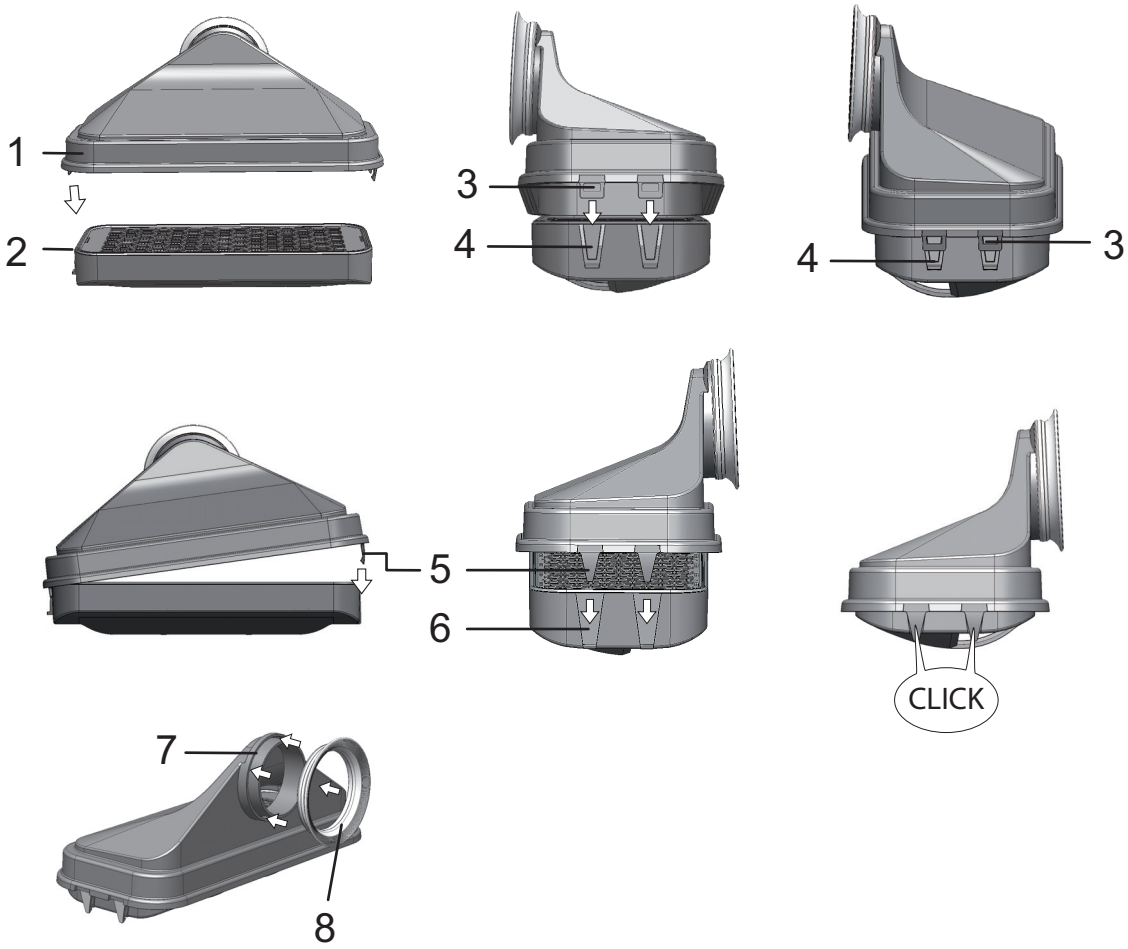


Figure 9-7. Installing the HEPA-Filter

8. Install the new HEPA-filter in airbox (1/Figure 9-7) and engage the locking tabs.
9. Place the airbox on its seat in the water reservoir cover panel.
10. If the unit has been operated without the HEPA-filter previously, activate the HEPA-filter in the user configuration according to instructions “Activating / De-Activating the HEPA-Filter:“ on page 6-39.
11. If necessary, set the reminder interval for the HEPA-filter replacement in the user configuration according to instructions “Reminder Interval Setting“ on page 6-26. The reminder interval for HEPA-filter replacement may be set between 1 and 12 months. We recommend setting this parameter to the factory preset value of 12 months.

Replacing the Gas Inlet Filter

The gas inlet filter (CO_2-/O_2-/N_2 supply) has a plastic thread and is screwed by hand into the female thread socket at the control box.

Procedure for gas supply gas inlet filter:

1. Make sure that the gas supply is shut off.
2. Loosen the hose clamp (4/Figure 9-8).

3. Remove the gas hose (5/Figure 9-8) from the gas inlet filter sleeve.

Procedure for all gas inlet filters:

4. Remove the retainer (1/Figure 9-8).
5. Unscrew the gas inlet filter(2/Figure 9-8) from the threaded hole (3/Figure 9-8).
6. When installing the new gas inlet filter, make sure that the plastic thread is not canted. Install the filter using caution.
7. Install the retainer.

Procedure for gas supply gas inlet filter:

8. Connect the gas hose to the gas inlet filter sleeve and secure it using the hose clamp. Check to see if the gas hose is securely seated on the sleeve.

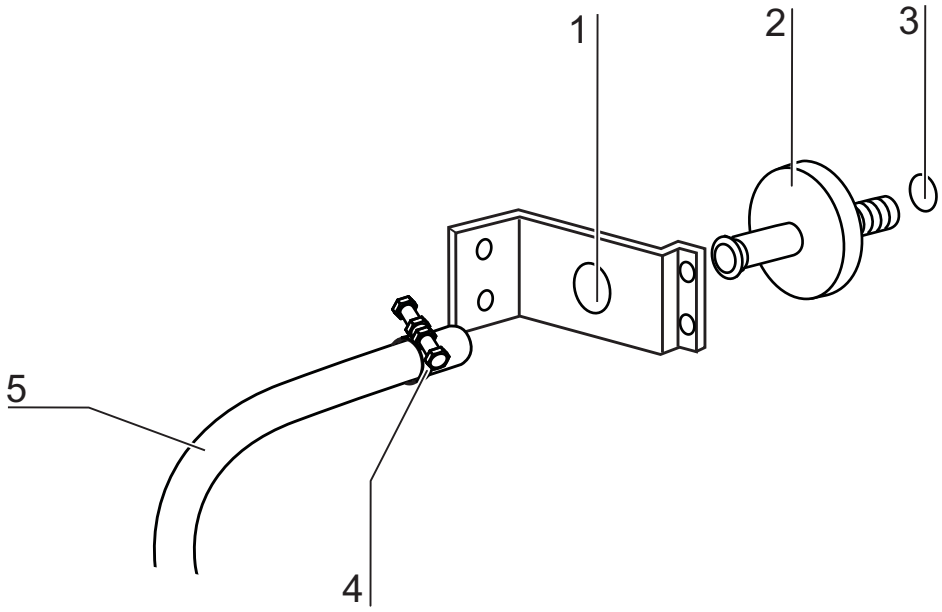


Figure 9-8. Gas Inlet Filter Installation

Device Fusing Replacement

The device's fuses are not user-replaceable. If the unit fails due to an electrical fault, call Technical Field Service.

Replacing the Door Seal

Note
We recommend having the door seal replaced by a service technician or by expert staff.

Waste Disposal

Content

- "Overview of the Materials Used:" on page 10-1



WARNING Contamination hazard!

The device may have been used for treating and processing infectious substances. Therefore, the device and device components may have been contaminated. Prior to disposal, all device components must be decontaminated!

- Clean the unit components thoroughly, then disinfect or decontaminate them (depending on application).
- Attach a declaration of non-objection with details of performed decontamination measures to the items that are to be disposed of.

All device components can be disposed of after they have been decontaminated properly.
HEPA filters must be disposed of in accordance with applicable national legislation and directives on the handling of hazardous waste.

Note Recycling Service:
Thermo Fisher Scientific offer a recycling service for discarded components.

Overview of the Materials Used:

Component	Material
Thermal insulation components	Glass wool, glass wool with single-sided glass mat lining
Printed circuit boards	Coated electrical components contain various plastics materials. Components mounted on circuit boards containing epoxy resin bonder.
Plastic components, general	ABS and PPS GF40, note material identification
Exterior housing	Galvanized and painted steel sheet, Stainless steel 1.4016
Incubator rear panel	Galvanized steel sheet

Component	Material
Outer door	Galvanized and painted steel sheet, Stainless steel 1.4016
Door inner panel	1.4301 stainless steel sheeting
Control panel and display window protective foil	Polyethylene
Heater	Silicone-sheathed resistance heater wires
Workspace containers, installed components and shelves	Stainless steel 1.4301, Copper
Insert for pressure compensation opening	Stainless steel 1.4301 (base), 1.4404 (sinter filter)
Glass screen	Sodium silicate glass
Sensor block (TCD)	Stainless steel 1.4301
Cables	Plastics- and silicon-sheathed copper stranded wire
Elastomers, general	Silicone
Filter	HEPA-filter, micro-fine glass, Membrane filter Cell locker with ABS and silicone Gas filter with polypropylene casing and GF/PTFE membrane, Pre-filter, stainless steel 1.4401 wire mesh
Packaging	Corrugated cardboard, polyethylene foil, styrofoam shaped elements and polypropylene
Door seal magnet	Permanent magnet
Cell locker	Polycarbonate Makrolon 2528

11

Specifications

Content

- “HERACELL VIOS 160i LK“ on page 11-2
- “HERACELL VIOS 250i LK“ on page 11-6

HERACELL VIOS 160i LK

Name	Unit	Value
Mechanical		
Outer dimensions (W x H x D)	mm	637 x 905 x 790 (25.08 x 35.63 x 31.10 inch)
Inner dimensions (W x H x D)	mm	470 x 607 x 576 (18.50 x 23.90 x 22.68 inch)
Inner space volume, of which useable volume	l l	approx. 165 approx. 100
Inserts (B x T) Quantity of components delivered Quantity, maximum Surface loading capacity, maximum	mm pcs. pcs. kg	423 x 465 (16.65 x 18.31 inch) 3 11 10 per insert
Overall device loading capacity, maximum	kg	30
Weight	kg	83
Weight, without accessories	kg	78.4
Thermal		
Thermal safety features to DIN 12880:2007-05		Class 3.1 (Overtemperature controller, providing alarming function upon excessive temperature condition)
Ambient temperature range	°C	+18...34
Ambient temperature for stacked devices	°C	+18...28
Temperature control range, incubation operation	°C	RT + 3...55
Temperature deviation from set value, over time (DIN 12880, part 2) at 37 °C	°C	± 0.1
Temperature deviation from set value, spatial (DIN 12880, part 2) at 37 °C [*1])	°C	<= ± 0.3
Duration of the auto-start routine: to 37 °C Ambient temperature 20 °C	h	5...10
Heat transfer to environment: at 37 °C during steri-run decontamination	 kWh/h kWh/h	 0.06 0.59
Humidity		
Water qualities		Electrical resistance: 50 kOhmcm to 1 MOhmcm Conductivity: 1 to 20 µS/cm
Capacities: Incubation operation	l	max. 3 / min 0.5

Name	Unit	Value
Constant humidity at 37 °C (high humidity mode)	%rH	approx. 93
Constant humidity at 37 °C (low humidity mode)	%rH	approx. 90
Others		
Sound pressure level (DIN 45 635, part 1)	dB(A)	< 50
Relative ambient humidity	%rH	max. 80
Altitude of site	m above sea level	max. 2000

*1) determined on the basis of DIN 12880 for devices with standard feature set. See calibration instructions for detailed information

HERACELL VIOS 160i LK

Name	Unit	Value
CO_2 gas supply system		
Gas purity	%	min. 99.5 or med. quality
Primary pressure	bar	min. 0.8 - max. 1 (11.6-14.5 psi)
Measurement and control range	Vol -%	0...20
Control deviation over time	Vol -%	± 0.1
CO_2 measuring cell		
Accuracy at 37 °C and 5% CO_2	%CO_2	± 0.3
O_2 gas supply system		
Gas purity	%	min. 99.5 or med. quality
Primary pressure	bar	min. 0.8 - max. 1 (11.6-14.5 psi)
Measurement and control range	Vol -%	1... 21 or 5...90
Control deviation over time	Vol -%	± 0.2
O_2 measuring cell		
Accuracy at 37 °C and 21% O_2	%O_2	± 0.5 (option: 1.....21% O_2) ± 2,0 (option: 5.....90% O_2)
Electrical		
Rated voltage	V	1/N/PE 230 V, AC (± 10%) 1/N/PE 220 V, AC (± 10%) 1/N/PE 120 V, AC (± 10%) 1/N/PE 100 V, AC (± 10%)
Rated frequency	Hz	50/60
Degree of protection (IEC 60529)		IP 20
Protection class		I
Overvoltage category (EN 61010)		II
Pollution degree (EN 61010)		2
Rated current	A	**230 V:** Decontamination: 4.6 Incubation: 2.4 **220 V:** Decontamination: 4.4 Incubation: 2.3 **120 V:** Decontamination: 8.3; Incubation: 4.6 **100 V:** Decontamination: 7.2; Incubation: 3.9
Circuit breaker		16 A

Name	Unit	Value
Rated power	kW	**230 V:** Decontamination: 1.10 Incubation: 0.56 **220 V:** Decontamination: 0.97 Incubation: 0.51 **120 V:** Decontamination: 1.00 Incubation: 0.55 **100 V:** Decontamination: 0.72 Incubation: 0.39
EMV class		B

HERACELL VIOS 250i LK

Name	Unit	Value
Mechanical		
Outer dimensions (W x H x D)	mm	780 x 970 x 945 (30.71 x 38.19 x 37.20 inch)
Inner dimensions (W x H x D)	mm	607 x 670 x 629 (23.90 x 26.38 x 24.76 inch)
Inner space volume, of which useable volume	l	approx. 255 approx. 162
Inserts (B x T) Quantity of components delivered Quantity, maximum Surface loading capacity, maximum	mm pcs. pcs. kg	560 x 500 (22.05 x 19.68 inch) 3 12 10 per copper shelf 14 per stainless steel shelf
Overall device loading capacity, maximum	kg	30 copper shelves/ 42 stainless steel shelves
Weight, without accessories	kg	97.5
Thermal		
Thermal safety features to DIN 12880:2007-05		Class 3.1 (Overtemperature controller, providing alarming function upon excessive temperature condition)
Ambient temperature range	°C	+18...34
Ambient temperature for stacked devices	°C	+18...28
Temperature control range	°C	RT + 3...55
Temperature deviation from set value, over time (DIN 12880, part 2)	°C	± 0.1
Temperature deviation from set value, spatial (DIN 12880, part 2) at 37 °C *1)	°C	± 0.3
Duration of the auto-start routine: to 37 °C Ambient temperature 20 °C	h	5...10
Heat transfer to environment: at 37 °C during steri-run decontamination	 kWh/h kWh/h	 0.07 0.75
Humidity		
Water qualities		Electrical resistance: 50 kOhmcm to 1 MOhmcm Conductivity: 1 to 20 µS/cm
Capacities: Incubation operation	l	max. 3 / min 0.5

Name	Unit	Value
Constant humidity at 37 °C (high humidity mode)	%rH	approx. 93
Constant humidity at 37 °C (low humidity mode)	%rH	approx. 90
Others		
Sound pressure level (DIN 45 635, part 1)	dB(A)	< 50
Relative ambient humidity	%rH	max. 80
Altitude of site	m above sea level	max. 2000

*1) determined on the basis of DIN 12880 for devices with standard feature set. See calibration instructions for detailed information.

HERACELL VIOS 250i LK

Name	Unit	Value
CO_2 gas supply system		
Gas purity	%	min. 99.5 or med. quality
Primary pressure	bar	min. 0.8 - max. 1 (11.6-14.5 psi)
Measurement and control range	Vol -%	0...20
Control deviation over time	Vol -%	± 0.1
CO_2 measuring cell		
Accuracy at 37 °C and 5% CO_2	%CO_2	± 0.3
O_2 gas supply system		
Gas purity	%	min. 99.5 or med. quality
Primary pressure	bar	min. 0.8 - max. 1 (11.6-14.5 psi)
Measurement and control range	VoI -%	1... 21 or 5...90
Control deviation over time	VoI -%	± 0.2
O_2 measuring cell		
Accuracy at 37 °C and 21% O_2	%O_2	± 0.5 (option: 1.....21% O_2) ± 2.0 (option: 5.....90% O_2)
Electrical		
Rated voltage	V	1/N/PE 230 V, AC (± 10%) 1/N/PE 220 V, AC (± 10%) 1/N/PE 120 V, AC (± 10%) 1/N/PE 100 V, AC (± 10%)
Rated frequency	Hz	50/60
Degree of protection (IEC 60529)		IP 20
Protection class		I
Overvoltage category (EN 61010)		II
Pollution degree (EN 61010)		2
Rated current	A	**230 V:** Decontamination: 5.5 Incubation: 3.3 **220 V:** Decontamination: 5.3 Incubation: 3.2 **120 V:** Decontamination: 10.4 Incubation: 6.3 **100 V:** Decontamination: 8.9 Incubation: 5.3
Circuit breaker		16 A

Name	Unit	Value
Rated power	kW	**230 V:** Decontamination: 1.26 Incubation: 0.76 **220 V:** Decontamination: 1.17 Incubation: 0.69 **120 V:** Decontamination: 1.25 Incubation: 0.75 **100 V:** Decontamination: 0.89 Incubation: 0.53
EMV class		B

Data Communication

Content

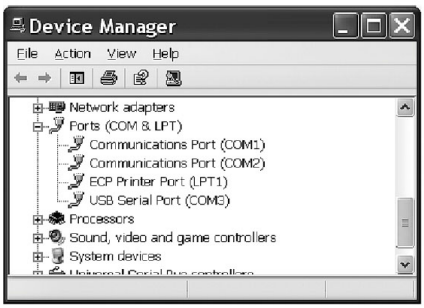
- "Structure of the Command Sequences for Data Communication" on page 12-4
- "Overview of General Parameters (Addresses 0xxx)" on page 12-5
- "Overview of Incubator Parameters (Addresses 2xxx)" on page 12-5
- "Error Memory Structure" on page 12-8
- "Data Logger Structure" on page 12-11
- "Examples of Data Logger Codes" on page 12-15
- "Program HERACELL VIOS 160i LK / HERACELL VIOS 250i LK" on page 12-21

USB Interface

The units come equipped with a USB interface. The USB interface complies with Standard USB 1.1 / USB 2.0 / USB 3.0 (full speed). The USB port is operated as a virtual COM port. Therefore, the port transmission speed can be changed within the defined baud rates (9,600, 19,200, 38,400, 57,600 baud. Data exchange is accomplished via a defined command sequence structure (frames). The command sequences correspond with the RS 232 interface installation diagram.

Note Installing the USB port with the virtual COM port:

If the USB port is to be used for data exchange between PC and incubator, the USB port is installed as virtual COM port (USB serial port) using the supplied driver.
The assigned COM port can be located in the Windows Device Manager/Ports dialog box, e.g. USB Serial Port (COM5), and is then defined as communication port in the ***HERACELL VIOS 160i LK / HERACELL VIOS 250i LK*** (see "Program HERACELL VIOS 160i LK / HERACELL VIOS 250i LK" on page 12-21).



The driver can be run under the following operating systems:
WIN 7, WIN 8, WIN 2000, WIN XP, WIN VISTA.

Installing the USB Port Driver

Plug the USB cable into the USB interface port (option) in the control box of the ***HERACELL VIOS 160i LK*** / ***HERACELL VIOS 250i LK*** and connect with a PC.
As soon as the Windows Hardware Detector has identified the USB port, the Find New Hardware Wizard dialog box opens.

1. Choose the INSTALL FROM A LIST OR SPECIFIC LOCATION (ADVANCED) option.



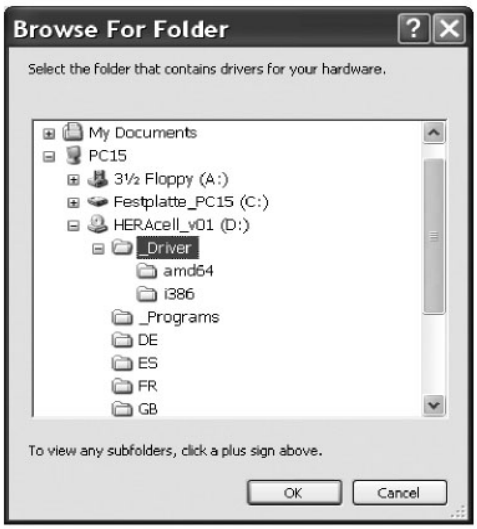
2. Select the Install from a list or specific location (Advanced) option.



3. Select the data CD as source.



4. On the data CD, select the DRIVER sub-directory.



5. The installation routine installs the driver: EVAL22 Board USB. After the installation has been completed successfully, the routine is completed with FINISH.

The interface transmission speed can be selected within the defined baud rates (9,600, 19,200, 38,400, 57,600 Baud) at the touchscreen of the ***HERACELL VIOS 160i LK*** / ***HERACELL VIOS 250i LK*** (see "Settings / Setup" on page 6-17).

Structure of the Command Sequences for Data Communication

All characters sent and received in the data exchange between a PC and the incubator ***HERACELL VIOS 160i LK*** / ***HERACELL VIOS 250i LK*** are ASCII characters that can be displayed on a conventional terminal.
This ensures that communication can be set up, controlled, and programmed easily.

Description of Protocol

Character coding
ASCII characters, capital letters are not allowed.

Reading parameters:

Query:	?:aaaa:bb::cc<CR>
or:	?:aaaa:bb:XXXX:cc<CR>
Response:	!:aaaa:bb:XXXXX:cc<CR>
where:	aaaa = parameter address
	bb =amount of payload in this telegram (00 – ff)
	cc = checksum: CRC8-CCITT: x8 + x2 + x1 + 1 = 0x07
	without cc and <CR>
	XXXX = bb-bytes user data

Description of the response elements:

aaaa	parameter address
bb	amount of payload in this telegram (00 – ff)
cc	Checksum: Inverted XOR of all bytes without checksum and <CR>

Example of a software version query (50111927):

Query:	?:0001:00::cc<CR>
Response:	!:0001:08:50111927:cc<CR>

Writing parameters:

Command:	!:aaaa:bb:XXXXX:cc<CR>
Response:	!:aaaa:bb::cc<CR>
where:	aaaa = parameter address
	bb =amount of payload in this telegram (00 – ff)
	cc = checksum: CRC8-CCITT: x8 + x2 + x1 + 1 = 0x07
	without cc and <CR>
	XXXX = bb-bytes user data

Response with an error message:

Response:	!:aaaa:bb:XX:cc<CR>

Description of the response elements:

aaaa	parameter address,
bb	amount of payload (always 02)
cc	Checksum: CRC8-CCITT: x8 + x2 + x1 + 1 = 0x07
	without cc and <CR>
	XX = 2 bytes error message (see table below)

Example of an unknown command:

Query:	?:0005:00::cc<CR>
Response	!:0005:02:?1:cc<CR>

Significance of the two bytes in the error message:

Failure message	Description
?0	Error in telegram structure or check sum
?1	Unknown error or unknown parameter
?2	Internal memory error
?3	Data error (value not within set limits)

Overview of General Parameters (Addresses 0xxx)

General parameters are system values such as date, time, and motherboard version number.

Reading General Parameters

Address	Description	Remarks
0001	Mainboard version number	8 places
0010	Date and time display [hours:minutes:seconds]; [day:month:year]	17 bytes / decimal value with the format xx:xx:xx;xx:xx:xx
0011	Date [day:month:year]	8 bytes / decimal value with the format xx:xx:xx
0012	Time [hours:minutes:seconds]	8 bytes / decimal value with the format xx:xx:xx

Overview of Incubator Parameters (Addresses 2xxx)

Incubator parameters are divided into:

- the basic parameters of the three control loops temperature, CO_2 and O_2,
- the internal function parameters of operating functions and data logging.

Reading Basic Parameters

Address	Description	Remarks
2000	Device status[*1)] (Error-) Status of the control loops temperature, CO_2, O_2, rH, ref. temp.	33 bytes / hexadecimal value with the format xxxxxxxx;xxxx; ... ;xxxx;xxxx;xxxx
2010	Specified, actual and reference temperature[*2)]	23 bytes / decimal value with the format +xxx.xx;+xxx.xx;+xxx.xx
2020	Specified and actual CO_2 content[*2)]	15 bytes / decimal value with the format +xxx.xx;+xxx.xx
2030	Specified and actual O_2 content[*2)]	15 bytes / decimal value with the format +xxx.xx;+xxx.xx
204a	Actual water level (100% or 0%)	7 bytes / decimal value with the format +xxx.xx
204b	Low humidity indicator (1 active, 0 inactive)	2 bytes / hexadecimal with the format xx

[*1)] Example of unit status and (error) status control loops (for details see error messages)

[*2)] All values have two decimal places.

Reading Internal Function Parameters

Address	Description	Remarks
2100	Status of run *1) and Remaining run time [hours:minutes] Disinfection, date and time of last start	25 bytes / decimal value with the format xx;+xxx:xx;xx.xx.xx;xx:xx
2105	Status of run *1), current CO_2 offset + waiting period [minutes:seconds] auto-start, Date and time of last start	25 bytes / decimal value with the format xx;xx.x;+xxx:xx;xx.xx.xx;xx:xx
2140	Status of as cylinder changeover switch Read CO_2 *3)	2 bytes / hexadecimal with the format xx
2141	Status of as cylinder changeover switch Read O_2 *3)	2 bytes / hexadecimal with the format xx
2300	Read the Error Log (current errors) *4)	Up to 241 bytes / hexadecimal value Format, see section on this topic
2301	Read the Error Log (older errors) *4)	Up to 241 bytes / hexadecimal value Format, see section on this topic
2400	Query (Start) of data stored in the data logger *5)	Up to 224 bytes / hexadecimal value Format, see section on this topic
2401	Query of other data stored in the data logger *6)	224 bytes / hexadecimal value Format, see section on this topic
2402	(Repeat) query for last data logger query *7)	224 bytes / hexadecimal value Format, see section on this topic
2410	Read out writing cycle of the data logger in hours/minutes/seconds	8 bytes / decimal value with the format xx:xx:xx

*1) See table with notes on disinfection and autostart run status.
*2) Two bytes each per level.
*3) Cylinder A active (0x01), cylinder B active (0x02), pressure in cylinder A OK (0x10), pressure in cylinder B OK (0x20).
*4) For other Informations on the Error Log, see Chapter 13.5.
*5) Place the reading pointer on the first entry, read up to 7 entries max.
*6) Send the next 7 entries. Set reading pointer automatically to next new entry, read up to 7 entries max.
*7) Re-send entries of last telegram. Can be used after communication error has occurred.

Note on *3) disinfection and auto-start run status:

Bit	Disinfection	auto-start
0x00	Steri-run not activated	auto-start not activated
0x01	Initialization	Initialization
0x02	Wait until open door time expires	Wait until open door time expires
0x03	Wait until door closes	Wait until door closes
0x04	Start	Start
0x05	Heating	Heating
0x06	Holding	Perform reverse voltage adjustment
0x07	Condensation	Waiting period 1
0x08	Cooling	Set tolerance range
0x09	Drying	Build up stable moisture
0x0A	Wait for enable	Perform reverse voltage adjustment
0x0B	Cancellation	Waiting period 2
0x0C	-	Determine offset
0x0D	-	Read out, check offset
0x0E	-	Release
0x0F	-	Cancellation

Error Memory Structure

The error memory contains 22 error messages. A query is responded with 22 data sets with a colon as separator and can be queried using the following commands:

Query: ?:2300:00::cc<CR>
Reading the first 11 error memory entries.

Query: ?:2301:00::cc<CR>
Reading the first 11 error memory entries.

These data sets consist of 11 byte and are encrypted in 21 ASCII characters prior to data transmission.
Example: The byte 0x23 is converted into the ASCII characters 0x32 (“2”) and 0x33 (“3”).

- Byte 1 consists of 1 characters,
- Bytes 2 - 11 consist of 2 characters.

Therefore, a response consists of 1+(10 x 2) = 21 data bytes plus separator.
A data set always delivers the date, the time, the faulty control loop, the device status, and the error message.

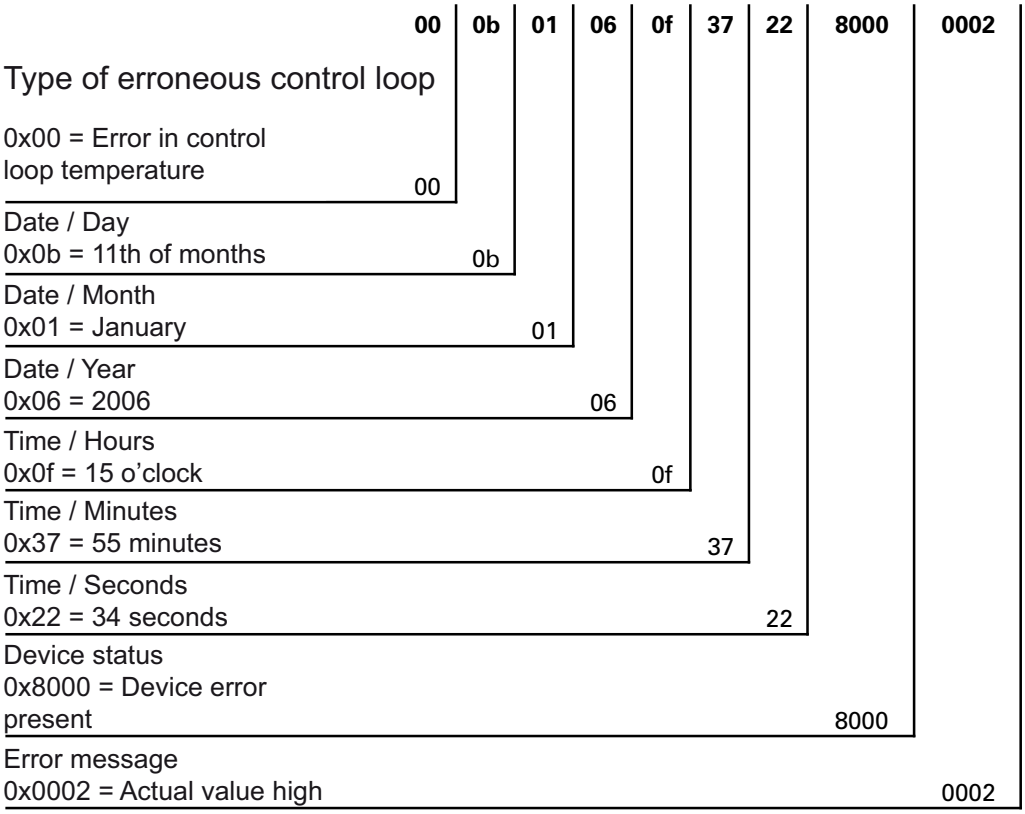
Example of a response:

!:2300:fb:10b01060f372280000002:20b01060f38100001... ...:80

First data set: !:2300:fb:10b01060f372280000002:
(with 21 bytes)

Second data set: 20b01060f38100001... ...:80
beginning of the second data set after 01060 bytes of the first data set and of the separator [1 byte])

Error Memory Data Set Structure Scheme:



Therefore, the following information is transmitted in this data set:

- Created on 1 January 2006 at 15:55:34 hrs.
- A device error has occurred and the set temperature is too high.

Overview of the Possible Error Messages in Hex Coding

Hex Code	Description / Type
0x00	Temperature control loop
0x01	CO_2 control loop
0x02	O_2 control loop
0x07	Water level
0x08	General device status

Overview of the Possible Error Messages in Bit Coding General Device Status, Temperature and CO_2 Control Loop:

Bit	General device status
0x0002	Device door open too long
0x0004	Display not communicating
0x0008	Implausible mainboard parameter (EEPROM defective)
0x0010	Data logger defective (unit can continue to function)
0x0020	Error for disinfection / steri-run
0x0040	Power-down during steri-run
0x0080	Error auto-start
0x0100	ADC-test failed
0x0400	Fan error
0x1000	IR sensor system replaced (info)
0x2000	auto-start active (info)
0x4000	Disinfection active (info)
0x8000	Device error has occurred (info)

Bit	Error status of temperature control circuit
0x0001	Sensor breakage
0x0002	Actual value high
0x0004	Actual value low
0x0008	Actual value not plausible
0x0010	Calibration values too high/low

Bit	CO_2 control loop error status
0x0001	Sensor breakage
0x0002	Actual value high

Bit	CO_2 control loop error status
0x0004	Actual value low
0x0010	Calibration values too high/low
0x0020	Error communication (to sensor)
0x0040	Error communication (to gas cylinder changing unit)
0x0080	No gas available, bottle A and B empty
0x0200	Cylinder A empty
0x0400	Cylinder B empty

O_2 Control Loop and Water Level:

Bit	O_2 control loop error status
0x0001	Sensor breakage
0x0002	Actual value high
0x0004	Actual value low
0x0020	Error communication (to sensor)
0x0040	Gas cylinder changeover switch does not communicate
0x0080	No gas available, bottle A and B empty
0x0200	Cylinder A empty
0x0400	Cylinder B empty

Bit	Water level error status
0x0001	No water

Data Logger Structure

The data logger can store up to 10,000 events. Depending on the setting for the logging cycle (in sections of seconds), e.g. for a value of 10,000 s (default value), the events of about 5 days can be stored.
The data logger stores the following information:

- important user actions, system events, and error messages,
- measured data of the three control loops during incubation operation.

The data logger can be queried using the following commands:

Query: ?:2400:00::cc<CR>
Set the data logger pointer to the oldest entry and output the first data sets.

Query: ?:2401:00::cc<CR>
Output of the following data sets, the reading pointer automatically moves gradually from the older entries to the current entries.

Query: ?:2402:00::cc<CR>

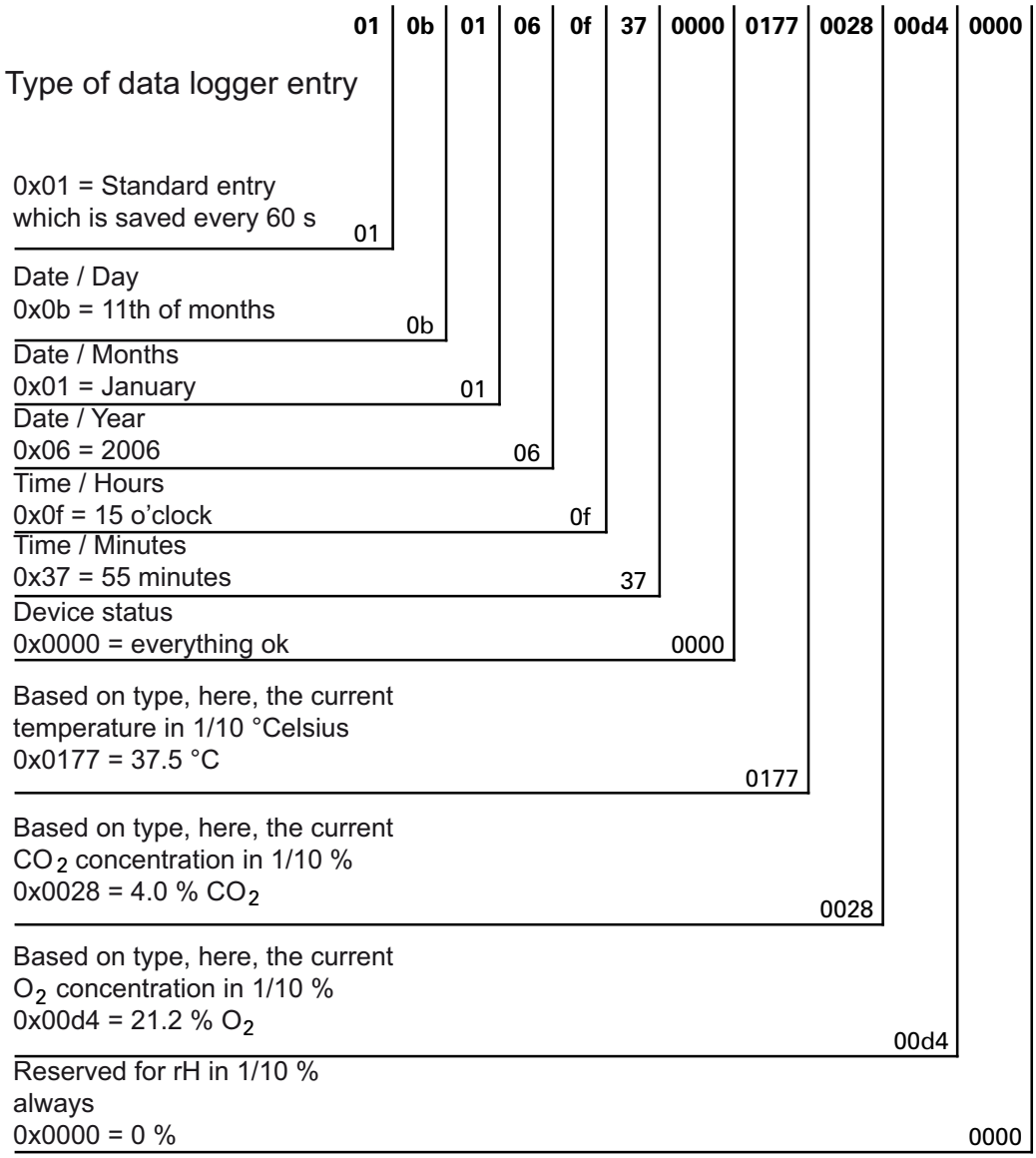
Repeated output of the most recently read data, this command does not move the reading pointer. This command can be used to avoid data loss after a communication error has occurred

Each query command is responded with up to 7 data sets that follow one another without a separator. These data sets consist of 16 bytes and are encrypted into 32 ASCII characters prior to transmission. For example, the byte 0x23 is converted into the ASCII characters:
0x32 (“2“) and 0x33 (“3“).
Therefore, a response consists of up to 7 X 16 = 112 bytes, i.e. 224 ASCII characters.
The date and time (without seconds), the device status and the type of data logger entry are always transmitted in a data set (byte 0-7, and ASCII characters 0-15).
Also, depending on the entry, the current actual values or set values of the control loops or other parameters can be entered (byte 8-15 or ASCII character 16-31).

Example of a response:
!:2400:e0:010b01060f3700000177002800d40000110b01060f3800000172003200d20352... ...:80

First data set	!:2400:e0:010b01060f3700000177002800d4000011 (consisting of 32 byte ASCII characters)
Second data set	0b01060f3800000172003200d20352... ...:80 (beginning of the second data set after 32 bytes of the first data set)

Data Logger Data Set Structure Scheme:



Therefore, the following information is transmitted in this data set:

- Created on 1 January 2006 at 15:55 hrs.
- The device status reports no particularities,
- the temperature is 37.5°C,
- gas concentration 4.0% CO_2, 21.2% O_2.

Note Example of a code:
For an example of a code, please refer to the end of this chapter.

Overview of Possible Event Entries in Bit Coding
Overview of Event Entries, Part I:

Code	Event	Special information (Byte 8-15)
0x01	Set values from all servo control circuits (periodically in one-minute cycles)	Current values for temperature, CO_2, O_2 and rH
0x02	Set value change (at beginning of new section)	Set value for temperature, CO_2, O_2 and rH
0x10	Set value change T	Set value for temperature, CO_2, O_2 and rH
0x11	Set value change CO_2	Set value for temperature, CO_2, O_2 and rH
0x12	Set value change O_2	Set value for temperature, CO_2, O_2 and rH
0x20	New error T	Status / error registration for temperature, CO_2, O_2 and rH
0x21	New error CO_2	Status / error registration for temperature, CO_2, O_2 and rH
0x22	New error O_2	Status / error registration for temperature, CO_2, O_2 and rH
0x2F	New error system	Status / error registration for temperature, CO_2, O_2 and rH
0x30	Power reset	Set value for temperature, CO_2, O_2 and rH
0x31	Door open	Current actual values for temperature, CO_2, O_2 and rH
0x32	Door closed	Current actual values for temperature, CO_2, O_2 and rH
0x40	Calibration T	Calibration level (2 bytes), old temperature, new temperature (2 bytes each)
0x41	Calibration CO_2	Calibration level (2 bytes), old CO_2 value, new CO_2 value (2 bytes each (2 bytes each)
0x42	Calibration O_2	Calibration level (2 bytes), old O_2 value, new O_2 value (2 bytes each)
0x50	Start auto-start	Status / error registration for temperature, CO_2, O_2 and rH
0x51	auto-start successfully completed	Current actual values for temperature, CO_2, O_2 and rH

Overview of Event Entries, Part II:

Code	Event	Special information (Byte 8-15)
0x52	auto-start completed with error	Status / error registration for temperature, CO_2, O_2 and rH
0x53	auto-start stopped manually	Status / error registration for temperature, CO_2, O_2 and rH
0x60	Start steri-run	Status / error registration for temperature, CO_2, O_2 and rH
0x61	steri-run successfully completed	Current actual values for temperature, CO_2, O_2 and rH
0x62	steri-run completed with error	Status / error registration for temperature, CO_2, O_2 and rH
0x63	steri-run stopped manually	Status / error registration for temperature, CO_2, O_2 and rH
0x70	Gas mon. cylinder A empty	Gas monitoring status (2 bytes), 4 bytes empty
0x71	Gas mon. cylinder B empty	Gas monitoring status (2 bytes), 4 bytes empty
0x72	Gas mon. changeover	Gas monitoring status (2 bytes), 4 bytes empty
0x90	Start low humidity	Current actual values for temperature, CO_2, O_2 and rH
0x91	Stop low humidity	Current actual values for temperature, CO_2, O_2 and rH
0xe0	Delete data logger	Current actual values for temperature, CO_2, O_2 and rH
0xff	Last entry of data logger	No information, not even on date, time, and status

Examples of Data Logger Codes

An entry in the data logger is 16 bytes large and has the following structure:

1st byte: indicates the event (e.g. door open 1x31, measured value entry 0x01)
2nd byte: day of entry
3rd byte: month
4th byte: year
5th byte: hours
6th byte: minutes
7th and 8th byte: device status
9th to 16th byte: various data on the event

Functions for Data Logger Queries

The following code example for reading the data logger uses six functions:

- ahex
  // converts the received ASCII character into a hexadecimal number,
- send_telegramm
  // sends a query to the data logger,
- get_telegramm
  // receives a response data the data logger,
- time_2_str
  // uses a hexadecimal value to create ASCII characters in time format,
- num_2_string
  // uses hexadecimal values to create ASCII characters to be entered into a file,
- read_datalogger
  // edits the received data and writes them into a file.

Example of a Code for a a Data Logger Query

char ahex (char a)

```
char ahex(char a)
    {
    char i;
    char hexa[16]="0123456789abcdef";

    for (i = 0; i < 16; i++)
        if (a == hexa[i])
        return (i);
    return 0;
    }
```

send_telegramm

```
void send_telegramm(char *p)
    {
    char string [15];
    unsigned char bcc = 0xFF;
    char i;

// copy telegram together
    strncpy (&string[0], „?:xxxx:00::00\r", 14);
// insert 4-digit address
    strncpy (&string[2], p, 4);
// calculate checksum: inverted XOR of all bytes
// without checksum and <CR>
    for (i = 0; i < 11; i ++)
        bcc = (bcc^string[i]);
// copy checksum
    string[11] = hexa(bcc/16);
    string[12] = hexa(bcc%16);
```

```
// send telegram
    ComWrt (COM_NR, string, 14);
    return;
    }
```

get_telegramm

```
int get_telegramm(char *p)
    {
    int reading_count = 0;
// reading the telegram character by character
    do
        ComRd(COM_NR, &p[reading_count], 1);
// until reception of <CR>
    while ((p[reading_count++] != '\r'));
// return = number of received characters
    return (reading_count);
    }
```

time_2_str

```
char time_2_str (int z, char * b)
    {
        char i;
// output two numerals
        for (i = 1; i >= 0; i--){
//calculate value
        b[i] = z%10+0x30;
// reduce default value
        z = z/10;
    }
    return (2);
    }
```

num_2_string

```
char num_2_str (int z, char * b)
    {
// number with one decimal place
    char a[12];
    char i, l;
    int rest = 0;
    l = 0;
// Negative number?
    if (z < 0) {
// set algebraic sign
        b[0] = '-';l = 1;
// convert value
        z = 0xffffffff-z+1;
    }
// store decimal place
```

```
rest = z % 10;
// cut off decimal place
    z = z / 10;
// calculate and copy number before decimal separator
    for (i = 0; i < 12; i++){
// calculate value
    a[i] = z%10+0x30;
// reduce default value
    z = z/10;
// Number copied completely?
    if (z == 0) break;
    }
    for ( ; i >= 0; i--)b[l++] = a[i];
// calculate and copy number after decimal separator
    b[l++] = ‘,’;
// calculate value
    b[l++] = rest%10+0x30;
    return (l);
    }
```

read_datalogger

```
int read_datalogger ()
{
#define SIZE_DATA2 16
#define EVENT_STATUS 0x01
unsigned char buffer[300], string [300];
unsigned char zahlenstring [150], datestring, timestring;
unsigned char excelstring [150];
unsigned char len, h,i;
unsigned int read_count,status;
#define EVENT_DATA.END 0xFF
char data;
int GetTele = 0
GetError = 0,
// writing the title line in the file
WriteFile (FileHandle, „Date;Time;Comment;Temp Act.;CO2 Act.;O2
Act.;rH Act.;Temp Set;CO2 Set;O2 Set;rH Set;\n“, 85);
// infinite loop
while (1)
    {
// set data logger to beginning and read
    if (!GetTele) {
    send_telegramm („2400“);
    }
    else{
// read additional data sets
    send_telegramm („2401“);
    }
    len = get_telegramm (buffer);
// no telegram received
```

```
    if (!len) {
        GetError ++;
// requery
    send_telegramm („2402“);
    len = get_telegramm (buffer);
// again, no telegram received
    if (!len) return 1;
    }
// increase telegram counter
    GetTele ++;
// length of sent payload
    len = (ahex(buffer[7]) * 0x10 + ahex(buffer[8])) / 2;
// converting ASCII string into usable numeric string
    for (i = 0; i < (string); i++)
    numeric string [i] = (ahex(buffer[10 + (2*i)]) * 0x10 +
    ahex(buffer[11 + (2*i)]));
// calculation of the sent data packages
    data = ((len) / SIZE_DATA2);
// evaluation of all data packages
    for (i = 0; i < data; i++)9{
    len = 0;
// write time and date into file
    len += time_2_str (numeric string[1+i*SIZE_DATA2],
    &excelstring[len]);
    excelstring[len ++] = ‘.’;
    len += time_2_str (numeric string[2+i*SIZE_DATA2],
    &excelstring[len]);
    excelstring[len ++] = ‘.’;
    len += time_2_str (numeric string[3+i*SIZE_DATA2],
    &excelstring[len]);
    excelstring[len ++] = ‘;’;
    len += time_2_str (numeric string[4+i*SIZE_DATA2],
    &excelstring[len]);
    excelstring[len ++] = ‘:’;
    len += time_2_str (numeric string[5+i*SIZE_DATA2],
    &excelstring[len]);
    excelstring[len ++] = ‘:’;
    len += time_2_str (0, &excelstring[len]);
    excelstring[len ++] = ‘;’;

    switch (numeric string[i*SIZE_DATA2]){
        case EVENT_STATUS:
//check cyclic entries for device errors
    status = numeric string[6+i*SIZE_DATA2]*0x100+
    numeric string[7+i*SIZE_DATA2];
        if (status & INFO_ERROR){
            str_cpy (&excelstring[len], „Error active;“, 13);
            len += 13;
        }
        else{
// query all device errors (see “Overview of Possible Event Entries in Bit Coding Overview of Event
```

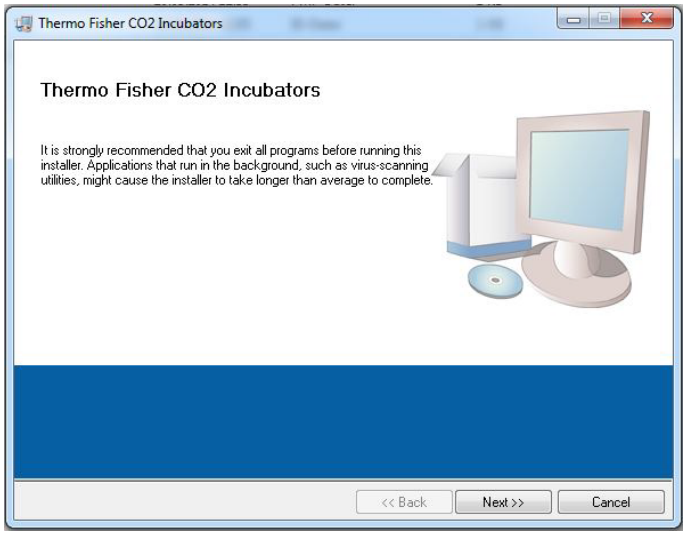
```
Entries, Part I:“ on page 12-14)
                if (status & DOOR_LONG){
                    str_cpy (&excelstring[len], „Door open too long;“,
                    19);
                    len += 19;
                else {
                    if (status & DOOR_OPEN){
                        str_cpy (&excelstring[len], „Door open;“, 10);
                        len += 10;
                        }
                    }
// query remaining device errors now
//              .
//              .
//              .
//              .
//              .
//and finally query cyclic nominal values entries without device // errors
//query all

else{
                str_cpy (&string[string], „ok;“, 3);
                string += 3;
            }
        }
// copy nominal values from numeric string to excel string
    len += num_2_str ((numeric string[8+i*SIZE_DATA2]*0x100+
    numeric string[9+i*SIZE_DATA2]), &excelstring[len]);
    excelstring[len ++] = ‘;’;
    len += num_2_str ((numeric string[10+i*SIZE_DATA2]*0x100+
    numeric string[11+i*SIZE_DATA2]), &excelstring[len]);
    excelstring[len ++] = ‘;’;
    len += num_2_str ((numeric string[12+i*SIZE_DATA2]*0x100+
    numeric string[13+i*SIZE_DATA2]), &excelstring[len]);
    excelstring[len ++] = ‘;’;
    len += num_2_str ((numeric string[14+i*SIZE_DATA2]*0x100+
    numeric string[15+i*SIZE_DATA2]), &excelstring[len]);
    excelstring[len ++] = ‘;’;
// enter set values from here
    len += num_2_str (SollTemp, &excelstring[len]);
    excelstring[len ++] = ‘;’;
    len += num_2_str (SollCO2, &excelstring[len]);
    excelstring[len ++] = ‘;’;
    len += num_2_str (SollO2, &excelstring[len]);
    excelstring[len ++] = ‘;’;
    len += num_2_str (SollrH, &excelstring[len]);
    excelstring[len ++] = ‘;’;
    excelstring[len] = ‘\n’;
    len += 1;
    WriteFile (FileHandle, excelstring, len);
    break;
```

```
// query the remaining events from here
    case EVENT_FORMAT_DATALOG:
        WriteFile (FileHandle, excelstring, len);
        WriteFile (FileHandle, „Data logger erased;\n“,20);
        break;
    case EVENT_POWER_ON:
// update of set values
        SetTemp = numeric string [8+i*SIZE_DATA2]*0x100+
        numeric string[9+i*SIZE_DATA2];
        SollCO2 = numeric string[10+i*SIZE_DATA2]*0x100+
        numeric string[11+i*SIZE_DATA2];
        SollO2 = numeric string[12+i*SIZE_DATA2]*0x100+
        numeric string[13+i*SIZE_DATA2];
        SollrH = numeric string[14+i*SIZE_DATA2]*0x100+
        numeric string[15+i*SIZE_DATA2];
        WriteFile (FileHandle, excelstring, len);
        WriteFile (FileHandle, „Power on;\n“, 10);
        break;
    case..
//query all events here (see “Overview of Possible Event Entries in Bit Coding Overview of Event Entries, Part I:“ on page 12-14)
// cancel 0xFF indicates the end of the data logger
    case 0xFF:
    WriteFile (FileHandle, „End;\n“,5);
    }
}
return 0;
}
```

Program *HERACELL VIOS 160i LK / HERACELL VIOS 250i LK*

The program provides a user surface (only with English menu designation) for handling the data communication between a device and a connected PC.

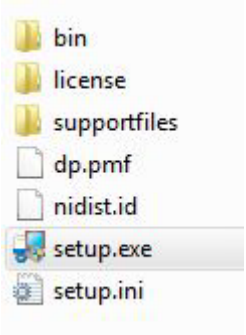


This program is used for:

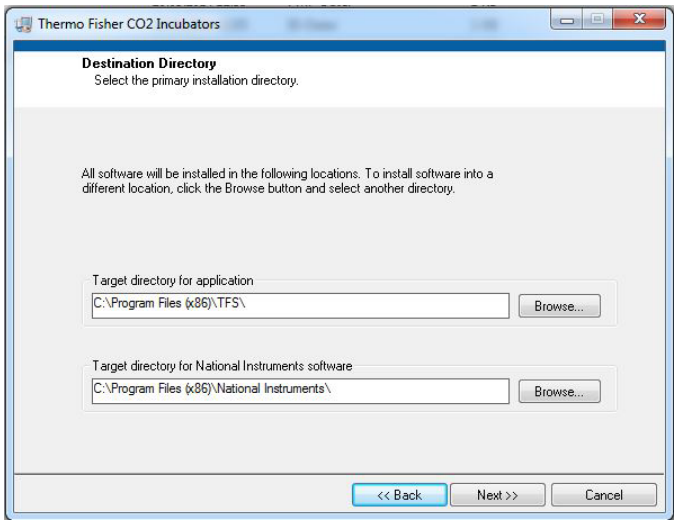
- Reading and archiving error messages (error logger). The data sets are stored in the meta format *.CSV.
- Reading and archiving event entries (data logger). The data sets are stored in the meta format *.CSV.
- Creating a service file (servicefile) to be sent to the Technical Service of Thermo Fisher Scientific. The information of the service file is very useful for systematic troubleshooting. The data sets are stored in the proprietary format *.SRF.

Installing the *HERACELL VIOS 160i LK & HERACELL VIOS 250i LK*

1. Starting the installation routine:
- On the data CD in the subdirectory PROGRAMS, double-click on the file SETUP.EXE to open this file.



2. Locate the installation directory for the program.

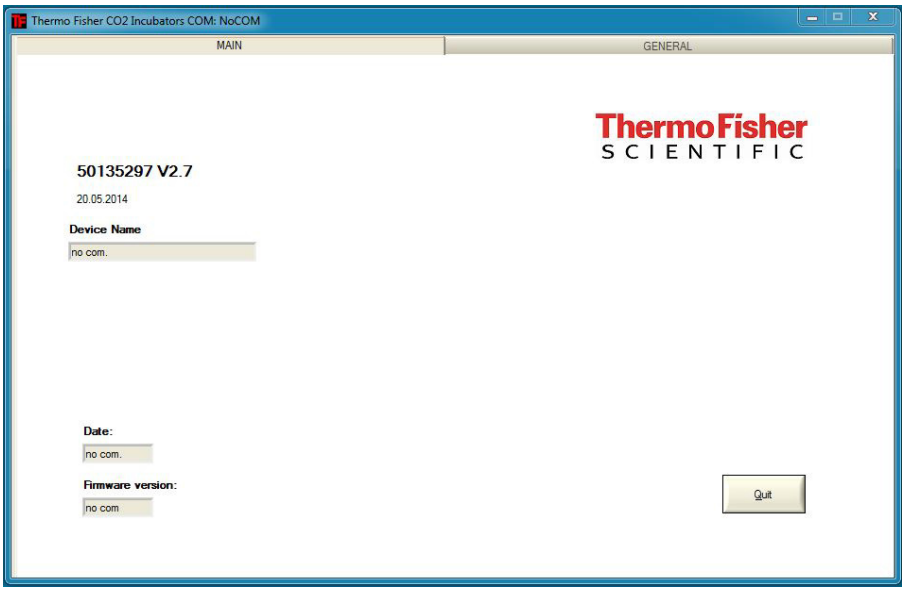


3. In the sequence of the given installation steps:
   - confirm the license agreement,
   - confirm the extent of installation,
   - after the message on the completeness of the installation has been displayed, close the installation surface and restart the computer.

Operating the *HERACELL VIOS 160i LK* & *HERACELL VIOS 250i LK*

User menu structure:
The user surface is divided into two main menus:

- MAIN with two functional elements:
  - Program version output: FIRMWARE VERSION
  - Switch for exiting the program: QUIT

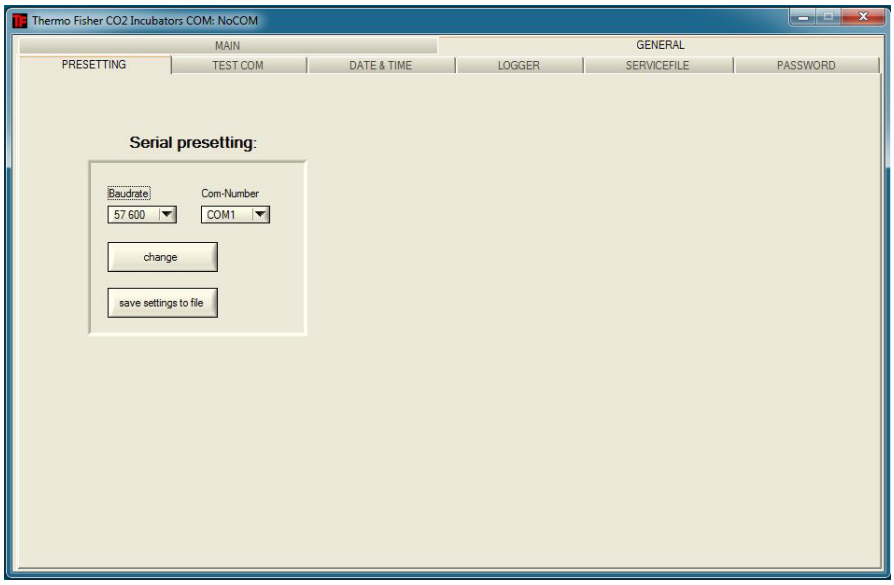


- GENERAL with the submenus:
  - PRESETTING for setting the transmission speed and for selecting the serial port,
  - TEST COM for testing the communication connection between PC and incubator,
  - DATE & TIME for adjusting date and time to the desired time zone,
  - ERROR LOGGER for reading the error messages,
  - DATA LOGGER for reading the event entries,
  - SERVICEFILE for reading error information and for creating a service file,
  - PASSWORD to prevent access to the device parameters of the incubator.

Function of the user menu:

PRESETTING

The submenu PRESETTING is used to set the transmission speed and to select the serial port.

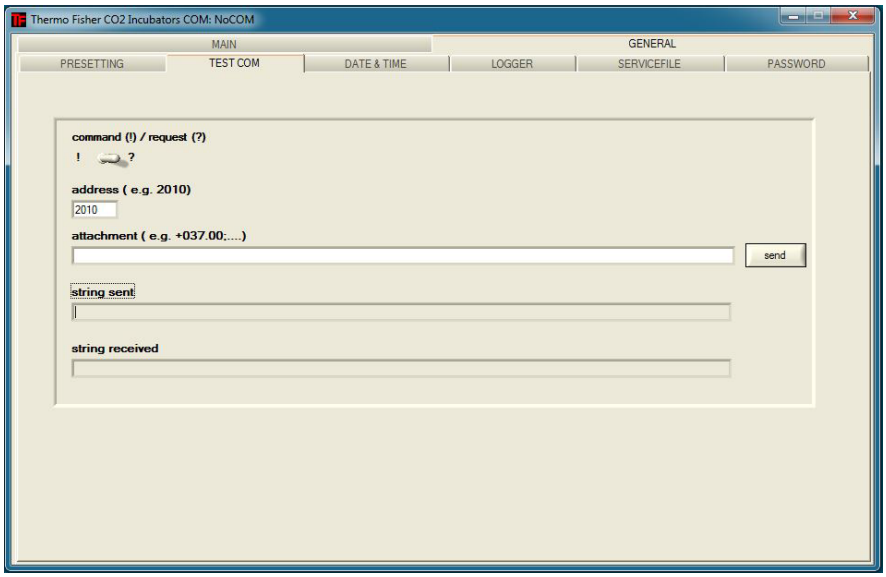


1. Select a transmission speed within the range of 9,600 to 115,200 baud.
2. Select the serial port of the PC. If the USB driver is installed, the (virtual) Com Port assigned to the USB port can be selected (see “USB Interface“ on page 12-1).
3. Accept the settings:
   - Press the CHANGE key.
4. Save the settings (in an INI file):
   - Press the SAVE TO FILE key.

Note Transmission speeds:
The transmission speed settings in the user menu PRESETTING and of the device must be identical!

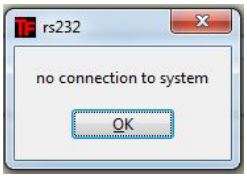
TEST COM

The submenu TEST COM is used for testing the communication connection with the settings defined in the submenu PRESETTING.



1. Example of a query for the currently measurable temperature values of the incubator:
- Query: ? (default, not changeable)
- Address: 2010 (Address temperature value: set value, actual value, reference value)

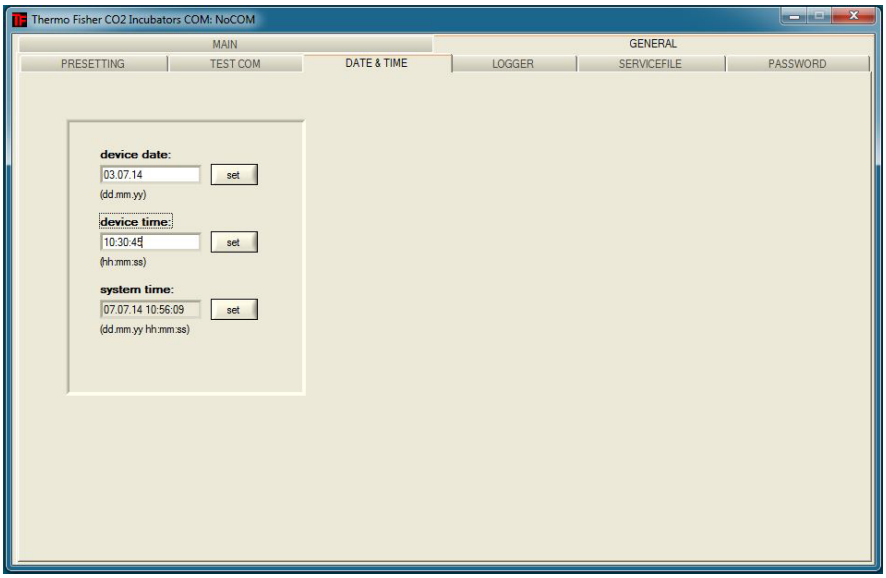
2. Send the query to the incubator:
- Press the SEND key.
- If the incubator returns a response string, the communication connection to the incubator has been established.
- If a connection cannot be established, an error dialog is displayed:



- 3. Exit the error dialog:
- Press the OK key.

DATE & TIME

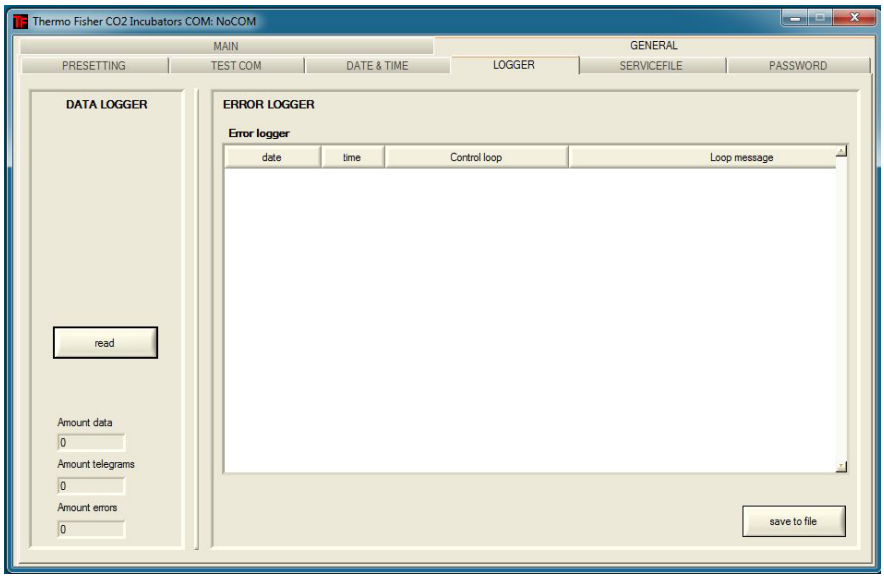
The submenu DATE & TIME is used for adjusting date and time to the desired time zone.



1. Data in the two text boxes must be entered in the format DD.MM.YY (day, month, year).
2. Accept the input data:
   - Press the SET key.

ERROR LOGGER

The submenu ERROR LOGGER is used for reading the error messages into the text box of the user surface.



The data sets can be stored in the metaformat *.CSV.

- Saving data sets as files:
- Press the SAVE TO FILE key.

DATA LOGGER

The submenu DATA LOGGER is used for reading the event entries into the text box of the user surface.

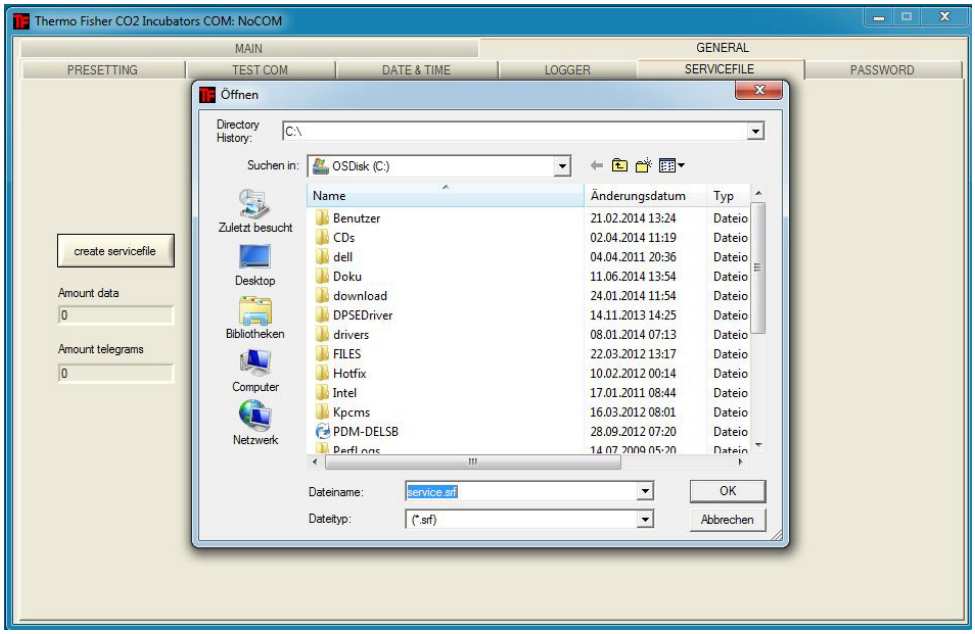
The data sets can be stored in the metaformat *.CSV.

1. Read the data sets:
- Press the READ key.

2. The progress of the data transmission is indicated in the three text boxes:
- AMOUNT DATA: Total number of transmitted data sets.
- AMOUNT TELEGRAMS: Therein the number of transmitted event entries.
- AMOUNT ERRORS: Therein the number of transmitted error messages.

Note Duration of the data transmission:
As the data logger can contain up to 10,000 data sets, the data transmission to a PC may take some time.

SERVICEFILE
The submenu SERVICEFILE is used for reading error informations and for creating a service file from it, saved with the proprietary extension *srf. The service file is transmitted to the Technical Service of Thermo Fisher Scientific for fault analysis.



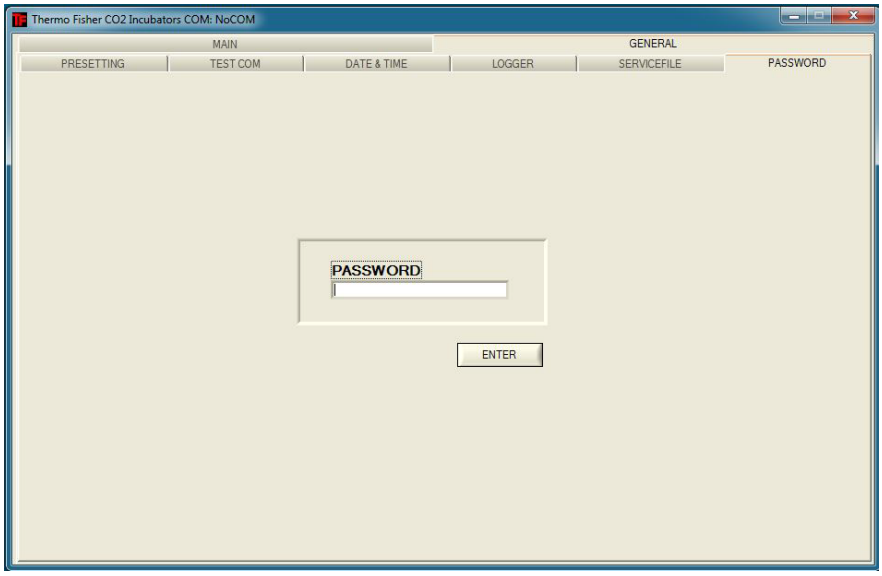
1. Create the service file:
- Press the CREATE SERVICEFILE key.
- Define file name and saving directory in the Windows dialog box.

2. Start saving process:
- Press the OK key.

Note Duration of the procedure:
The compilation of device informations and the creation of the service file may take some time.

PASSWORD

The submenu PASSWORD can only be accessed by the service personnel of Thermo Fisher Scientific.



Device Log

Please list carried out works here:

Device type:		Part No.:	
Serial number:		Service number:	
Location:		Operator's note:	

Work carried out:	Comments:	Date	Signature

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6-door Gas Tight Screen for Cell Locker

The 6-door gas tight screen for Cell Locker is a segmented inner door concept designed for the Cell Locker system.

The 6-door gas tight screen for Cell Locker divides the existing interior of the CO_2 incubator into 6 sample rooms (Cell Locker). In order to be able to remove samples, glass doors (passage openings) are provided in the front plate, which can be opened and closed separately.



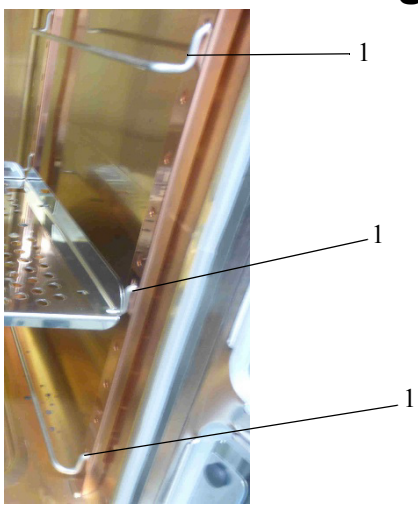
6-door gas tight screen for *CELL LOCKER*



CELL LOCKER

Note Performance Change
Due to the design of the 6-door gas tight screen the performance of the incubator changes, see Technical Data.

Installation of the Shelving



Insert the shelf supports (1) in the lower, center and upper **rectangular** holes of the support rails.

In the upper and center position place the perforated shelves with the unseparated guiding rails.

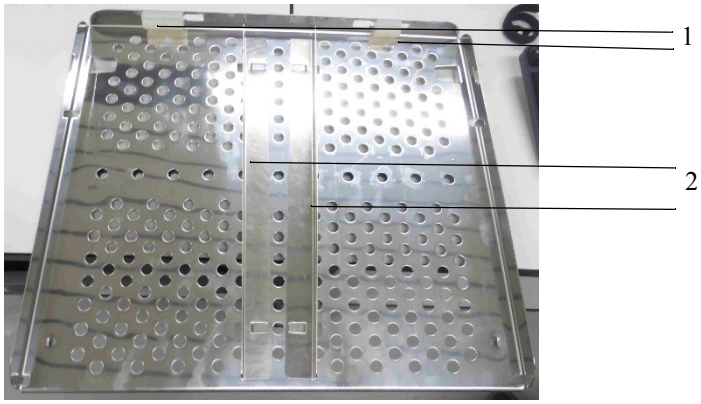


Figure: Perforated Shelf with Unseparated Guiding Rails

Do not remove silicone stoppers (1).

Before the perforated shelf with unseparated guiding rails can be placed, the guiding rails (2) must be slotted in.

The guiding rails can be removed, if necessary.

Place the perforated shelf with the separated guide rails (1) and middle openings in the lower position.

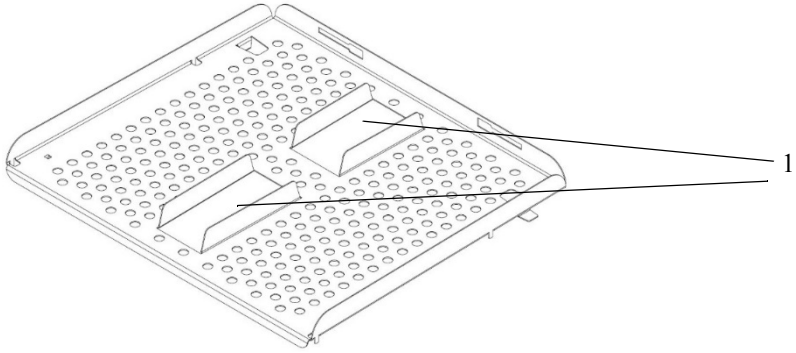


Figure: Perforated Shelf with Separated Guiding Rails for the Lower Position

This guiding rails cannot be removed.

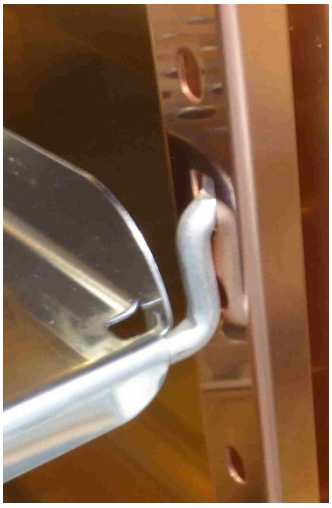


Figure: Perforated Shelf Installation

Place the perforated shelves, so it snaps in behind the rail. The metal tab underneath the shelf needs to be fixed behind the rail for door closure.

Close the 6-door gas tight screen.

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Operating Instructions

Cell Locker

50155007 Revision C May 2021



Preface

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1. General notes

1.1 Explanation of safety information and symbols

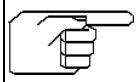


Warning
Indicates a hazardous situation which, if not avoided, could result in death or serious injuries.



Caution
Indicates a hazardous situation which, if not avoided, could result in minor or moderate injuries.

Notice
Indicates a situation which, if not avoided, could result in damage to equipment or property.

	In chapters of the instruction manual which deal with safety, this icon appears under the title of the chapter. Displayed on the equipment, this icon denotes that special attention must be paid to the information given in the instruction manual or accompanying documents.
	Is used for application hints and useful information
	Harmful liquids!
	Fire hazard!
	Toxic substances!
	Wear safety gloves!
	Wear safety goggles!
	Wear breathing protection!

1.2 Safety notes

The *CELL LOCKER* may only be used by instructed personnel.

The present operating instructions, applicable safety data sheets, hygiene guidelines and the corresponding technical rules issued by the operator shall be used to create written procedures targeted at personnel working with the subject matter device, detailing:

- the decontamination measures to be employed for the *CELL LOCKER* and the accessories used with it,
- the safety precautions to be taken when processing specific agents,
- wearing protective equipment when handling e.g. microbiological and biological samples,
- the measures to be taken in case of accidents,
- drying time after decommissioning, as Transport 2 hours,
- working according to GLP - Good Laboratory Practice.

1.3 Operational Safety Rules

Observe the sample weight limits as a whole and its shelving in particular.

Check the door seal every six months for proper sealing performance and possible damage.

Do not process any samples containing hazardous chemical substances that may be released into the ambient air through defective seals or may cause corrosion or other defects.

1.4 Warranty

Thermo Fisher Scientific warrants the operational safety and functions of the *CELL LOCKER* for one year only under the condition that:

- the *CELL LOCKER* 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 Fisher Scientific are used (third-party spares without Thermo Fisher Scientific approval void the limited warranty),
- inspections and maintenance are performed at the specified intervals,
- an operation verification test is performed after each repair activity.

The warranty is valid from the date of delivery of the *CELL LOCKER* to the customer.

1.5 Intended Purpose

1.5.1. Correct Use

The ***CELL LOCKER*** is intended for use in laboratory equipment, which among others is used for the preparation and cultivation of cell and tissue cultures for research applications.

The maximum Autoclave temperature is 15 minutes at 121°C (250 °F) with fast exhaust.

1.5.2. Incorrect Use

Do not use tissues, substances or liquids that:

- are easily flammable or explosive;
- release vapor or dust that forms combustible or explosive mixtures when exposed to air;
- release poisons;
- release dust;
- exhibit exothermic reactions;
- are pyrotechnical substances.

Do not pour any liquids on the bottom of the interior surface or into a collecting basin inside the unit.

The *CELL LOCKER* is not for use in Medical Devices.

2. Delivery of the device

2.1 Scope of delivery

Description	Pcs.
CELL LOCKER	1
Membrane filter	2
Work tray with cover	1
Consumables kit	1
Operating instructions	1
Summarized safety instructions	1

2.2 Acceptance inspection

After the *CELL LOCKER* has been delivered, check the delivery immediately for:

- completeness,
- possible damage.

If components are missing or damage is found on the device or the packaging, please contact the carrier, as well as the customer service, immediately.

3. Description of the device

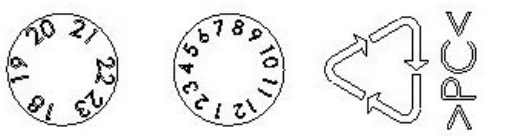
3.1 Description

The *CELL LOCKER* consists of a polycarbonate chamber with two membrane filters, which are permeable to water vapor and gas, but are impermeable to microorganisms.



Fig. 1. *CELL LOCKER*

Position	Name
1	work plate
2	membrane frame with filter
3	gasket
4	latch
5	cover
6	handle knob



Production year | Production month | Polycarbonate Makrolon 2528

Fig. 2. Bottom marks

3.2 First use

When using the first time, clean and disinfect the *CELL LOCKER*.

Note
Clean the *CELL LOCKER* before inserting the membrane frame with filter.

Warning
The *CELL LOCKER* must be removed before the incubator is sterilized.

3.3 Operation

The *CELL LOCKER* can be placed into the incubator with 6-door gas tight screen with or without cover.

When inserting into a laboratory device make sure that the *CELL LOCKER* is not twisted.



3.4 Application versions

Depending on user preference, the *CELL LOCKER* can be modified to attach or remove the transport cover, using the consumables kit:

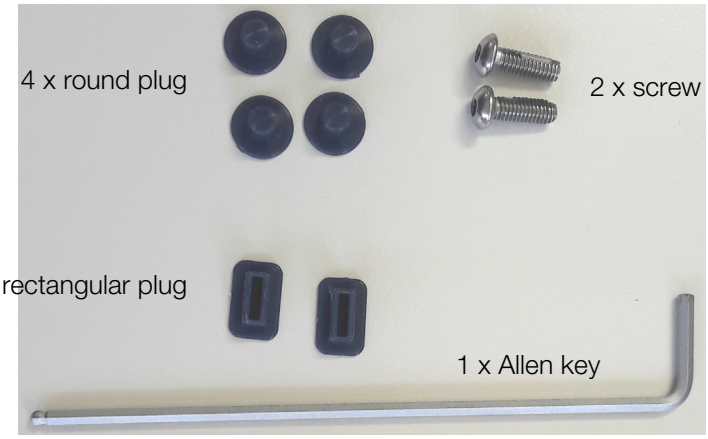


Fig. 3. Consumables kit

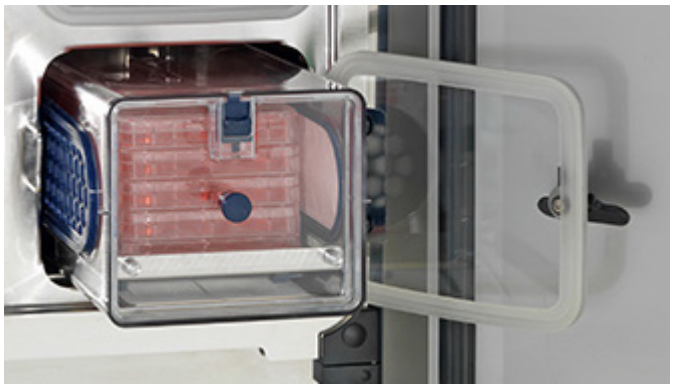
Cover can be attached to work tray with the Allen key, allowing protected transport.



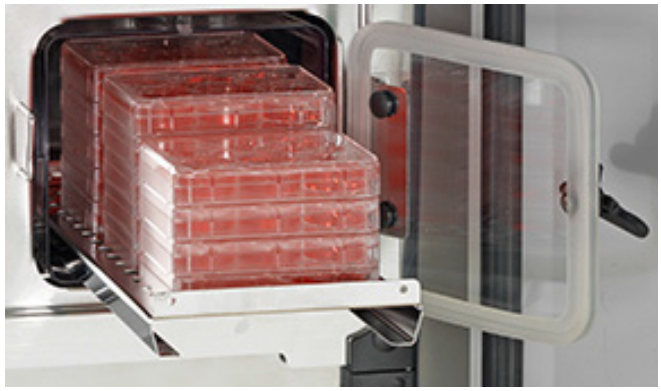
with attached transport cover



without transport cover



with cover to remove *CELL LOCKER* with cultures



without cover to remove cultures with single door access



samples access inside the chamber with transport cover

Note:
Attach cover for protected transport to biosafety cabinet or to another incubator or lab. Use of cover in the chamber may require two hand opening.

Fig. 4. *CELL LOCKER* options

4. Cleaning and disinfection

Before starting any work, the following safety hints should be followed:



Warning
Health hazard!



The surfaces of the work space may be contaminated. Contact with contaminated cleaning liquids may cause infections. Disinfectants may contain harmful substances. When cleaning and disinfecting, always observe the safety instructions and hygiene guidelines.



Wear safety goggles!



Wear safety gloves!



Wear breathing protection!

Observe the safety instructions of the disinfectant's manufacturer and the hygiene supervisor!

4.1 Cleaning



Caution
Incompatible cleaners!



Some of the ***CELL LOCKER*** components are made of plastic.

Solvents may attack plastics.

Strong acids or alkaline solutions may cause corrosion of plastics.



Caution
Moisture-sensitive components!

Do not spray cleaning agent onto the membrane filter of the ***CELL LOCKER***. When wiping the membrane filter frame make sure that no moisture contacts the membrane filter.

Remove dirt residues and deposit thoroughly using a solution of lukewarm water and mild detergent.

Wipe the surfaces and work plate with a clean cloth and clear water. Then, wipe the surfaces dry using a clean cloth.

4.2 Wipe/spray disinfection



Caution
Alcoholic disinfectants!



Disinfectants having a alcohol content of more than 10% may form, in combination with air, easily combustible and explosive gas mixtures.

When using such disinfectants, avoid open flames or exposure to excessive heat during the entire disinfection process.

Use such disinfectants only in adequately ventilated rooms.

After the disinfectant has been allowed to react, wipe the cleaned ***Cell Locker*** components thoroughly dry.

Observe safety regulations to avoid fire and/or explosion hazard caused by alcohol-containing disinfectants.



Caution
Chloride-containing disinfectants!



Do not use chloride-containing disinfectants.

Use only disinfectants that do not affect stainless steel.



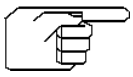
Warning
Decontamination or cleaning agents!

Thermo Electron LED GmbH or his agent is to be consulted, if there is any doubt about the compatibility of decontamination or cleaning agents.

1. Remove all samples from the work space and store them in a safe place.
2. Spray disinfectant onto the surfaces of the work space and of the accessories or wipe the surfaces clean using disinfectant. Do not spray disinfectant onto the membrane filters.
3. Allow time for the disinfectant to act as specified by the manufacturer.
4. Wipe off the chamber surfaces and the work tray using lukewarm water mixed with standard rinsing agents. Rinse completely using warm water.
5. Re-rinse the cleansed surfaces 3 to 5 times with autoclaved water to completely remove any cleaning agent residues.
6. After this, wipe the cleansed surfaces, air baffle and internals dry with a soft, sterile cloth.

4.3 Autoclaving

The *CELL LOCKER* can be autoclaved up to 15 minutes at 121°C with fast exhaust. Autoclaving at higher temperature is not recommended since the material cannot withstand higher temperature and its composition would be negatively affected.



Note
Remove the membrane frame with filter before autoclaving the *CELL LOCKER*.

5. Service

Any service work should be recorded.

5.1 Membrane filter replacement

Periodically check the membrane frame filters and at least once a year replace them.



Warning
Health hazard!



Wear safety gloves!

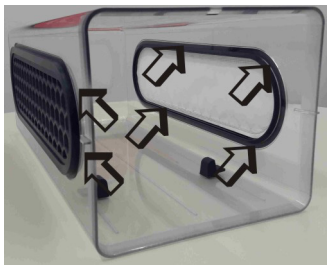


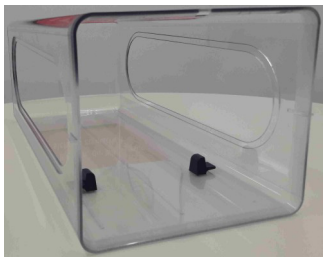
Wear breathing protection!

1. Pull out the work tray and take it out.



2. Press and remove the membrane frame from the inside.





3. Put the membranes into a plastic bag, autoclave them and dispose as hazardous waste.





4. Unpack the new membranes.



5. Insert the new membrane frame and press firmly in the radial direction.
6. Visually inspect from the inside, whether the gasket lip is correctly seated, if necessary press from the outside.







7. Insert the second membrane according to 5. and 6.

Warning Contamination hazard!

Damaged or improperly mounted membranes can contaminate the user or the environment!

8. Insert the work tray over the tilting stop and push into the interior.



5.2 Cover gasket replacement

Inspect the cover gasket periodically, e.g. monthly, for integrity, no damage and replace as needed.

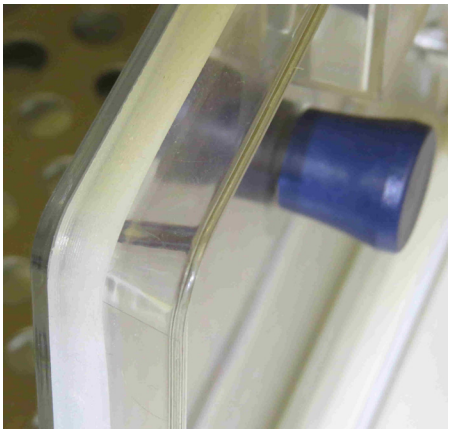
1. Pull out the work tray and take it out.



2. Remove cover gasket from the notch.



3. Insert a new gasket in the notch and take care that the gasket lip is outside.



Warning Contamination hazard!

Damaged or improperly mounted membranes can contaminate the user or the environment!

4. Insert the work tray and push into the interior.



6. Spare and wear parts

Description	Material-No.
Membrane frame‘s	50153148
Cover seal (6 pieces)	50156433
Work tray, stainless steel	50155808
Work tray, copper	50155809
Consumables kit	50161834
Cover *CELL LOCKER*	50156434

Only original spare parts and accessories that have been approved by Thermo Fisher Scientific used, third-party spares without Thermo Fisher Scientific approval void the limited warranty.

7. Disposal

Warning

Contamination hazard!

The device may have been used for treating and processing infectious substances. Therefore, the device and device components may have been contaminated. Prior to disposal, all device components must be decontaminated!

Clean the unit components thoroughly, then disinfect ,decontaminate or autoclave them (depending on application).

Attach a declaration of non-objection with details of performed decontamination measures to the items that are to be disposed of.

All device components can be disposed of after they have been decontaminated properly. Membrane filters must be disposed of in accordance with applicable national legislation and directives on the handling of hazardous waste.

Overview of the materials used

Component	Material
CELL LOCKER housing and cover	Polycarbonat, Makrolon 2858
Work tray stainless steel	1.4301+2B / Steel 10088-2
Work tray copper	Copper
Membrane frame	ABS
Membrane filter	PES Supor-200R Membrane 0,2 µm PALL

8. Technical Data

Description	Unit	Value
Outer dimensions (W x H x D)	mm	185 x 156 x 380
Inner space volume	l	approx. 5.4
Weight	kg	1.8
Loading capacity per work tray	kg	5
Operating temperature	°C / °F	4 - 55 / 39 - 131
Autoclave cycles		max. 12
Autoclave temperature	°C / °F	max. 121 / 250

Find out more at **thermofisher.com**

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