

Thermo Scientific

# Heracell Vios 160i CR/ Heracell Vios 250i CR

*CO<sub>2</sub> Incubator*

## Operating Instructions

50163129

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## Figures

# Preface

## General Notes

### Identification of the Device and of the Documentation

#### Identification of the Device

**Identification data**

|              |  |
|--------------|--|
| Device name: | CO <sub>2</sub> incubator  |
| Unit Name:   | <b><i>Heracell Vios 160i CR</i></b><br><b><i>Heracell Vios 250i CR</i></b> |

**Allocation of product documentation**

|                  |          |
|------------------|----------|
| Documents CD-ROM | 50163127 |
|------------------|----------|

**Certifications and quality audit:**

|                |                  |
|----------------|------------------|
| Certification: | CE Certification |
| Test mark:     | TÜV, cTÜVus, EAC |

## Instruction of the Operating Personnel

These operating instructions describe the CO<sub>2</sub> incubator ***Heracell Vios 160i / 250i CR***. The CO<sub>2</sub> incubator has been manufactured in keeping with the latest technological developments and is operationally safe. However, the device may present potential hazards, particularly if the device 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<sub>2</sub> 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 disinfection measures are to be applied for the device and accessories,
  - which protective measures apply when specific agents are used,
  - the measures to be taken in case of accidents,
  - which precautions and rules of conduct are necessary when entering and working in a clean room.
- 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 Fisher Scientific warrants the operational safety and functions of the CO<sub>2</sub> 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 Chambers 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.

## Preface

Explanation of Safety Information and Symbols

### Additional Symbols for Safety Information:



Wear safety gloves!



Wear safety goggles!



Harmful liquids!



Electric shock!



Hot surfaces!



Fire hazard!



Explosion hazard!



Suffocation hazard!



Tilting hazard!



## Symbols on the Device



CE conformity mark: confirms conformity according to EU Guidelines



TÜV test mark, 230 V devices



TÜV test mark, 120 V devices, 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<sub>2</sub> 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<sub>2</sub> content
- O<sub>2</sub>/N<sub>2</sub> content
- Relative humidity

Typically, this CO<sub>2</sub> 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.

This device is only to be operated indoors.

The device may only be operated by a laboratory technician or an instructed person.

A laboratory technician is a person with appropriate technical training or with many years of experience in the relevant field of work who, on the basis of his or her knowledge and experience, is able to recognize and avoid dangers that may emanate from laboratory equipment.

An instructed person is a person who has been instructed by a laboratory technician to avoid these hazards.

## **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.

The Cell Locker Chamber is not for use in medical devices.

## **Standards and Directives**

The device complies with the following standards and guidelines:

- Low Voltage Directive 2014/35/EU
- IEC 61010-1:2010+ AMD 2016, Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
- IEC 61010-2-010:2019, 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
- IEC 60529:2.1:COR 2018 (IP54)
- 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.

## Safety Notes on Gases



### Gases!

No other gases than those specified in the intended use may be used.

#### Note Installation work:

Any work on supply lines and pressurized gas containers, cylinders or containers used for storing CO<sub>2</sub> or O<sub>2</sub>/N<sub>2</sub> 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<sub>2</sub> and/or O<sub>2</sub>/N<sub>2</sub> 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<sub>2</sub> supply must be instructed about the particularities in the handling of CO<sub>2</sub> before starting their work:

- Correct operation of pressurized gas containers and gas supply systems,
- Obligation to report damages and shortcomings in CO<sub>2</sub> 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<sub>2</sub>)

Since CO<sub>2</sub> is rated as a harmful gas, certain safety instructions must be observed when the CO<sub>2</sub> incubator is started up and when the device is operated.



### Suffocation hazard!

Large amounts of carbon dioxide (CO<sub>2</sub>) released into the room atmosphere may cause suffocation. If CO<sub>2</sub> 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<sub>2</sub>)

O<sub>2</sub> is a gas that promotes combustion and may explode in combination with grease-containing materials.



Oxygen explosion!

Oxygen (O<sub>2</sub>) 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<sub>2</sub>) 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<sub>2</sub>)

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

Suffocation hazard!



Large amounts of nitrogen (N<sub>2</sub>) released into the room atmosphere may cause suffocation. If N<sub>2</sub> 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!

# Delivery of the Device

## Table of Contents

- “Packaging” on page 1-1
- “Examination on Receipt” on page 1-1
- “Standard Equipment Components Heracell Vios 160i / 250i CR” on page 1-2
- “Optional Equipment Components Heracell Vios 160i / 250i CR” on page 1-2
- “Optional Equipment Components Heracell Vios 160i / 250i CR” on page 1-3

## Packaging

The CO<sub>2</sub> incubator **Heracell Vios 160i / 250i CR** 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
- Pallet: Untreated wood

## Examination on Receipt

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.

## 1 Delivery of the Device

Standard Equipment Components Heracell Vios 160i / 250i CR

### Standard Equipment Components *Heracell Vios 160i / 250i CR*

| Quantity of components supplied   | Pieces |
|---|--------|
| Water reservoir cover panel   | 1      |
| Max. water level sensor   | 1      |
| Air duct, rear wall filter enclosure  | 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  | 2      |
| Exhaust filter for installation in rear wall filter enclosure - to be installed by the customer | 1      |
| Power cord  | 1      |
| CO <sub>2</sub> connecting hose set   | 1      |
| Operating instructions  | 1      |
| Quick-release connector with hose for water draining  | 1      |

### Optional Equipment Components *Heracell Vios 160i / 250i CR*

| Components delivered with oxygen supply control option | Pieces |
|--|--------|
| O <sub>2</sub> sensor head                             | 1      |
| O <sub>2</sub> connecting hose set                     | 1      |

## Optional Equipment Components *Heracell Vios 160i / 250i CR*

| Components                 | Pieces |
|----------------------------|--------|
| Threefold gas-tight screen | 1      |
| Sixfold gas-tight screen   | 1      |
| Cell Locker                | 6      |
| Refill Funnel              | 1      |

## Optional Equipment Components *Heracell Vios 160i / 250i CR*

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

## **1 Delivery of the Device**

Optional Equipment Components Heracell Vios 160i / 250i CR



# Installation of the Device

## Table of Contents

- “Environmental Conditions” on page 2-1
- “Site Ventilation” on page 2-2
- “Space Requirements” on page 2-2
- “Transport” on page 2-3
- “Stacking” on page 2-4
- “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

- The device must not be damaged.
- 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 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 amounts of heat must not be placed near the **Heracell Vios 160i / 250i CR**.

## Site Ventilation

When CO<sub>2</sub>/O<sub>2</sub>/N<sub>2</sub> is supplied, the work space 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<sub>2</sub>/O<sub>2</sub>/N<sub>2</sub> 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.

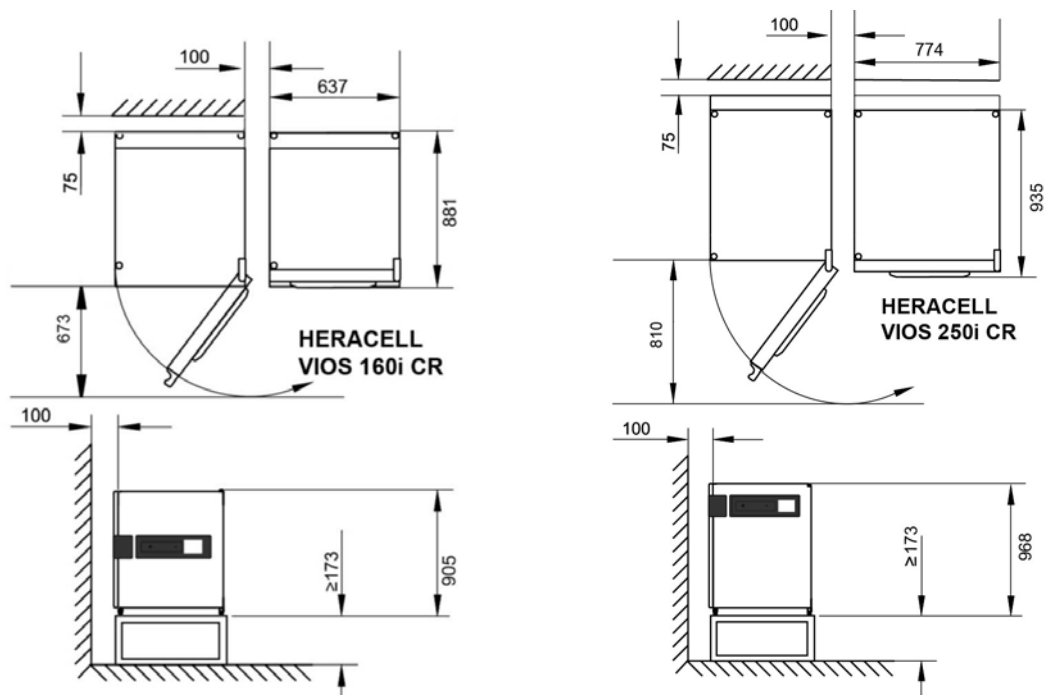
- Therefore, the **Heracell Vios 160i / 250i CR** must only be installed in rooms with sufficient ventilation.
- Do not install the device in room recesses without ventilation.
- The room ventilation should be a technical ventilation that complies with the national requirements for laboratories or some other suitable 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

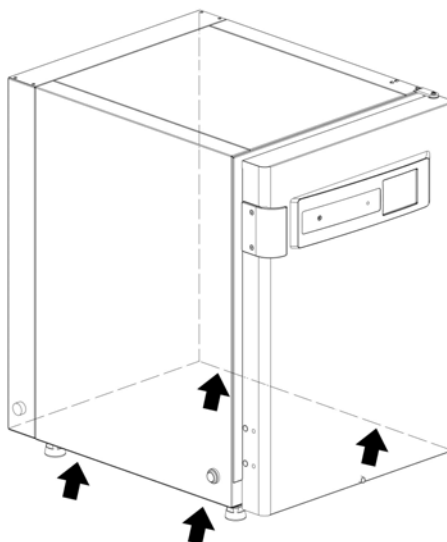
Figure 2-1. Device Dimensions

### 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 sixfold gas tight screen with Cell Locker must have a clearance to the wall directly at the hinge side of  $\geq 31$  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!

The weights without accessories are for **Heracell Vios 160i CR** - 95 kg and for **Heracell Vios 250i CR** - 119 kg.

To avoid injury through physical strain, such as strain trauma and slipped discs, do not attempt to lift the incubator alone! Use the required number of persons or lifting aids according to the weight.

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

The **Heracell Vios 160i / 250i CR** 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. The castors of the base rack are fitted with a locking brake.

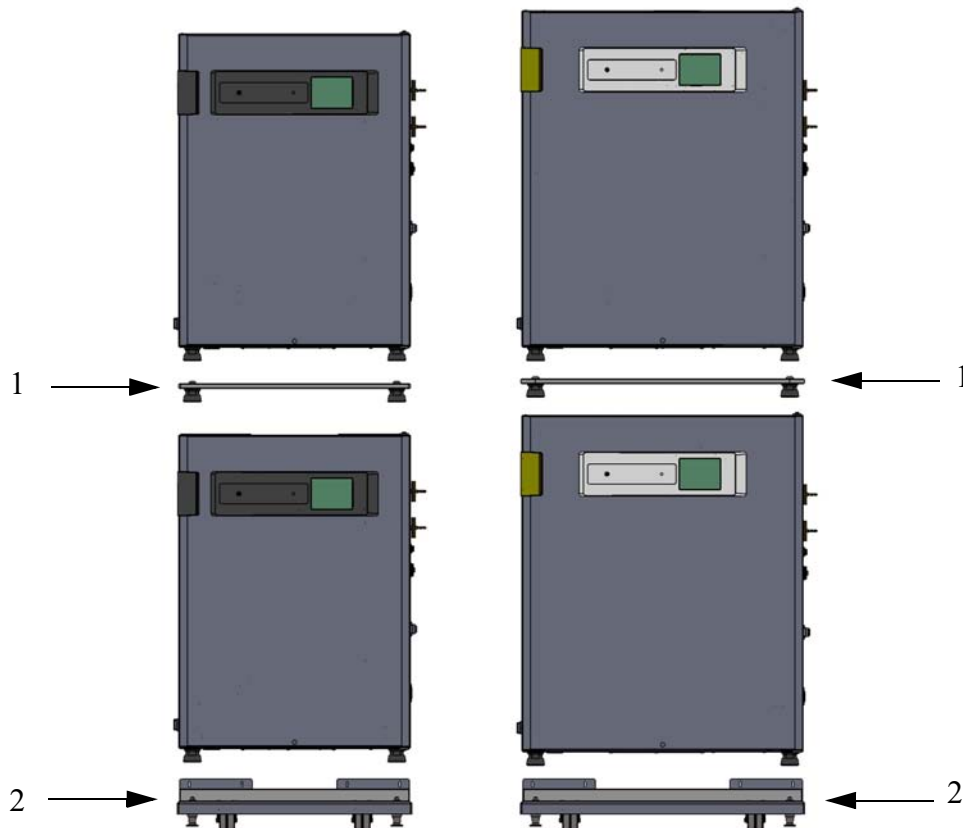
**Note**

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

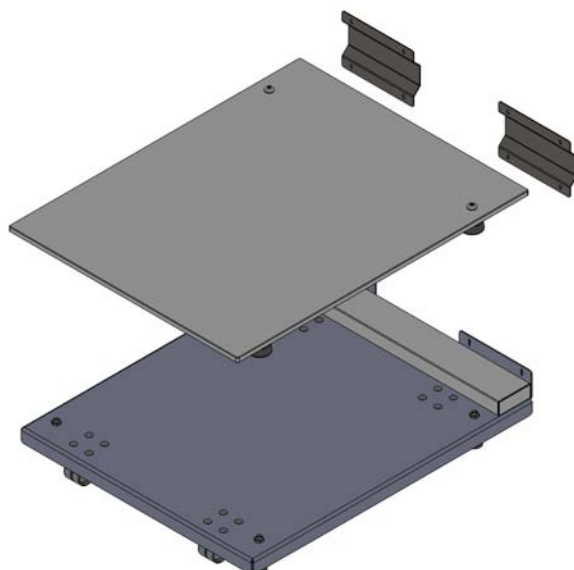
**Note** Moving stacked devices:

Before moving stacked devices, be sure to remove the support brackets!

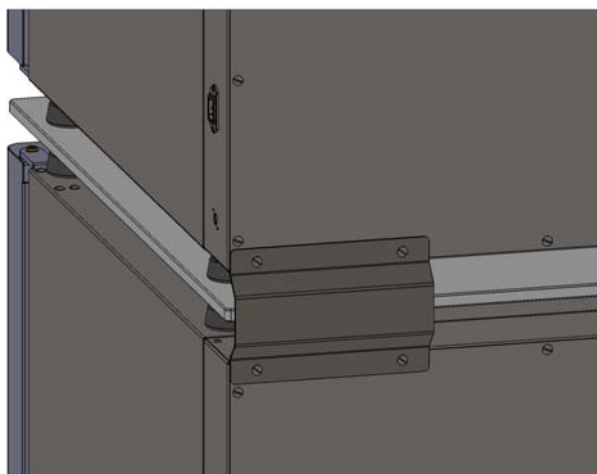
Stacked devices provided with a mobile base rack must only be moved inside rooms on even floors without any slopes.



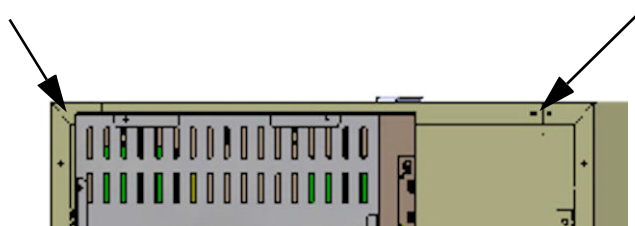
**Figure 2-3.** Stacking



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



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



**Figure 2-6.** Removing the Screws

1. Remove the 2 outer rear panel screws on both sides of the lower unit and store them.
2. Place the lower device on the mobile base rack on the attachment points so that the rear side rests against the connecting straps.
3. Using the outer rear panel screws on the left and right side, attach the device to the connecting straps, only tightening the screws to hand-tight.

4. Level the lower device using the device feet and tighten the outer rear panel screws.
5. Place the stacking adapter with its feet on the lower device and align it with the rear side.
6. Remove and retain the outer screws on the top of the lower device and the lower outer rear panel screws of the top device.
7. Place the top device on the centering lugs (160 L: 2 pcs., 250 L: 4 pcs.).
8. Tighten the 2 connecting straps to the lower device with 4 rear panel screws.
9. Screw the 2 connecting straps to the top device hand-tight with 4 rear panel screws.
10. Level the top device using the device feet and tighten the outer rear panel screws.
11. Move both stacked devices to the installation position.
12. Rotate out the supporting feet of the mobile base rack until the castors of the mobile base rack are no longer taking the load, for stability while the incubators are in use.
13. Level both stacked devices using the supporting feet of the mobile base rack.

#### Note

The mobile base rack is not a transport device, but only intended for moving the two stacked devices to the installation position and for cleaning purposes.



#### CAUTION Transporting stacked devices!

Stacking elements are not 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 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 CR** and **Heracell Vios 250i CR**, an adapter plate should be placed between the two devices for thermal separation.

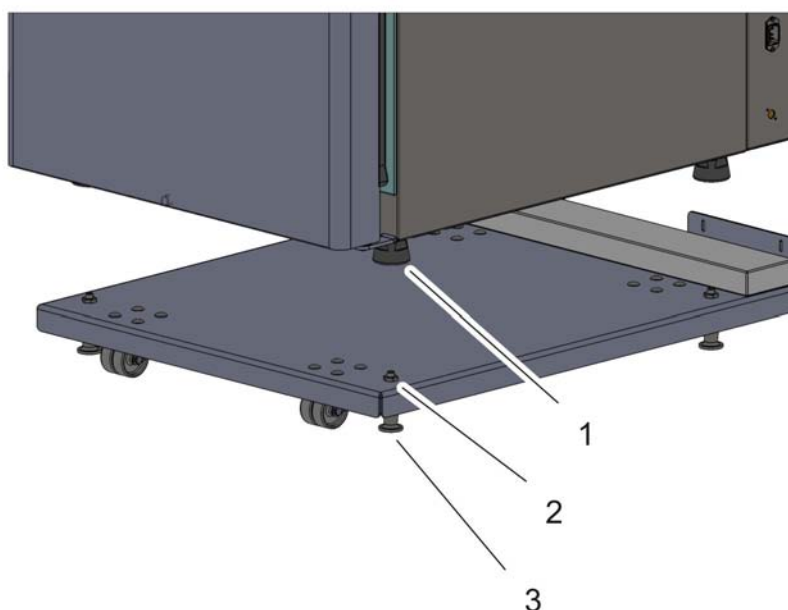
If stacked devices are operated at an ambient temperature of more than 28 °C, an overtemperature alarm is triggered on the upper device while the Steri-Run sterilization routine is operated on the lower device. Condensate formation may then occur on the upper device.

## Stacking Variants

|                                |                              |                              |
|--------------------------------|------------------------------|------------------------------|
| Possible stacking combinations | Bottom stacking adapter      |                              |
|                                | <b>Heracell Vios 160i CR</b> | <b>Heracell Vios 250i CR</b> |
|                                | <b>Steri-Cycle i160 CR</b>   | <b>Steri-Cycle i250 CR</b>   |
| Top stacking adapter           | <b>Heracell Vios 160i CR</b> | 50148171                     |
|                                | <b>Steri-Cycle i160 CR</b>   |                              |
|                                | <b>Heracell Vios 250i CR</b> | 50154522                     |
|                                | <b>Steri-Cycle i250 CR</b>   |                              |

For details see assembly instruction of stacking adapter kit.

## Installing the Support Stand with Castors



**Figure 2-7.** Support Stand with Castors without Supporting Feet (160i Unit)



**CAUTION** Providing Stability

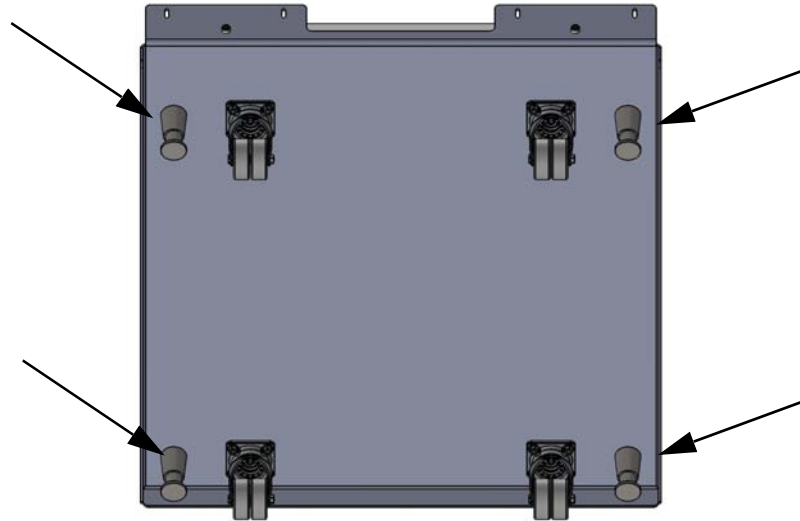
Make sure that the support stand castors are locked during operation of the device and that the castors are facing forward.

- Position unit with device feet [1] matching all 4 staple pads [2].  
For positioning, 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.
- Secure the support stand by unscrewing the 4 bolts [3].

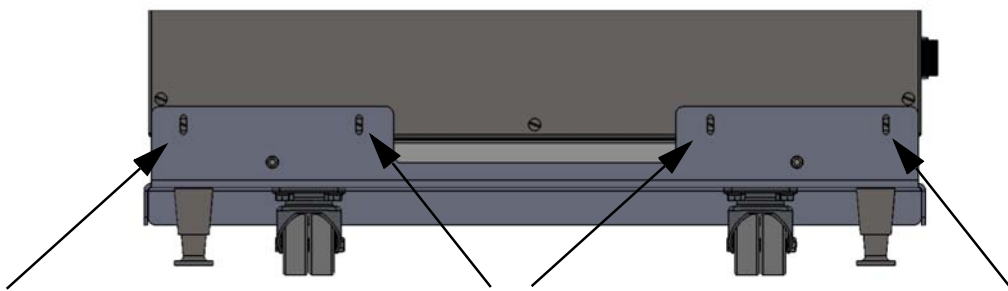
## Support Stand with Castors and Supporting Feet (160i and 250i Unit)

### Scope of Delivery

1 support stand, 4 screws M4x16



- Remove the 4 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 4 new supplied screws and tighten them.



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

#### Note

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

- Rotate out until the load is supported by the supporting feet and not by the castors.

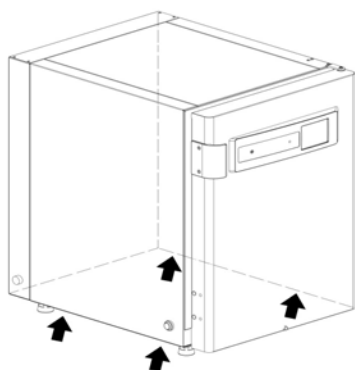


- Adjust the support stand by screwing the supporting feet with a pipe wrench until it stands level.



**CAUTION** Providing Stability

Make sure that the supporting feet are screwed out and adjusted with a pipe wrench after positioning the device 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 trauma 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**

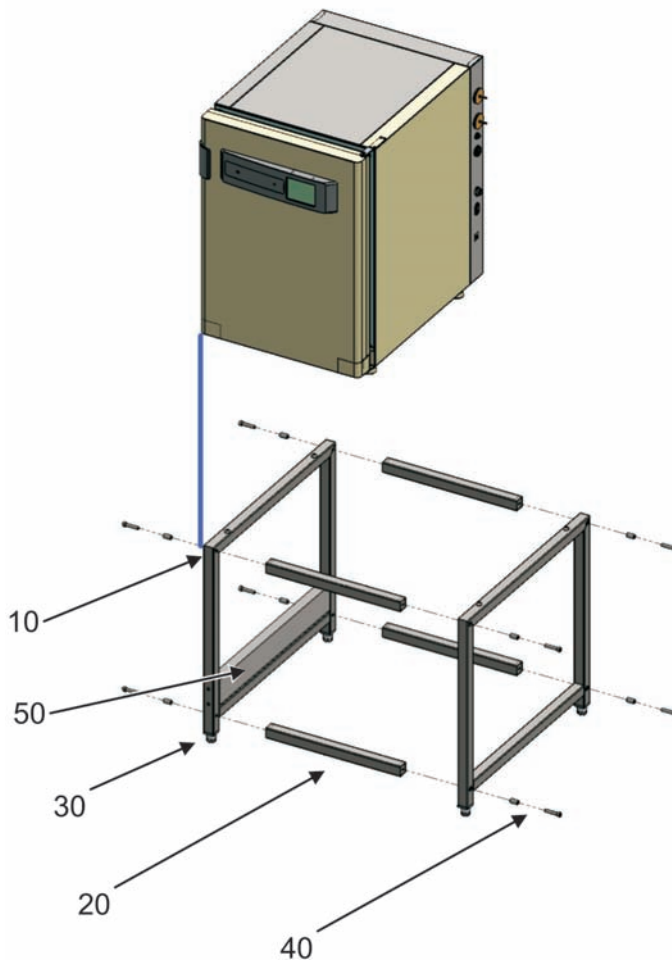
Moving units must be done very carefully. Sudden stops or accelerating the unit or units may result in tilting from the support stand with castors. Don't move the units with the front door open. The support stand with castors should only be used for the near vicinity of the installation site inside the laboratory, not for transportation purposes.

| Material Number | Description   |
|-----------------|---|
| 50161859        | Support stand H = 76 mm with castors for <b>Heracell Vios 160i CR</b> and Steri-Cycle i160 CR |
| 50162731        | Support stand H = 76 mm with castors for <b>Heracell Vios 250i CR</b> and Steri-Cycle i250 CR |

## Installing the Floor Stand, 780 mm

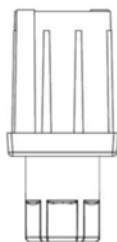
|    |   |   |
|----|---|---|
| 10 | Side parts  | 4 |
| 20 | Spacer  | 2 |
| 30 | Hinged foot with check nut, height adjustable     | 4 |
| 40 | Fillister head screw M10 x 40, with distance tube | 8 |
| 50 | Counter weight for 160 L units                    | 1 |
| 60 | Open-end wrench SW 24                             | 1 |
| 70 | Allen key SW 8                                    | 1 |

**Required tools: Open-end wrench SW 24, Allen key SW 8**



- Screw the support profiles (20) onto the side parts (10) with a socket head screw / spacer tube (40).
- Place the equipment with door handle side (blue line) upon the counter weight (50), the floor stand for 250L equipment has no counter weight.
- Level the sub-frame with an open-end wrench (60):

for Vios CR and Steri-Cycle CR SW 24



## Retrofitting/Modifications

The following components can be retrofitted to the standard version:

### ***Heracell Vios 160i CR***

- threefold gas-tight screen (the gas-tight screen is installed in place of the glass door),
- sixfold gas tight screen with or without Cell Locker,
- reinforced shelf

### ***Heracell Vios 250i CR***

- threefold gas-tight screen (the gas-tight screen is installed in place of the glass door),
- split inserts,
- reinforced shelf

**Note** Modifications:

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

## **2 Installation of the Device**

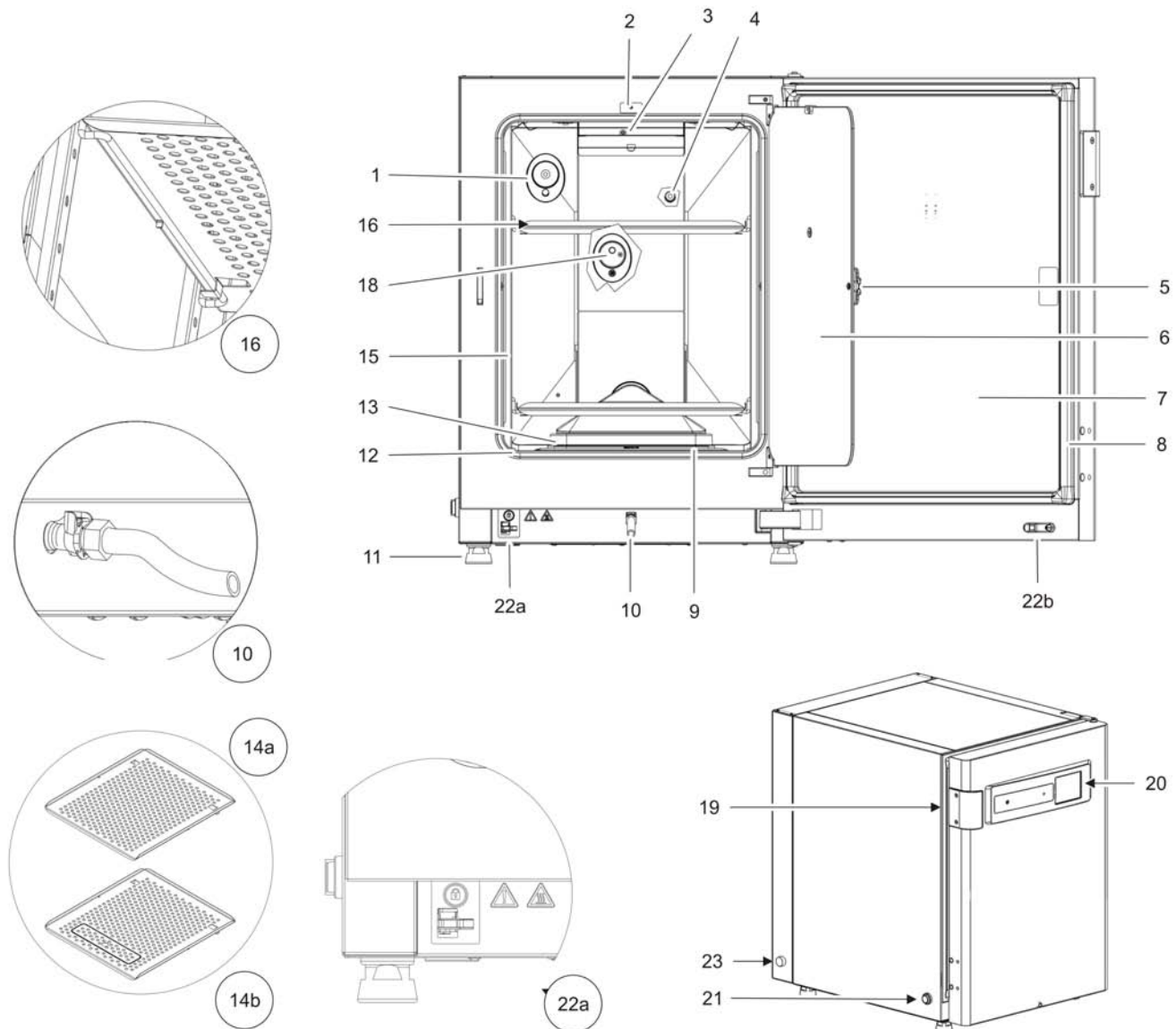
Retrofitting/Modifications

## Description of the Device

### Table of Contents

- “Heracell Vios 160i / 250i CR Front View” on page 3-2
- “Heracell Vios 160i / 250i CR Back View” on page 3-4
- “Safety Devices Heracell Vios 160i / 250i CR” on page 3-4
- “Workspace Atmosphere” on page 3-5
- “Door Switch” on page 3-10
- “Sensor System” on page 3-10
- “Supply Interface” on page 3-13
- “Workspace Components” on page 3-16

## Heracell Vios 160i / 250i CR Front View



**Figure 3-1. Heracell Vios 160i / 250i CR Front View**

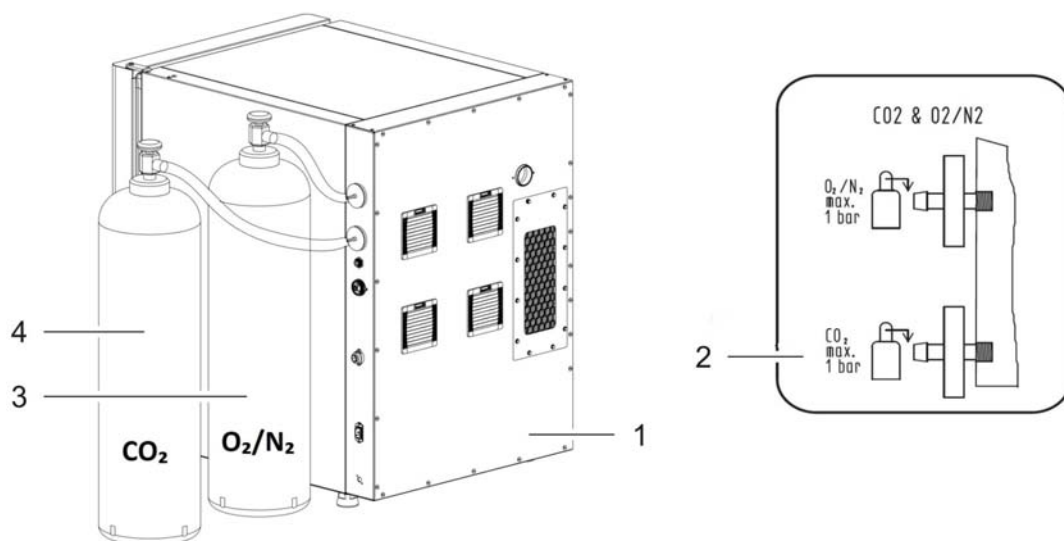
1. Pressure compensation opening /Access port with plug
2. Door switch for glass door
3. Temperature sensor
4. O<sub>2</sub> sensor (optional)
5. Door handle for the glass door or the gas-tight screen
6. Glass door or gas-tight screen (optional)
7. Device door
8. Magnetic door seal, replaceable
9. Prefilter

10. Water drain
11. Stand, height-adjustable
12. Glass door seal, replaceable
13. Airbox with seal and HEPA filter
14. Shelves
15. Support rail
16. Insert with shelf support
- 17.
18. IR CO<sub>2</sub> 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
23. Alarm indicator in the rear wall filter enclosure for the HEPA filter

### 3 Description of the Device

Heracell Vios 160i / 250i CR Back View

## Heracell Vios 160i / 250i CR Back View



**Figure 3-2. Heracell Vios 160i / 250i CR Back View**

1. Control box with supply interface for combined gas connection (optional) CO<sub>2</sub> and O<sub>2</sub>/N<sub>2</sub>
2. Diagram: CO<sub>2</sub> and O<sub>2</sub>/N<sub>2</sub> gas connection without gas monitoring
3. O<sub>2</sub>/N<sub>2</sub> gas cylinder
4. CO<sub>2</sub> gas cylinder

## Safety Devices *Heracell Vios 160i / 250i CR*

The device is equipped with the following safety devices:

- A door switch interrupts the CO<sub>2</sub>/O<sub>2</sub>/N<sub>2</sub> supply and the workspace heating when the glass door is opened.
- 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.
- An externally mounted light provides a visual warning of any malfunction of the internal particle extraction system.



## Workspace Atmosphere

In the workspace of the incubator, the particular physiological 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<sub>2</sub> concentration
- O<sub>2</sub> 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 CR** and **Heracell Vios 250i CR**: 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 K-Ohm-cm to 1 M-Ohm-cm 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  $\mu\text{S}/\text{cm}$  (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 adaptation 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 prefilter. The prefilter consists of a dual-layer wire mesh with a silicone frame and is autoclavable as well as heat-resistant. The prefilter must remain installed in the device during the Steri-Run sterilization routine, but needs to be removed for refilling the water reservoir.

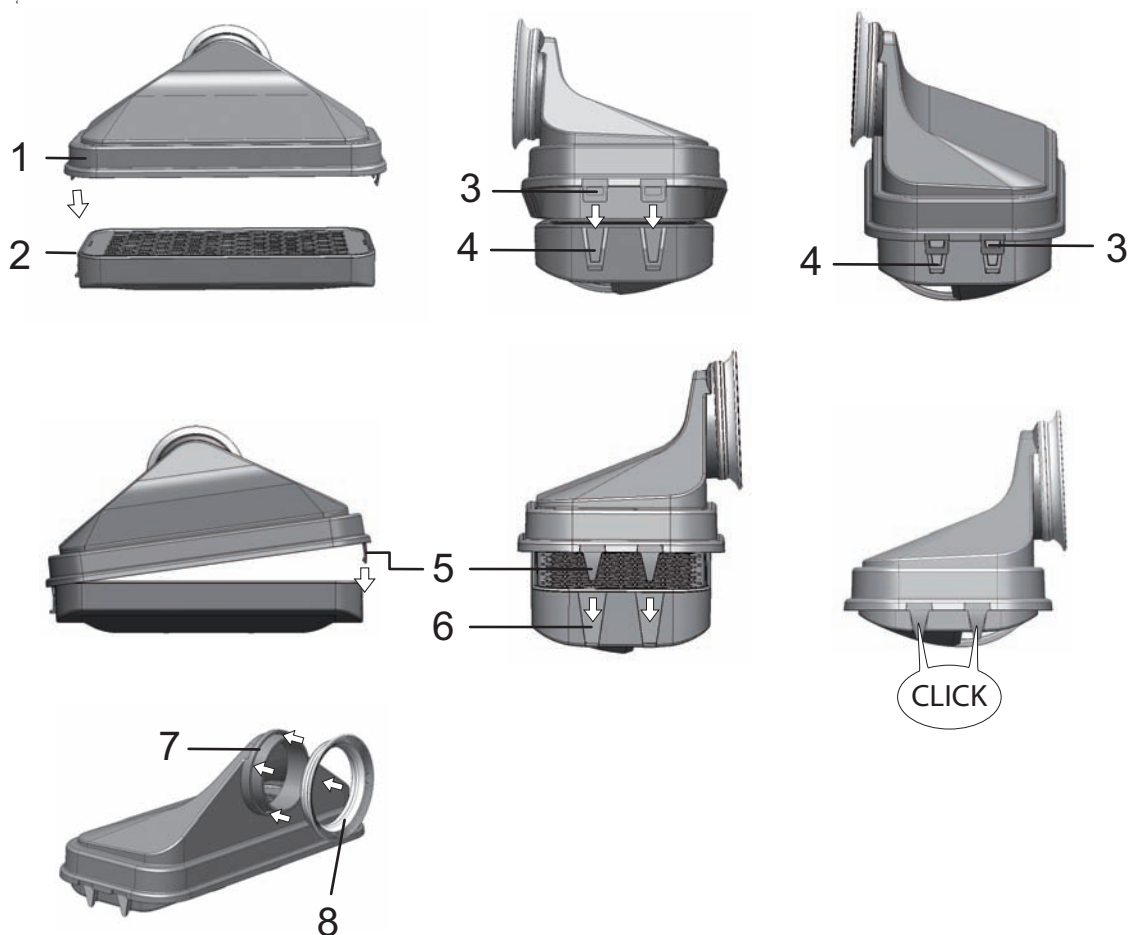
## HEPA Filter and Air Duct

There are 2 HEPA filters in the **Heracell Vios 160i / 250i CR** devices, one in the inner chamber and one in the rear wall filter enclosure which must be installed by the customer before starting up the device.

## HEPA filter in the inner chamber

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  $\mu\text{m}$  (HEPA filter quality).

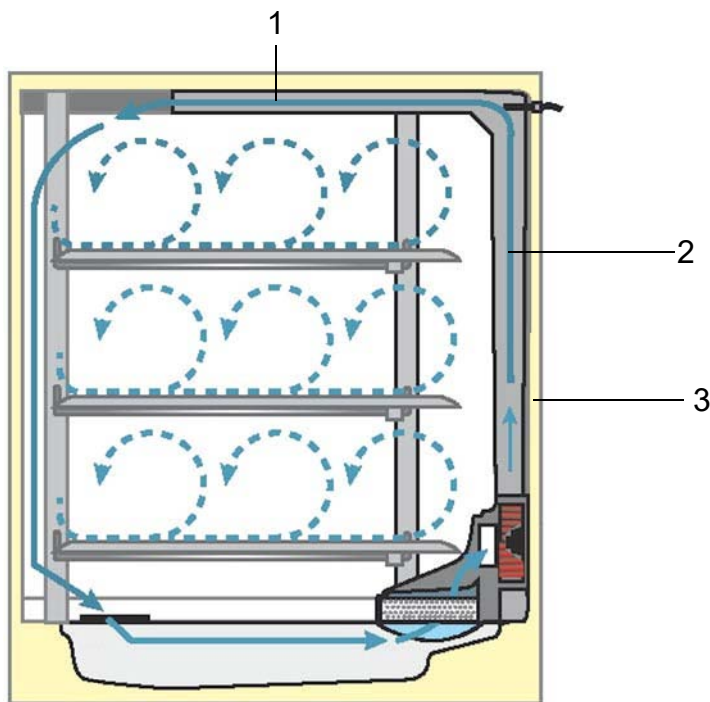
The HEPA filter (2/[Figure 3-3](#)) must be inserted into the airbox (1/[Figure 3-3](#)) from below. The airbox rests on the water reservoir cover panel (2/[Figure 4-6](#)) and is pushed against the air intake.



**Figure 3-3.** HEPA Filter and Airbox

Instructions for activating the HEPA filter monitor are given in section [“Activating / De-Activating the HEPA Filter:”](#) on [page 6-38](#).

The air duct feeds the flow of air from the fan along the rear wall (3/[Figure 3-4](#)) to the workspace ceiling, thus ensuring an optimum temperature distribution. At the same time, it directs the incoming stream of process gases into the workspace and ensures that the gases are optimally mixed and distributed uniformly.



**Figure 3-4. Air Duct**

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

1. Ceiling duct (1/[Figure 3-4](#))
2. Rear wall duct (2/[Figure 3-4](#))
3. Back wall of the workspace (3/[Figure 3-4](#))

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

## CO<sub>2</sub> Supply

To ensure the growth conditions for the cell and tissue cultures, the workspace is supplied with CO<sub>2</sub>. The pH of the bicarbonate-buffered culture media largely depends on the CO<sub>2</sub> content of the workspace atmosphere.

The CO<sub>2</sub> content of the workspace atmosphere can be controlled within a range of 0-20 %.

The supplied CO<sub>2</sub> must have one of the following quality characteristics:

- Purity 99.5 % min
- medical gas quality.

## O<sub>2</sub> Supply

If the CO<sub>2</sub> incubator is to be operated with more than 21 % oxygen, the workspace is supplied with oxygen (optional).

The O<sub>2</sub> 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<sub>2</sub> 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<sub>2</sub> concentration in the workspace atmosphere can be controlled depending on sensor technology.

## HEPA Filter and Exhaust Filter in the Rear Wall Filter Enclosure

A HEPA filter with 12 hexagonal bolts must be installed in the rear wall filter enclosure before the device is commissioned.

**Note**

Do not touch the surface of the HEPA filter.



Front View



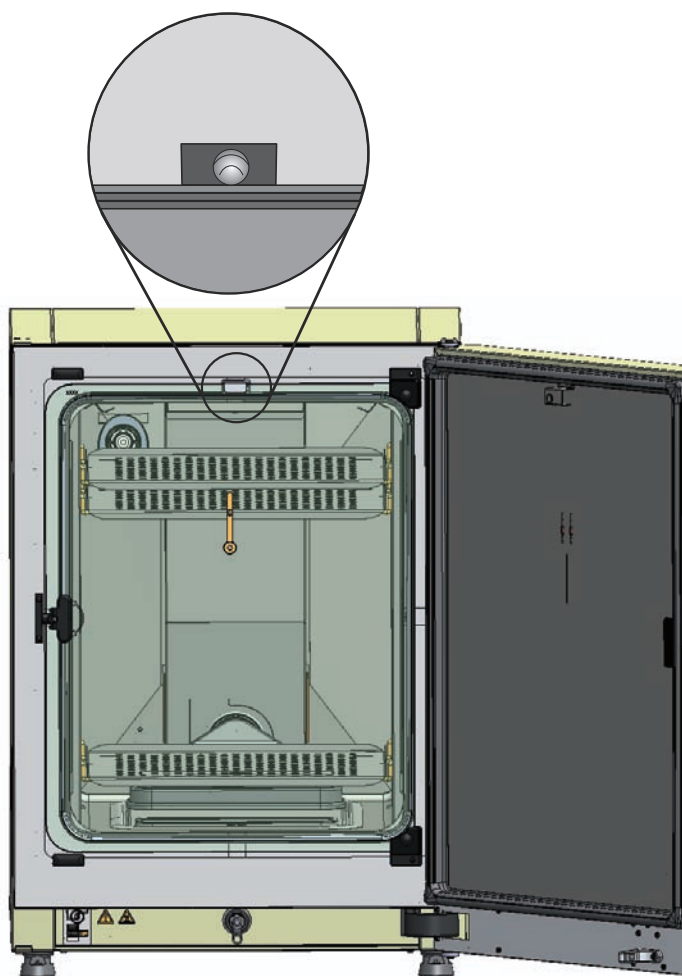
Back View



Exhaust filter

HEPA filter holder

## Door Switch



**Figure 3-5.** 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:

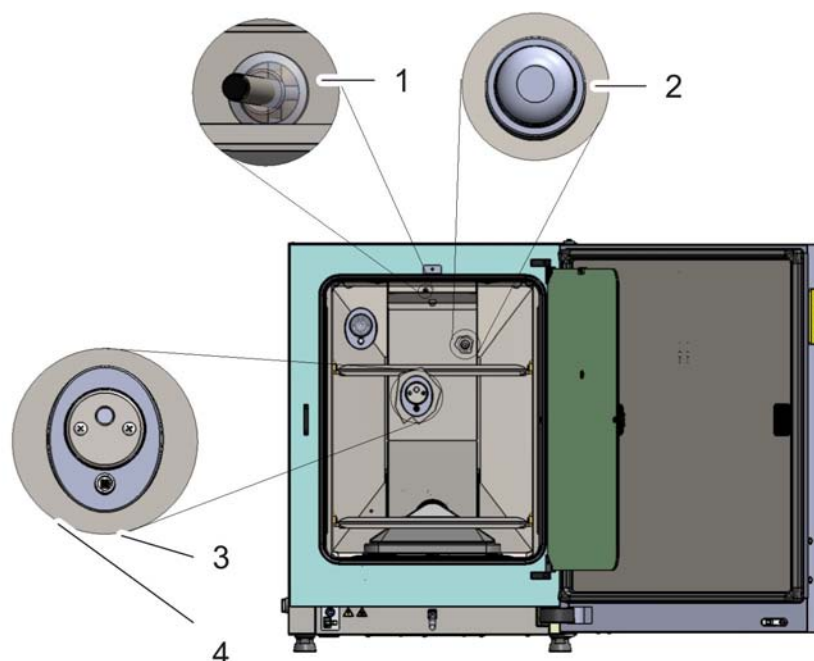
For devices with the optional gas-tight screen, the door switch function described above is activated when the outer door is opened.

## Sensor System

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

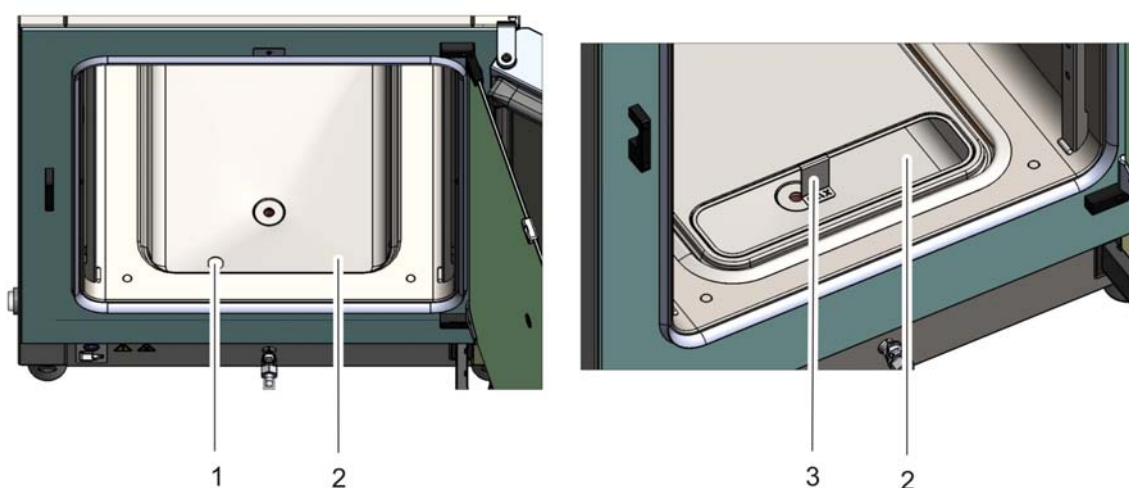
- Sensor for the acquisition of the workspace temperature and the overtemperature protection (1/[Figure 3-6](#)).

- O<sub>2</sub> sensor (optional) for the acquisition of the oxygen content in the workspace atmosphere (2/[Figure 3-6](#)).
- CO<sub>2</sub> sensor for the acquisition of the CO<sub>2</sub> content in the workspace atmosphere (3/[Figure 3-6](#)).
- rH sensor for monitoring the humidity of the workspace atmosphere (4/[Figure 3-6](#)).



**Figure 3-6.** Temperature, O<sub>2</sub>, CO<sub>2</sub> and Humidity Sensors

- The water level sensor (1/[Figure 3-7](#)) alerts the user when the water reservoir (2/[Figure 3-7](#)) 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 6-43](#)).



**Figure 3-7.** 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 3-7](#)).

### 3 Description of the Device

#### Sensor System

The sensor for the acquisition of the workspace temperature as well as the CO<sub>2</sub> sensor and the optional O<sub>2</sub> 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<sub>2</sub>/O<sub>2</sub>/N<sub>2</sub> supply. The fan ensures that the incoming gases are well mixed with the humidified air, thus providing for a uniform temperature and gas 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

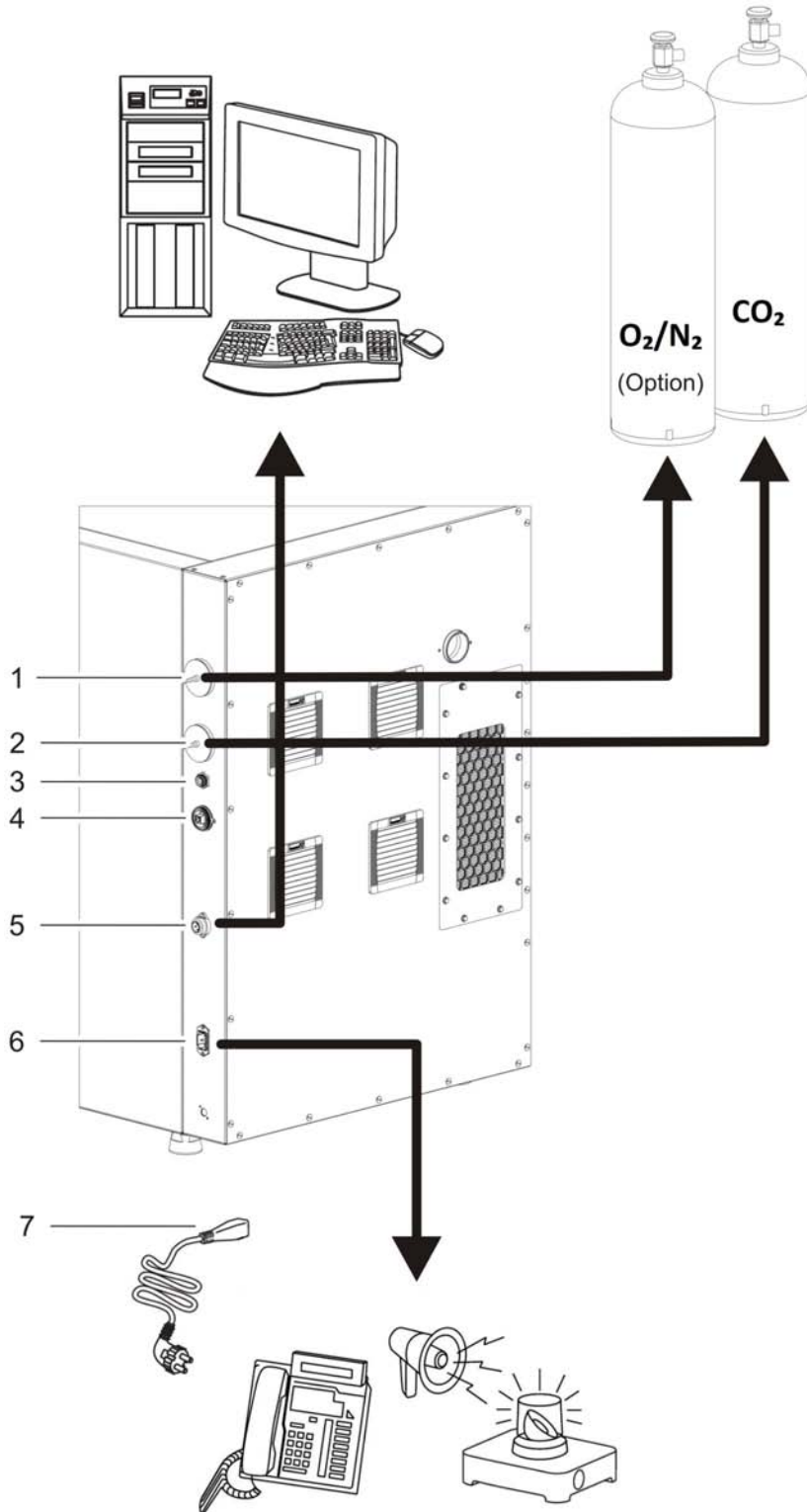


Figure 3-8. Interfaces (Right Side of Control Box)

### 3 Description of the Device

#### Supply Interface

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

Mounted on the right side (Figure 3-8) of the control box are the connectors for the basic functions of the unit as well as various optional elements:

1. O<sub>2</sub> connector (not available with CO<sub>2</sub> and O<sub>2</sub>/N<sub>2</sub> gas supply sources and simultaneous use of gas monitoring option)
2. CO<sub>2</sub> connector
3. 4-20 mA interface
4. USB interface
5. Alarm contact
6. Mains Connection
7. Connecting cable

## Gas Connection

The gas supply lines between the device and the gas supply system are connected using the supplied connecting hoses. CO<sub>2</sub> and O<sub>2</sub>/N<sub>2</sub> (optional) are supplied to the unit through dedicated connectors (1 and 2/Figure 3-8).

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.

The illustration shows the optional combined gas connection.

## USB Interface

The USB interface (4/Figure 3-8) allows for connecting the incubator to a computer. 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<sub>2</sub>/O<sub>2</sub>/N<sub>2</sub> concentration, error codes, etc.).

## 4-20 mA Interface

The 4-20 mA interface (3/Figure 3-9) converts the digital actual values displayed for temperature, CO<sub>2</sub> concentration, O<sub>2</sub> concentration (optional) 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-View 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...20 mA     |
| 2           | CO <sub>2</sub> concentration,  | 0.8 mA/%   | 0...20% CO <sub>2</sub> | 4...20 mA     |
| 3           | O <sub>2</sub> concentration*   | 0.16 mA/%  | 0...100% O <sub>2</sub> | 4...20 mA     |
| 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:

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

$I_0 = 4\text{m A}$ , MV = measured value (°C, % or rH%)

$I_{\max} = 20\text{m A}$ , 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    | Problem  |

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: CO <sub>2</sub> |
| 4       | Channel 2 Ground           |
| 5       | Channel 3: O <sub>2</sub>  |
| 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 (5/[Figure 3-8](#)).

**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 (6/[Figure 3-8](#)). 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 clean room conditions (clean room ISO Class 5) while at the same time having no negative impact on the stored cultures.

## Inner Container

The workspace of the incubator is designed to limit 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 an ISO Class 5 clean room air quality.

## Interior Container Materials

The standard version is equipped with an interior made of stainless steel or 100% copper.

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

The airbox for the HEPA filter is made of thermally resistant plastic material and must remain installed while the Steri-Run sterilization 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 sterilization.

**Note** Oxidation of copper components:

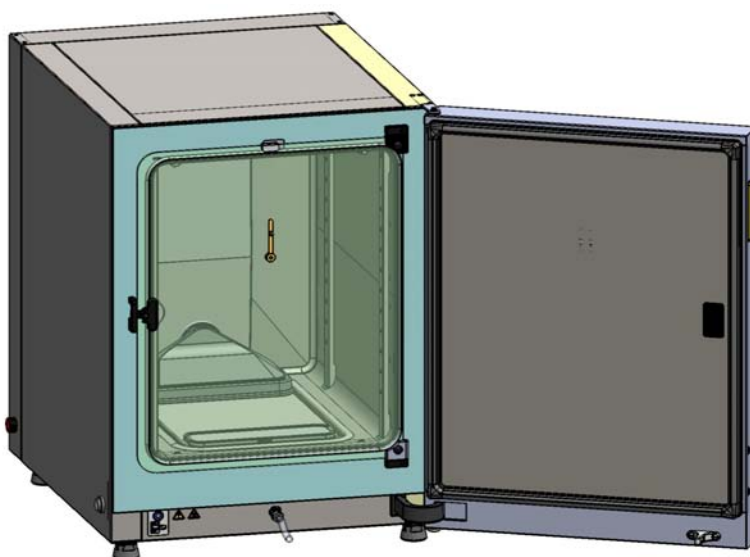
When exposed to heat and humid air, the copper material of the interior container will oxidize. This results in a discoloration of the copper components during the test run for checking the device functions.

Do not remove the oxide layer during routine cleaning as the 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 CR** and **Heracell Vios 250i CR** units is equipped with a single-piece door made of tempered safety glass.



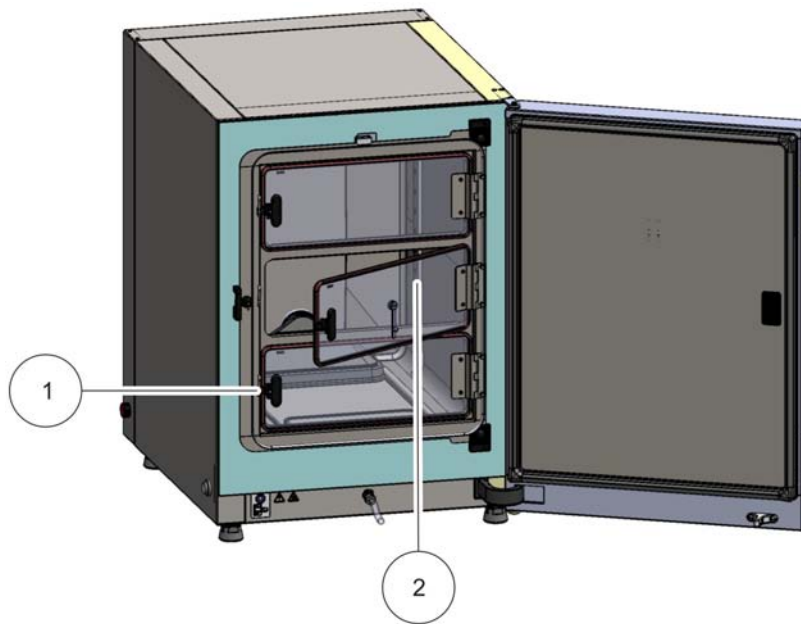
**Figure 3-9. Heracell Vios 160i / 250i CR with Glass Door**

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<sub>2</sub> concentration,
- O<sub>2</sub>/N<sub>2</sub> concentration,
- relative humidity.

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

- **Heracell Vios 160i CR:** Threefold gas-tight screen or sixfold gas-tight screen – with or without Cell Locker System (see Appendix) (see [Figure 3-10](#)),
- **Heracell Vios 250i CR:** Sixfold gas-tight screen.



**Figure 3-10. Heracell Vios 160i CR with Threefold Gas-Tight Screen**

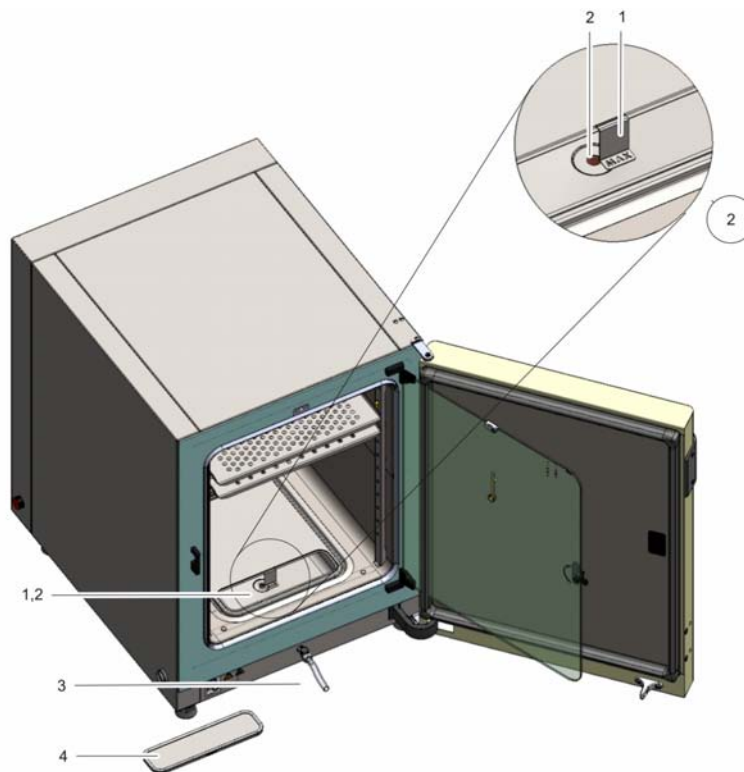
Each door of the gas-tight screen (2/Figure 3-10) is separately closed (1/Figure 3-10).

## Water Reservoir

The water reservoir is recessed into the interior floor and separated from the workspace by means of a cover panel. A drain (2/Figure 3-11) provided in the front section of the water reservoir allows for quickly draining the water through a fill and drain valve (3/Figure 3-11) located at the front section of the device.

Placed on the front section of the water reservoir cover is a prefilter (4/Figure 3-11). The prefilter consists of a dual-layer wire mesh with a silicone frame and is autoclavable as well as heat-resistant. The prefilter must remain installed in the device during the Steri-Run sterilization routine, but needs to be removed for refilling the water reservoir.

For additional instruction when filling with the sixfold gas tight screen, see [Appendix](#).

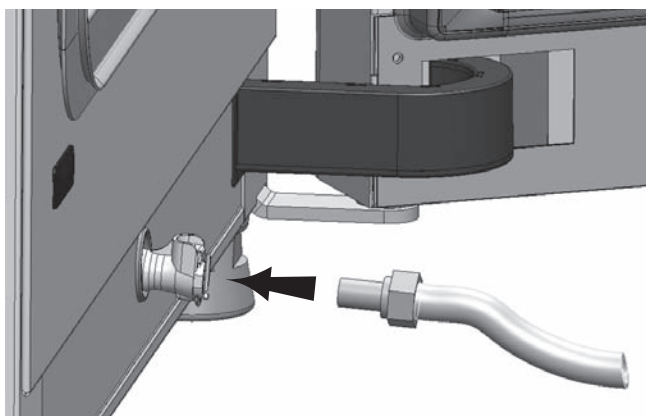


**Figure 3-11.** Water Reservoir

The water reservoir is monitored by the water level sensor described in section “[Sensor System](#)” on [page 3-10](#).

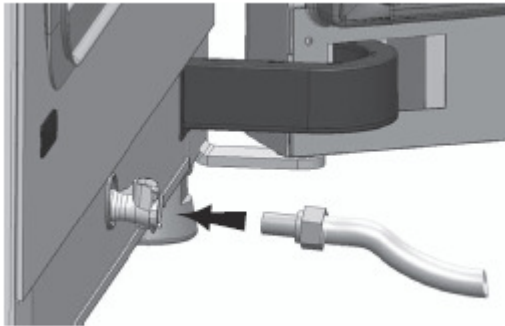
A fill level indicator with the punched-out word “MAX” (1/ [Figure 3-11](#)) is suspended above the water reservoir to indicate the maximum fill level. The maximum fill volume of the water reservoir is 3 liters.

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.



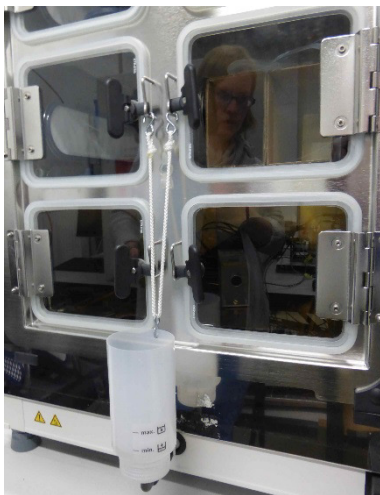
**Figure 3-12.** Fill and Drain Valve of Water Reservoir

## Water Filling



**Figure 3-13.** Fill and Drain Valve Incubator

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



**Figure 3-14.** Refill Funnel

Hang 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 filling with sterile distilled water. This may take up to several times.
- Keep adding until the maximum level indicator is reached.

## Heating System

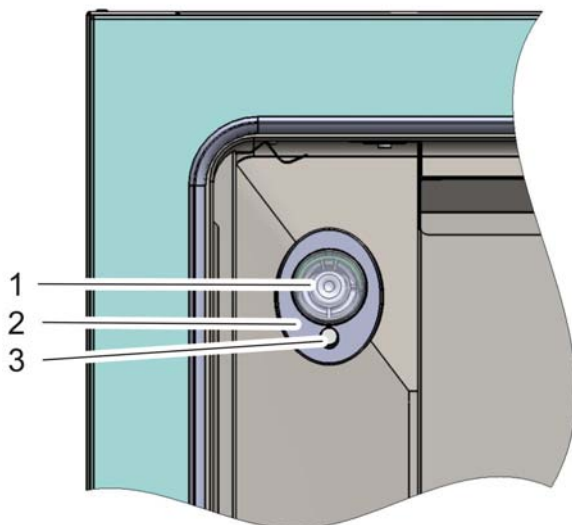
The workspace is heated by a surface heater system. The arrangement of the heating elements ensures that condensate formation above the water reservoir is prevented.

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 3-15.** Rear Panel Openings

The access port with insert (Figure 3-15 Ø 42 mm / 1.66 inch) can be sealed with a plug (1/Figure 3-15) and allows for feeding cables, tubes or additional sensors into the workspace of the unit.

The pressure compensation opening (3/Figure 3-15) 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**

Before starting the sterilization run, the two silicon plugs inside and outside the access port must be fitted on the access port.

The silicon plug on the outside should cover the free space inside the access port.

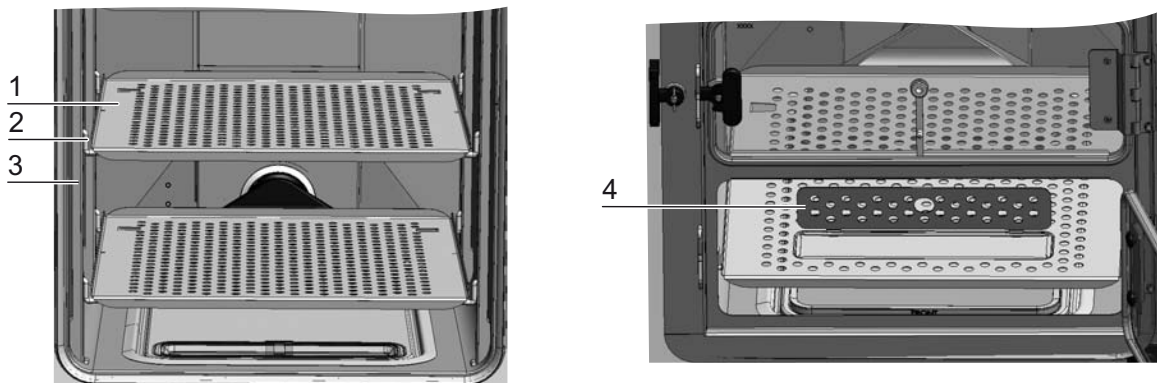
**Note** Operating conditions:

When accessories are to be operated in the workspace of the CO<sub>2</sub> incubator, the environmental 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:<br>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 3-16.** Shelf System Components

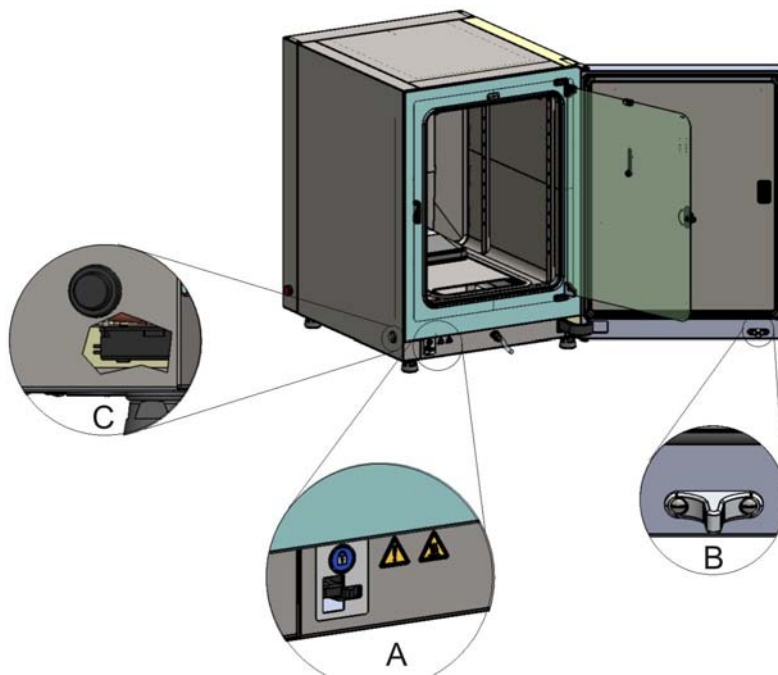
The support rails (3/[Figure 3-16](#)) of the shelf system are perforated every 42 mm (1.66 inch) so that the support hooks (2/[Figure 3-16](#)) can be inserted variably for any culture container size required. The shelves (1/[Figure 3-16](#)) have an integrated tilt protection and withdrawal stop. **Heracell Vios 250i CR** models come equipped with a single-piece bottom insert, as shown on the left side in [Figure 3-16](#), **Heracell Vios 160i CR** with a cutout for refilling (4/[Figure 3-16](#)). For details on using the shelf system, see “Start-up” on [page 4-1](#).

For additional instruction when using shelf with sixfold gas tight screen, see [Appendix](#).

## Electromechanical Door Lock

The electromechanical door lock consists of a rotary latch (detail A in [Figure 3-17](#)) 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 is a safety device that denies access to the incubator's workspace while the Steri-Run sterilization routine is running. It locks the door of the incubator as soon as the workspace temperature reaches, then surpasses 65 °C. When the sterilization routine ends, the door lock assembly releases the door lock shortly after the temperature has dropped below 65 °C.



**Figure 3-17.** 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 sterilization routine has been launched and active, 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. To reach it, remove the round cover inserted in the floor and replace it after unlocking. Detail C of [Figure 3-17](#) presents a breakout view through the side panel to illustrate the lever location.

### **3 Description of the Device**

Electromechanical Door Lock

# Start-up

## Table of Contents

- “Adapting the Unit to the Ambient Atmosphere” on page 4-1
- “Preparing the Workspace” on page 4-1
- “Installing the “MAX” Fill Level Indicator and the Prefilter” on page 4-2
- “Install the Air Duct” on page 4-4
- “Installing the Shelf System” on page 4-9
- “Mounting the Split Shelves (Optional) into the Heracell Vios 250i CR” on page 4-11
- “Gas Connection” on page 4-12
- “Mains Connection” on page 4-14
- “Connecting the USB Interface” on page 4-15
- “Connecting the Alarm Contact” on page 4-15

## Adapting the Unit to the Ambient Atmosphere



**CAUTION** Adapting the unit to the ambient atmosphere!

Prior to commissioning allow sufficient time for 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<sub>2</sub> incubator is not in a sterile state. Before the initial start-up, the device must be cleaned and disinfected.

Before the disinfection is performed, the following workspace components must be cleaned:

- Support rail

## 4 Start-up

### Installing the “MAX” Fill Level Indicator and the Prefilter

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

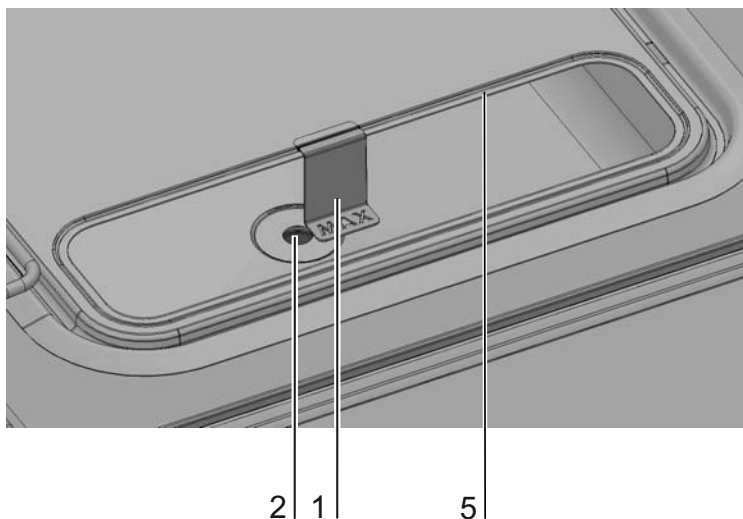
**Note** Disinfection:

For details about the cleaning and disinfection of the device see chapter “[Cleaning and Disinfection](#)” on [page 8-1](#).

## Installing the “MAX” Fill Level Indicator and the Prefilter

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

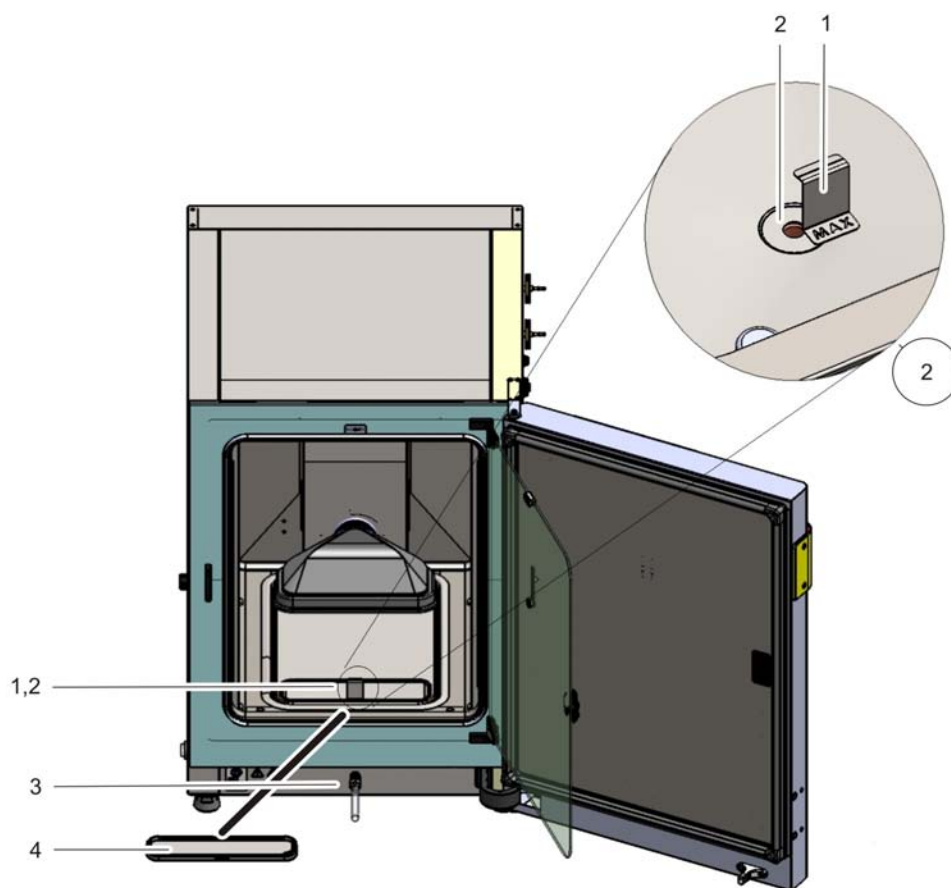
1. Make sure that the tube is removed from the fill and drain valve (3/[Figure 4-2](#)).
2. Check whether the drain (2/[Figure 4-2](#)) in the front section of the water reservoir is free of obstruction; it is needed for discharging the water through the fill and drain valve (3/[Figure 4-2](#)) on the 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. Check prefilter for damage and replace if necessary

5. Insert the prefilter (4/[Figure 4-2](#)) into the water reservoir cover panel.



**Figure 4-2.** “MAX” Fill Level Indicator and Prefilter

## 4 Start-up

Installing the HEPA Filter in the Rear Wall Filter Enclosure

# Installing the HEPA Filter in the Rear Wall Filter Enclosure

A HEPA filter with 12 hexagonal bolts must be installed in the rear wall filter enclosure before the device is commissioned.



Front View



Back View



HEPA filter holder

Exhaust filter

The HEPA filter is placed on the holder and fixed with the 12 hexagonal bolts.

### Note

Do not touch the surface of the HEPA 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.



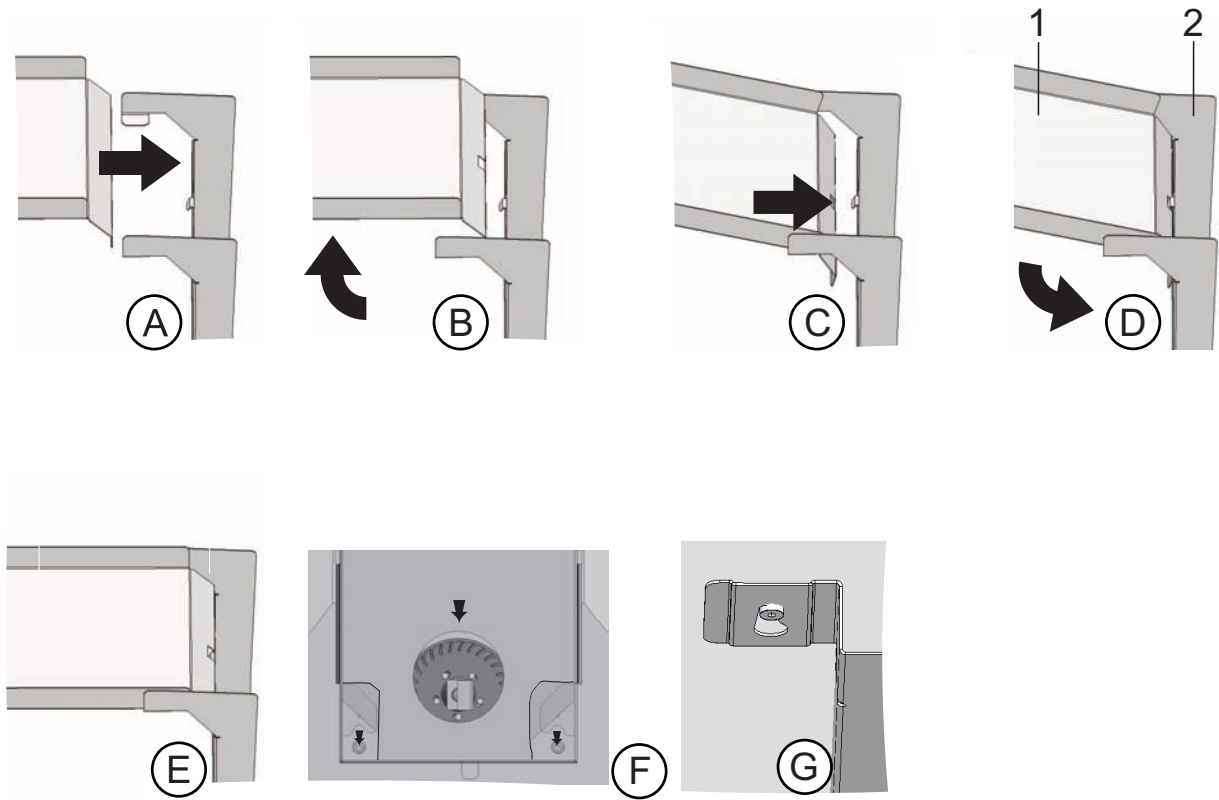
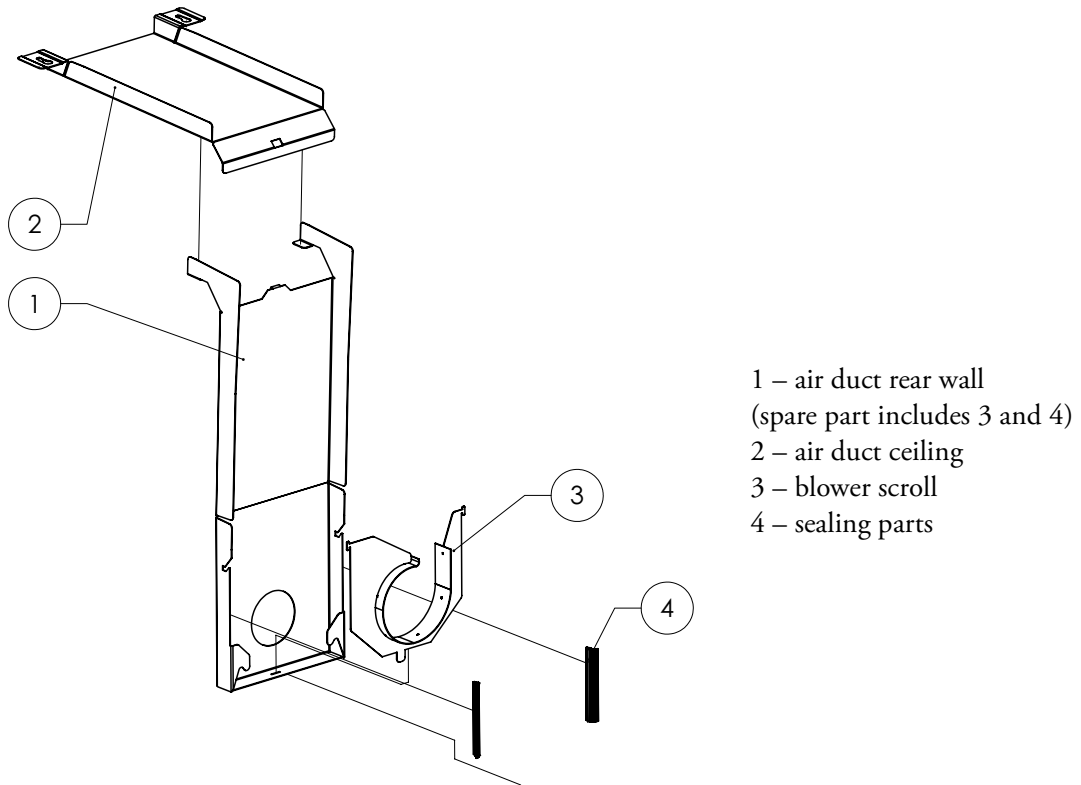


Figure 4-3. Assembling the Air Duct

## 4 Start-up

### Installing the HEPA Filter and the Water Reservoir Cover Panel

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

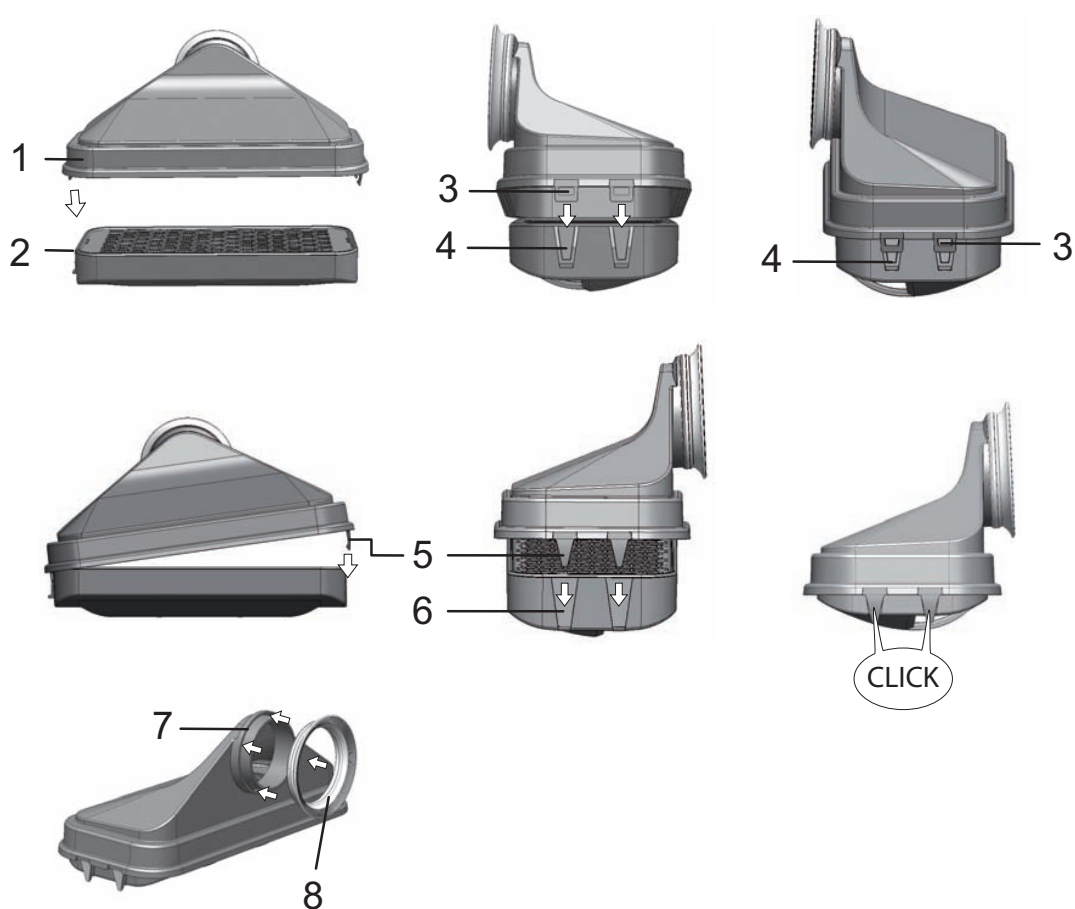


**Figure 4-4.** Air Duct Parts *Heracell Vios 160i CR*

**Note** Do not remove the air duct seals on the *Heracell Vios 160i CR* versions. The rear wall air ducts are important for 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.



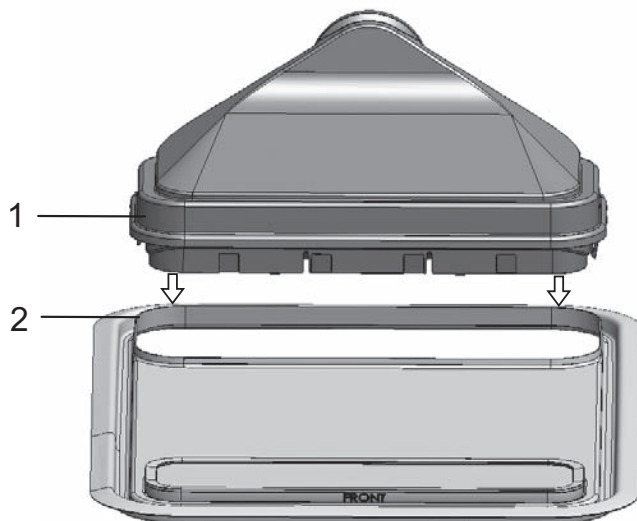
**Figure 4-5.** Assembling the HEPA Filter and the Airbox

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.

## 4 Start-up

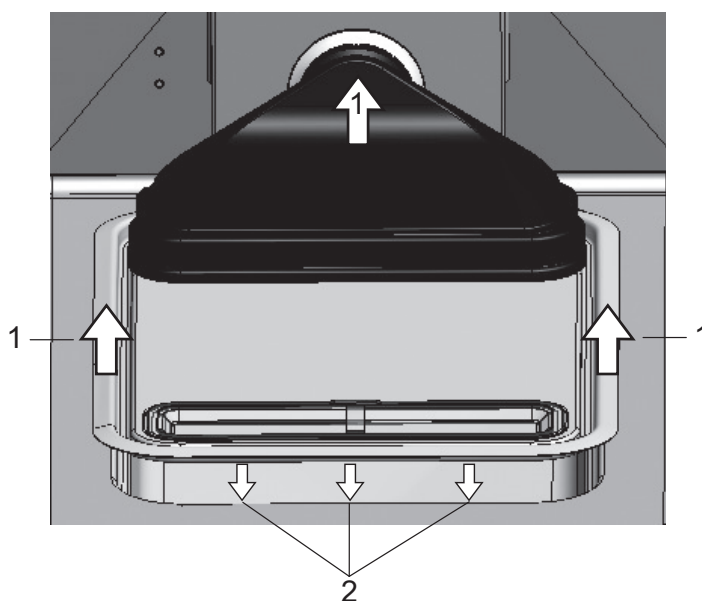
### Installing the HEPA Filter and the Water Reservoir Cover Panel

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](#)).



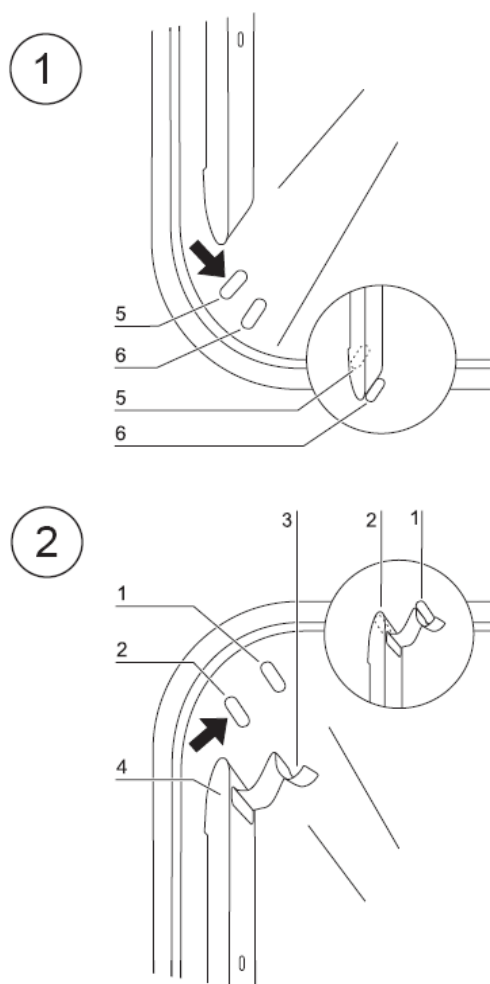
**Figure 4-7.** Installing the Airbox

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 HEPA Filter in the Rear 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.

## 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 shelf supports have been inserted into the rail, the shelves are pushed onto the shelf supports.

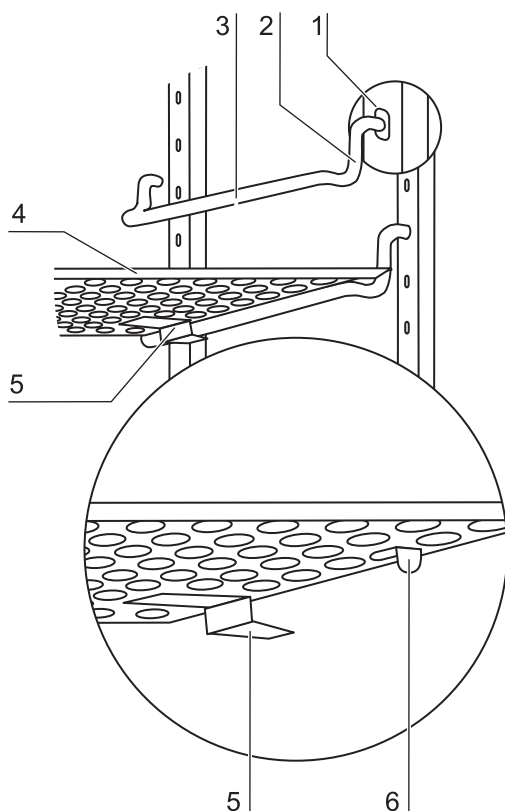
## Installation/Removal of the Support Rail

The support rails are guided and held in place by the embossings in the workspace floor and ceiling. The locksprings of the support rails must point upwards (see [Figure 4-8](#) on [page 4-9](#)).

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 (1/[Figure 4-9](#)) with the support bar (2/[Figure 4-9](#)) 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 with the tilt 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 completely installed and that the two shelf tilt protection tabs allow the shelf to move freely.

#### Note

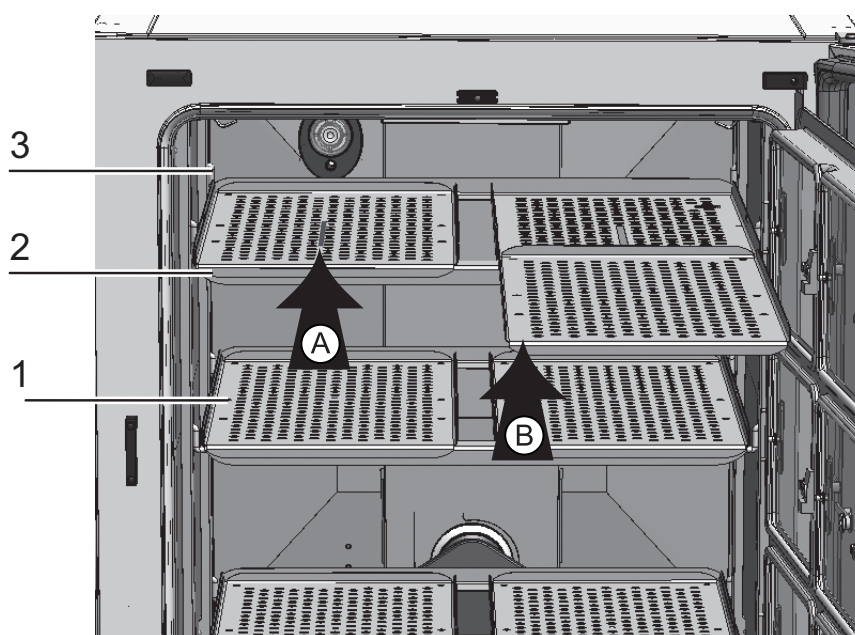
With the **Heracell Vios 160i CR** incubator be sure to install the shelf that has the cut-out for water refilling at the bottom position only. For the sixfold gas tight screen, the shelf supports are installed in the rectangular holes only. For installing the shelves with the sixfold gas tight screen, see [Appendix](#).

In the **Heracell Vios 160i CR** incubator with threefold gas-tight screen, the shelf supports are inserted into the holes directly above the rectangular holes.

## Levelling the Device

1. Position a bubble level onto the center shelf or onto the roller holder.
2. Rotate the adjustable device feet using the supplied 24 mm (0.94 inch) wrench until the shelf is positioned horizontally level in all directions. Perform the height adjustment of the device feet from left to right and from rear to front.

## Mounting the Split Shelves (Optional) into the *Heracell Vios 250i CR*



**Figure 4-10.** Installation of Split Shelves

For a **Heracell Vios 250i CR** equipped with an optional six-fold gas screen and 6-segment split shelves, 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 support rails(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.

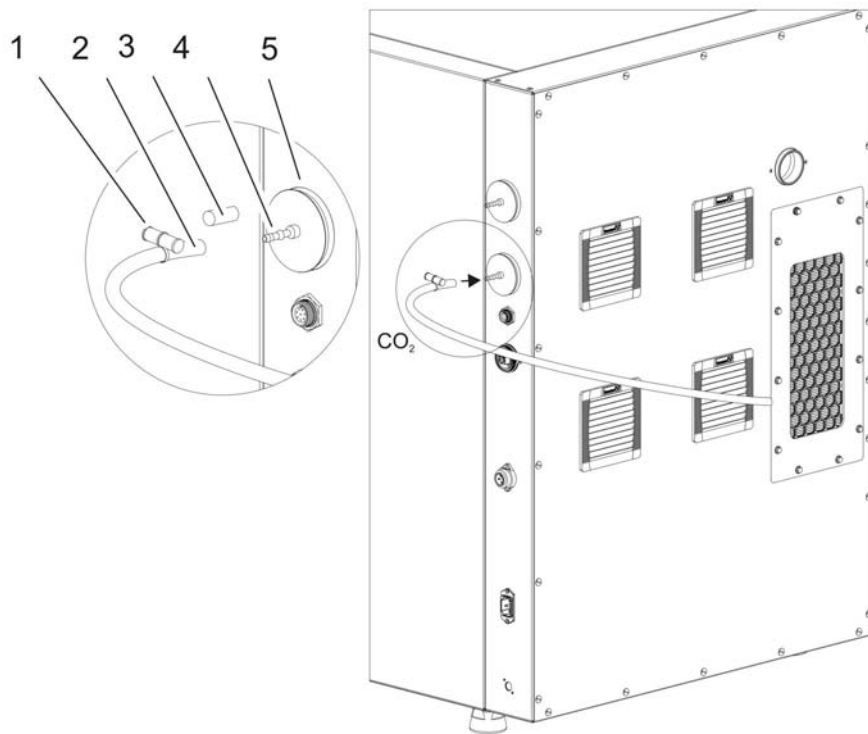
**CAUTION** Overpressure!

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:

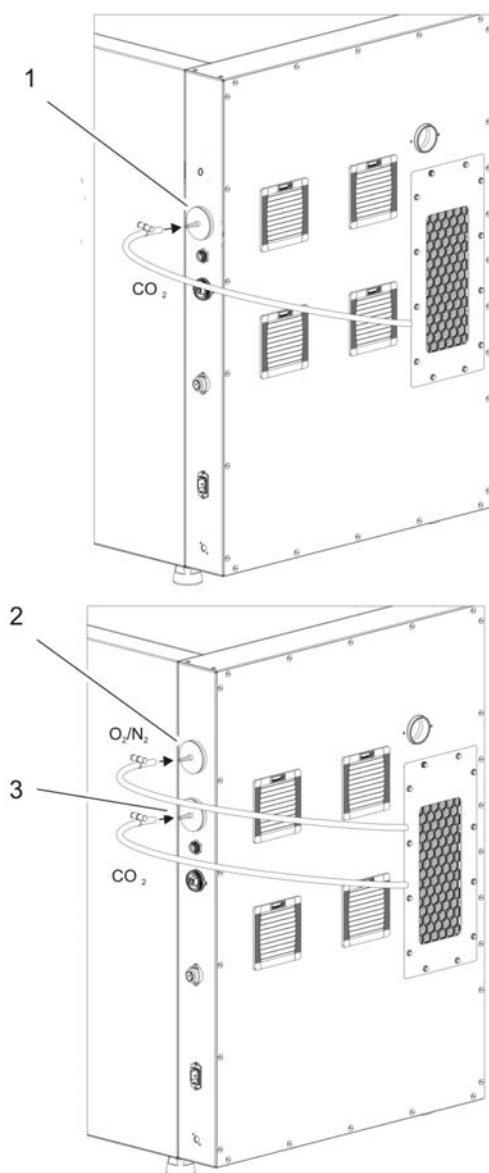
1. Connect the gas pressure hose to the sleeve of the gas supply system.
2. Remove the protective cap (3/Figure 4-11) from the sterile filter.
3. Slide the hose clamp (1/Figure 4-11) onto the gas pressure hose (2/Figure 4-11) and connect hose to the sleeve (4/Figure 4-11) of the gas line air filter (5/Figure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



**Figure 4-12.** Gas Connection

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

## Mains Connection

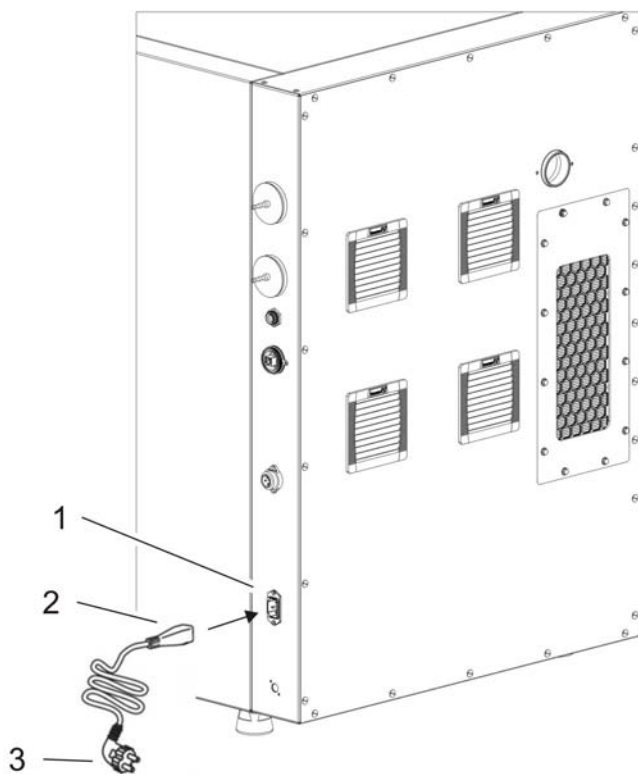


Figure 4-13. Mains Connection



**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.

## Connecting the USB Interface

The units come equipped with a USB interface as a standard feature. The connection to a computer is made using a commercially available USB 1 or USB 2 cable (incubator side: USB male connector of Type B, computer 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 computer and incubator across the USB interface requires that suitable driver software be installed on the computer, 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 proper performance 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               |

## 4 Start-up

### Connecting the Alarm Contact

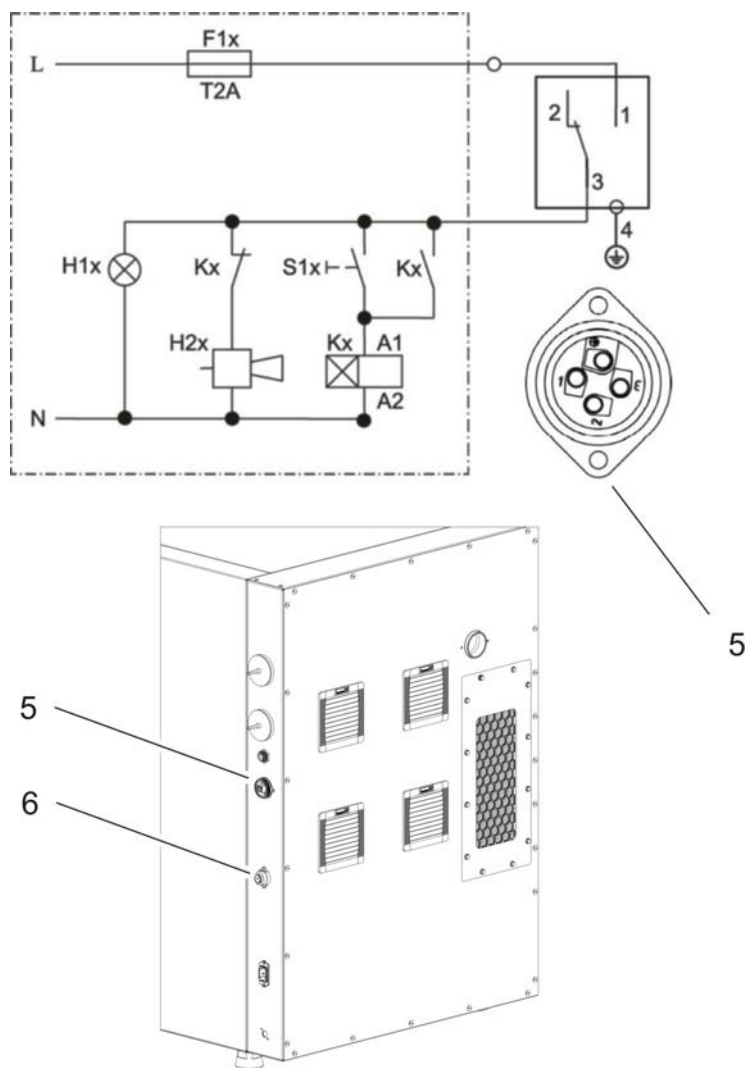
| Operating states            | Contact 3 - 2 | Contact 3 - 1 |
|-----------------------------|---------------|---------------|
| Error power failure<br>"ON" | X             | O             |

Legend: 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 6-43).

### Connection Example:



**Figure 4-14.** Connection Example Alarm Contact

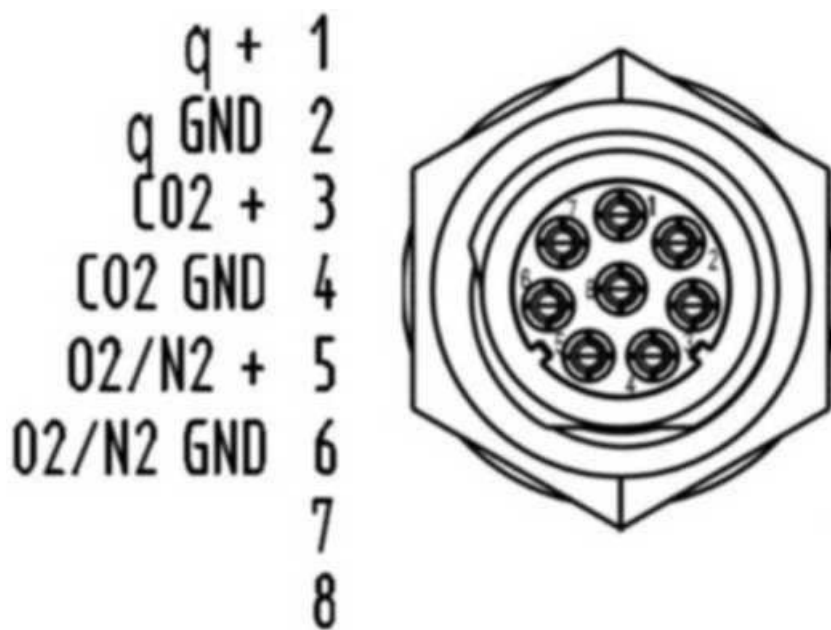
The adapter for connecting the interface cable is not included in the scope of delivery and must be ordered separately. Specifications for the operating voltage and the fusing of external alarm circuitry are given in the table above.

1. Wire the individual conductors as shown in the wiring diagram.

2. Connect the adapter 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 4-15.** Pin-out of the 4-20 mA Interface

**Note** Skilled work:

Thermo Scientific warrants the operational safety and the proper performance 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.

## 4 Start-up

Connecting the 4-20 mA Interface

# 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 port 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.
- Check the HEPA filter on the rear wall filter enclosure for correct fit. The red warning light on the rear wall filter enclosure indicates a fault in the fan of the rear wall filter enclosure.

### Sterilizing the Device Workspace:



#### **CAUTION** Limited operating temperature for the Cell Locker Chambers!

Before a sterilization run the Cell Locker Chambers must be removed. The max. operating temperature for the Cell Locker Chambers is 121°C/250 °F. The Cell Locker Chambers will melt if they remain in the device during the Steri-Run sterilization cycle.

- Run the Steri-Run sterilization routine (see “[Steri-Run Sterilization Routine](#)” on [page 8-7](#)) or disinfect 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.

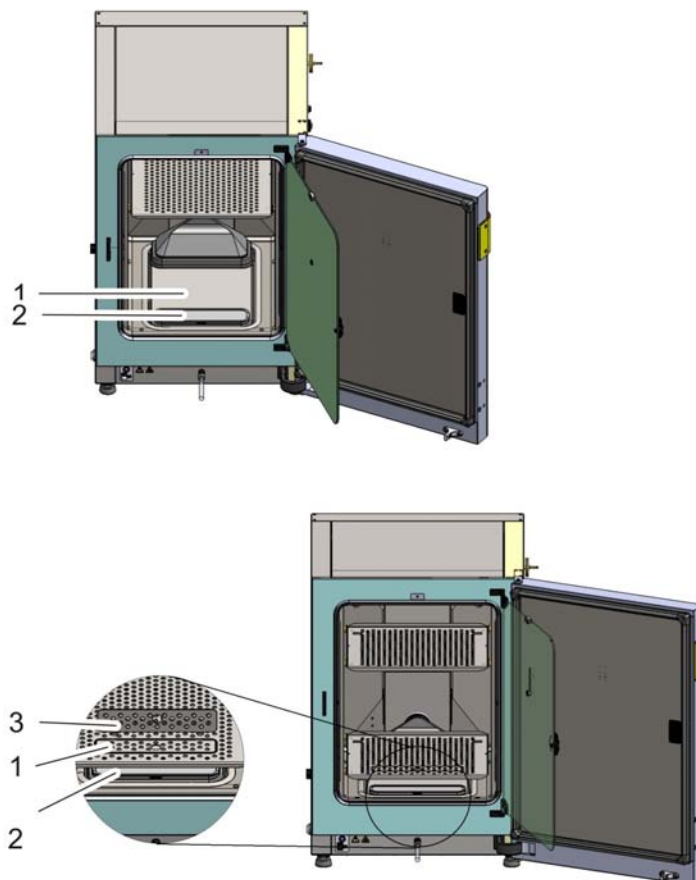
Water supply: see “Relative Humidity” on page 3-5.

When the water fill level drops below the minimum value, the water must be refilled.

Filling max. for the **Heracell Vios 160i CR** and **Heracell Vios 250i CR**: 3 l

## Starting Operation

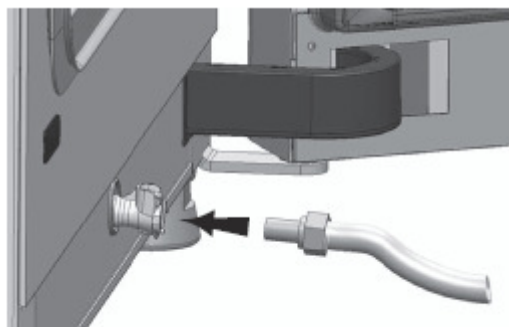
1. Open glass door or gas-tight screen.
2. Remove prefilter (2/[Figure 5-1](#)).
3. Bottom shelf with cut-out for refilling (**Heracell Vios 160i CR**): Open flap (3/[Figure 5-1](#)).  
Single-piece shelf (**Heracell Vios 250i CR**): Remove bottom shelf if there is not enough to allow for filling.
4. Fill reservoir with sterile distilled water (beneath water reservoir cover 1 in [Figure 5-1](#)) of the workspace.



**Figure 5-1.** Water Reservoir

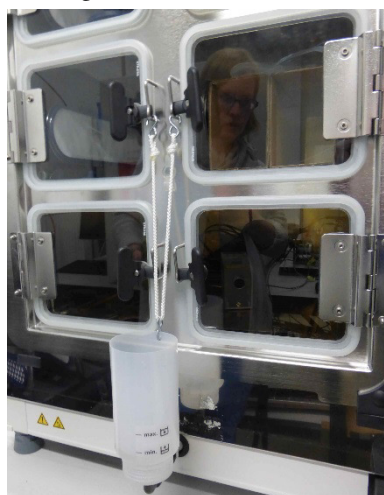


## Water Filling



**Figure 5-2.** Fill and Drain Valve Incubator

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



**Figure 5-3.** Refill Funnel

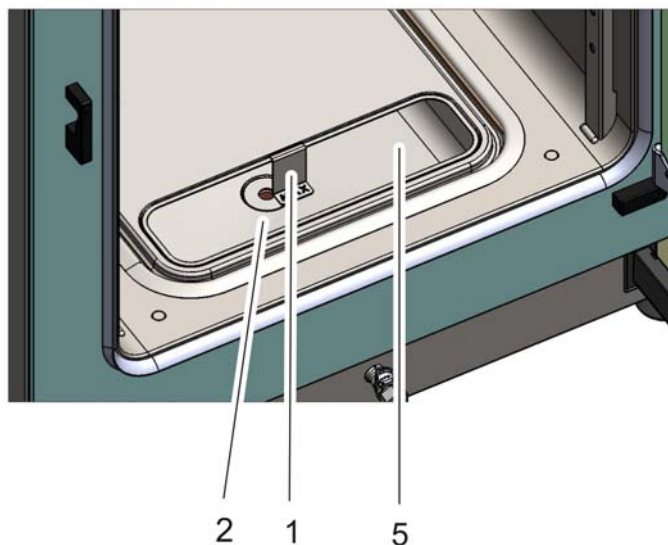
Hang the hooks of the refill device in the locks of the glass doors as shown above.  
Connect the hose to the fill and drain valve.

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 prefilter (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<sub>2</sub> /O<sub>2</sub> /N<sub>2</sub> supply system are open.
10. Turn on the device using the power switch.
11. Adjust set values for temperature and CO<sub>2</sub> /O<sub>2</sub> 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 begun.
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<sub>2</sub>/O<sub>2</sub> measuring system is performed.
16. The CO<sub>2</sub>/O<sub>2</sub> control supplies the set amount of CO<sub>2</sub>/O<sub>2</sub>.
17. If the auto-start routine has been completed, the progress indicator is hidden, and the main menu is displayed. The device is now 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 uniform heating of the cultures, 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. Large objects in the work space that dissipate heat may impair heat distribution.

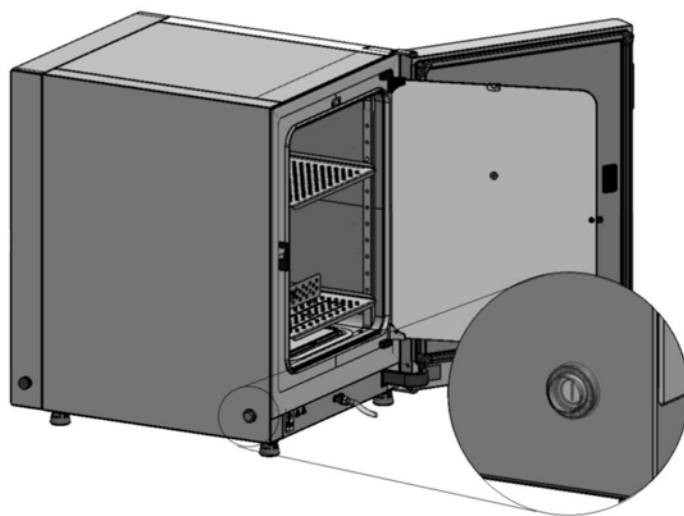


# Handling and Control

## 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 CO<sub>2</sub> Set Value” on page 6-9
- “Setting the O<sub>2</sub> 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
- “Scaling the Trend Display” on page 6-41
- “Error Messages” on page 6-43
- “Measures After Power Outage” on page 6-45

## Power Switch



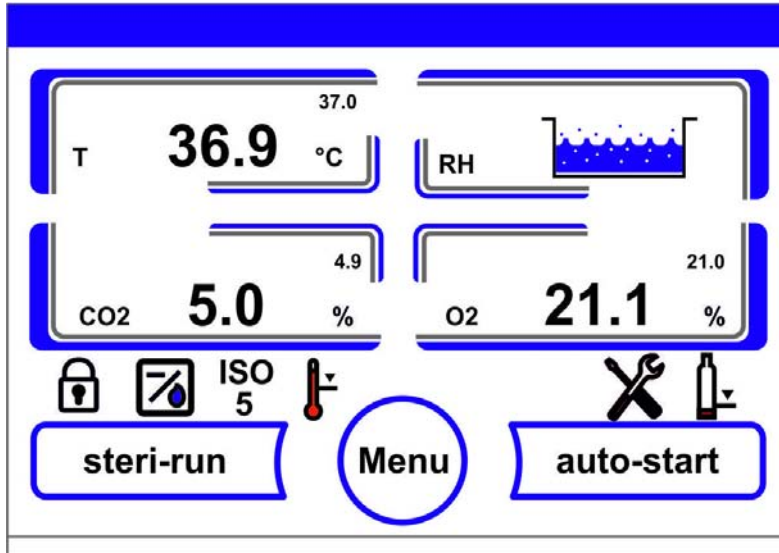
**Figure 6-1.** Power Switch

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](#)).
- To turn the device off: 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 with light pressure using a finger or a blunt pen.



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

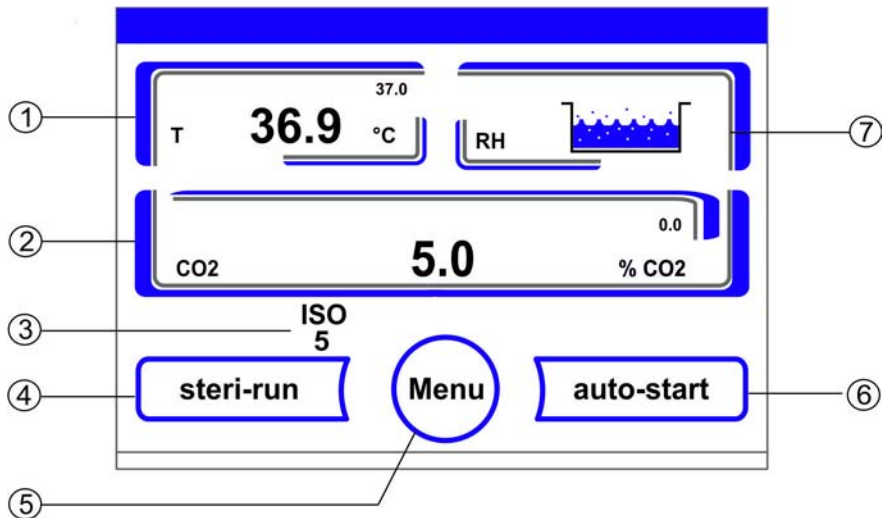
The following screen areas of the operating panel are touch-sensitive and accept operating commands:

- Temperature display T,
- CO<sub>2</sub> display CO<sub>2</sub>,
- Display field water level RH,
- O<sub>2</sub> display (optional),
- Icon bar with symbolic representations of operating states, allowing direct access to installed options (see also “[Icon Description](#)” on [page 6-39](#)),
- **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<sub>2</sub>/N<sub>2</sub> Control



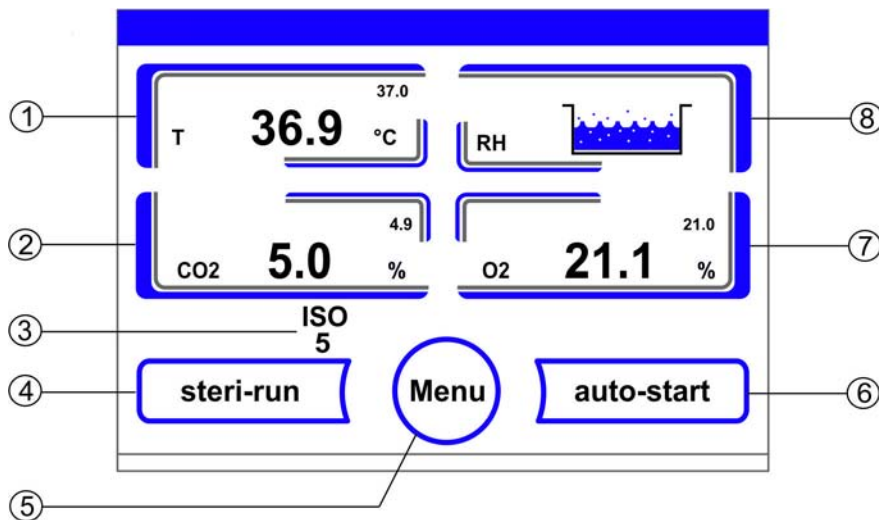
**Figure 6-3.** iCan™ Touchscreen without O<sub>2</sub>/N<sub>2</sub> gas supply

Function keys and actual value readouts on the operating panel for versions without O<sub>2</sub>/N<sub>2</sub> 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. CO<sub>2</sub> 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 6-39](#))
4. Key for starting the Steri-Run sterilization 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<sub>2</sub>/O<sub>2</sub>/N<sub>2</sub> 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<sub>2</sub>/O<sub>2</sub>/N<sub>2</sub> 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<sub>2</sub> 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 6-39](#))
4. Key for starting the Steri-Run sterilization routine
5. Key for opening the menu navigation
6. Key for starting the auto-start routine
7. O<sub>2</sub> 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<sub>2</sub>, O<sub>2</sub> setpoint,
- B: Starting the Steri-Run or auto-start routine of the unit,
- C: Navigation through the submenus for device configuration.

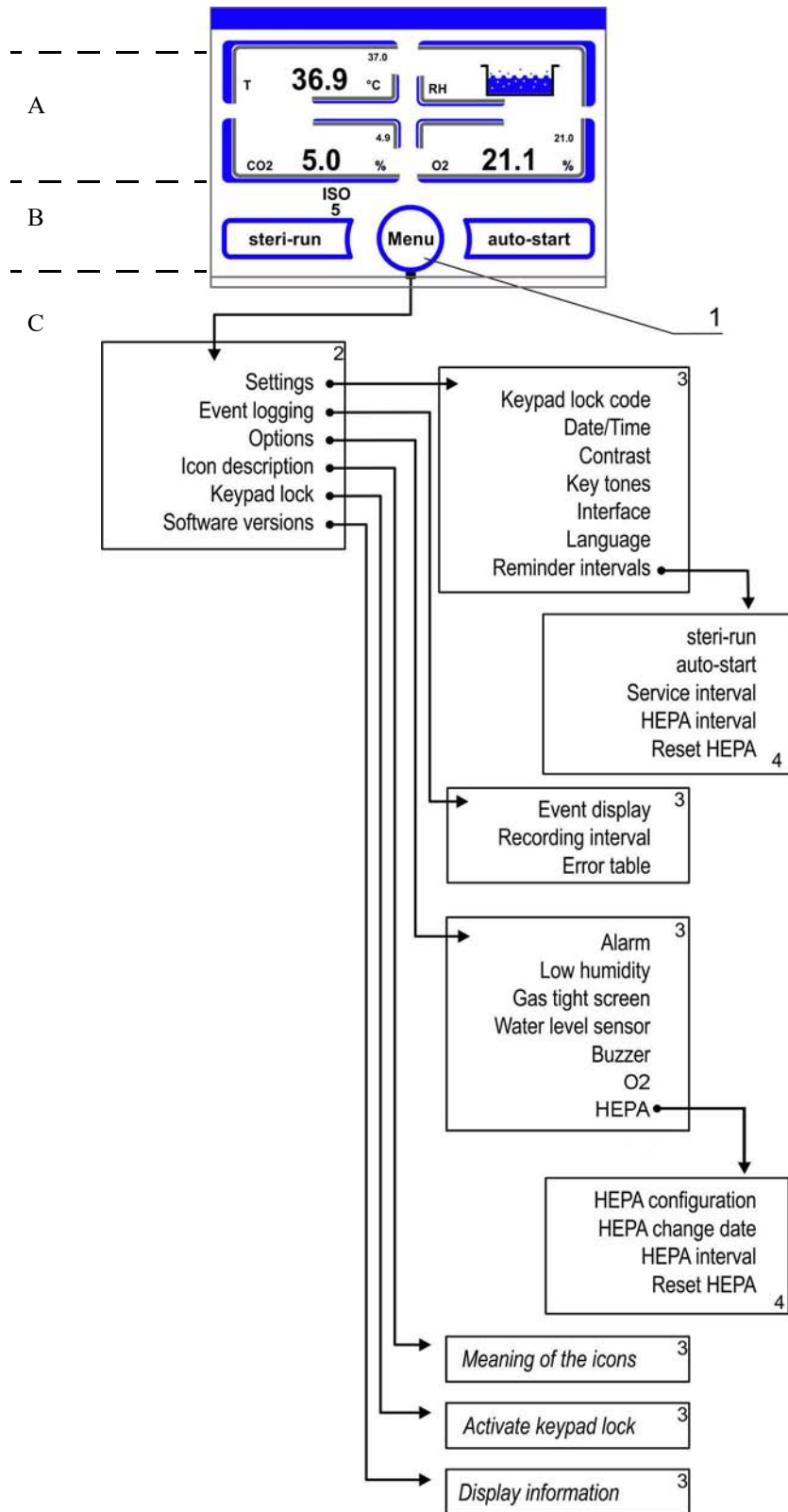


Figure 6-5. Menu Structure Overview

## Factory Presettings of the iCan™ Touchscreen Controls

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

- Temperature: 37 °C
- CO<sub>2</sub> content: 5.0 %
- O<sub>2</sub> content (optional): 21.0 %

**Note** CO<sub>2</sub>/O<sub>2</sub> control:

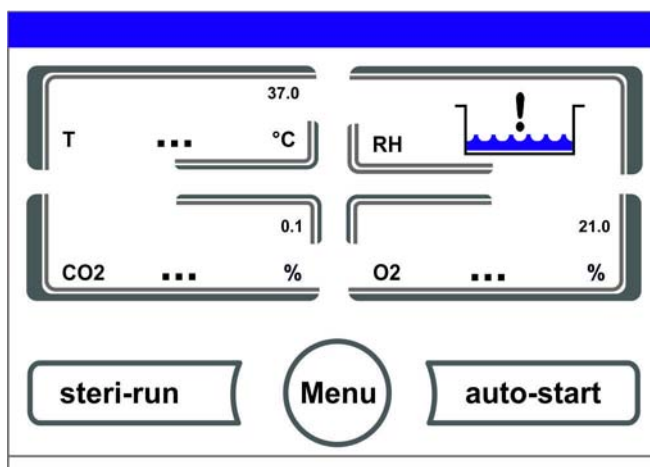
Since the CO<sub>2</sub> concentration of the air is nearly 0%, the CO<sub>2</sub> control and the control loop error monitoring system are disabled at a set value of 0%.

Since the O<sub>2</sub> concentration of the air is 21%, the O<sub>2</sub> 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<sub>2</sub> sensor heat-up period: 5 min
3. O<sub>2</sub> 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<sub>2</sub> display and
- O<sub>2</sub> display field

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

**Note** CO<sub>2</sub> gas supply:

During the 5-minute heat-up phase of the O<sub>2</sub> control loop, the work space is not exposed to CO<sub>2</sub> gas and the CO<sub>2</sub> control and is disabled.

## 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:

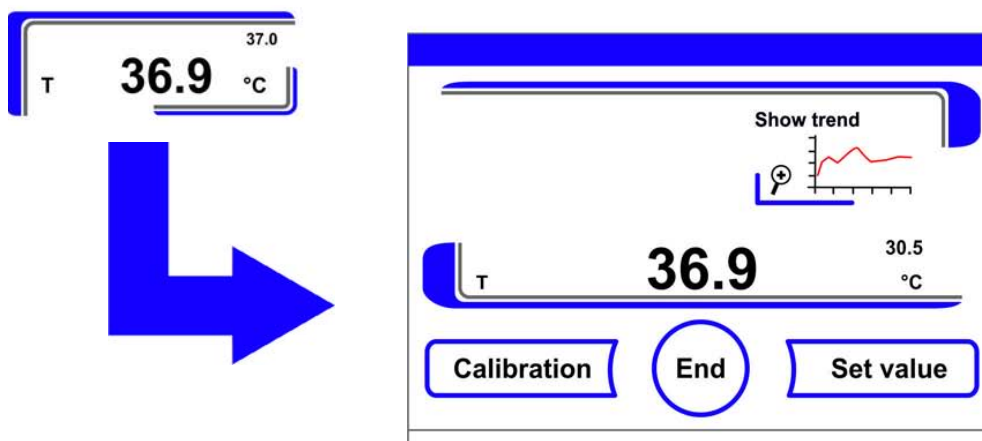
To save changed values, press the **Enter** key.

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.

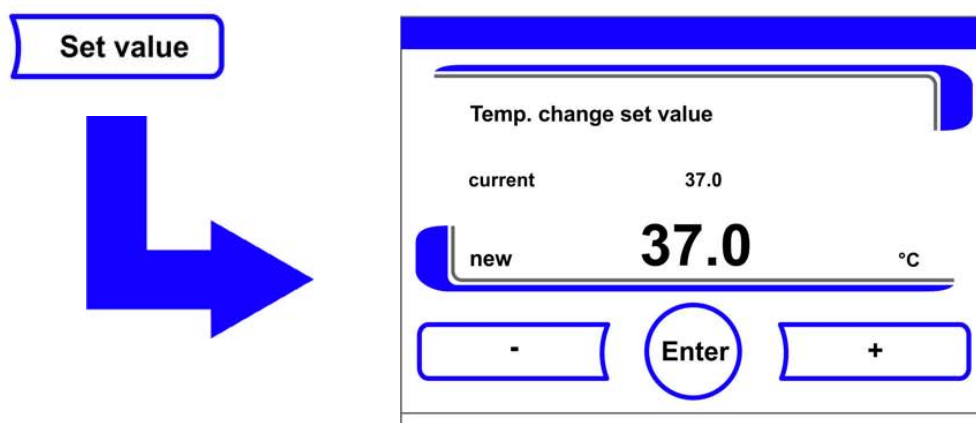
## Setting the Temperature Set Value

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. 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:

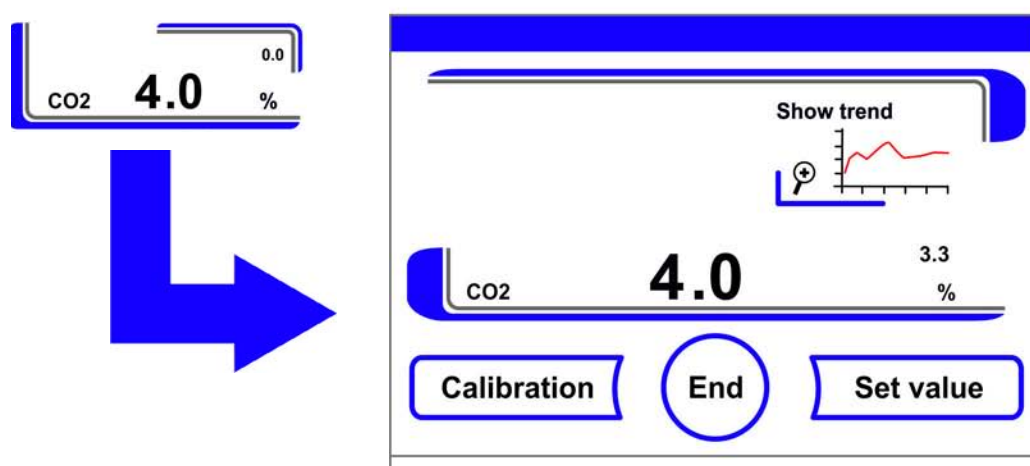
- Press the - key.

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<sub>2</sub> Set Value

1. Press the CO<sub>2</sub> display key.
  - The CO<sub>2</sub> menu is displayed.



**Figure 6-9.** CO<sub>2</sub> Display and CO<sub>2</sub> Menu

2. To exit the CO<sub>2</sub> menu:

- Press the **End** key.

3. To set the CO<sub>2</sub> set value:

- Press the **Set value** key.

To increase the set value:

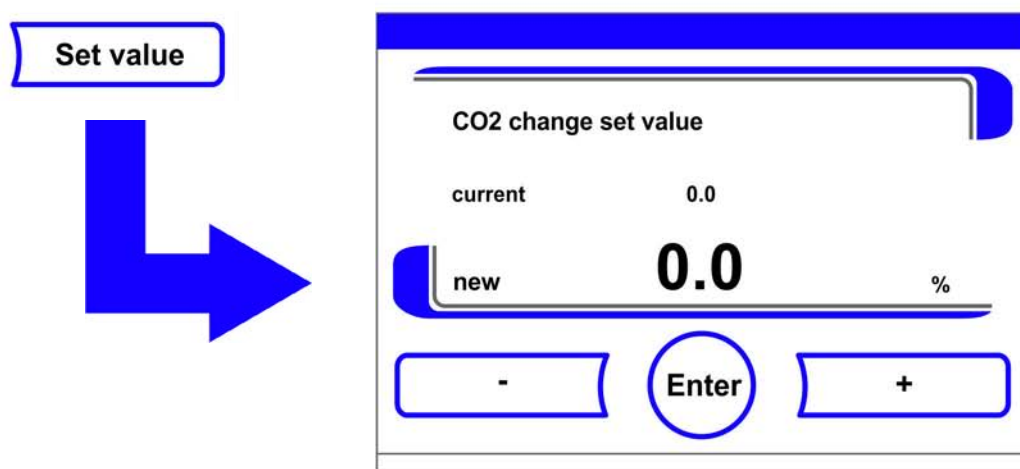
- Press the + key.

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<sub>2</sub> display shows the actual value currently measured in the workspace.



**Figure 6-10.** Setting the CO<sub>2</sub> Set Value

**Note** Deactivating the CO<sub>2</sub> control loop:

To deactivate the CO<sub>2</sub> control, the set value is set to 0 %.

If the control loop is deactivated, error monitoring is enabled as well.

**Note**

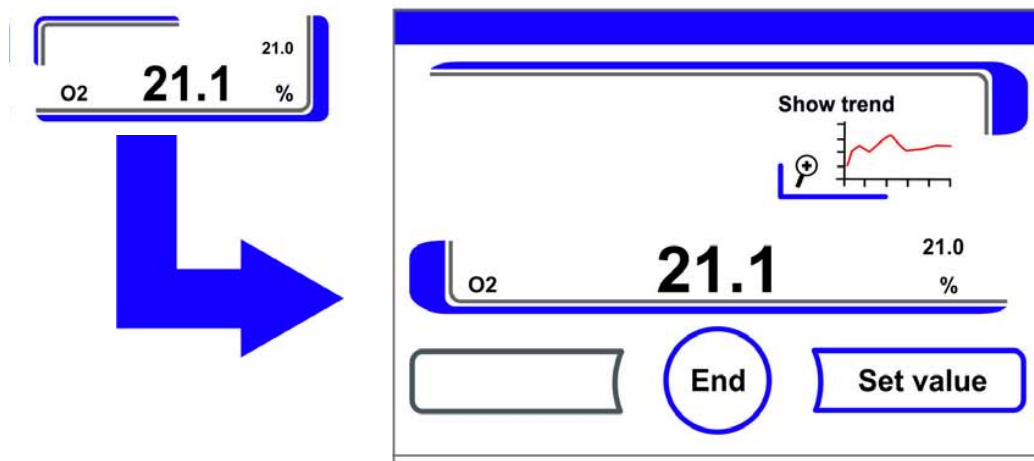
Ventilate the inner chamber after changing the CO<sub>2</sub> setpoints so that no alarm occurs.

## Setting the O<sub>2</sub> Set Value

This setting is possible only on versions with the optional O<sub>2</sub>/N<sub>2</sub> control.

1. Press the O<sub>2</sub> display key.

- The O<sub>2</sub> menu is displayed.



**Figure 6-11.** O<sub>2</sub> Display and O<sub>2</sub> Menu

2. To exit the O<sub>2</sub> menu:
  - Press the **End** key.
3. To set the O<sub>2</sub> set value:
  - Press the **Set value** key.

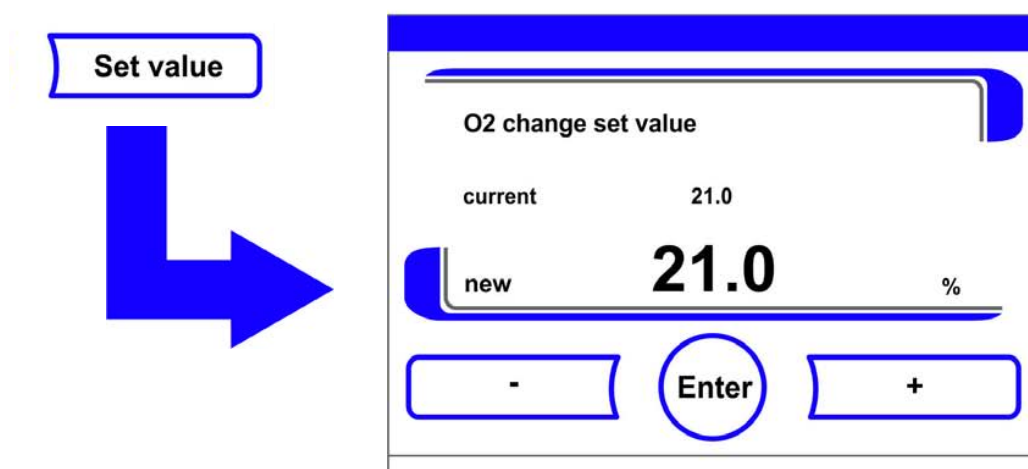
To increase the set value:

- 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<sub>2</sub> display shows the actual value currently measured in the workspace.



**Figure 6-12.** Setting the O<sub>2</sub> Set Value

**Note**

Ventilate the inner chamber after changing the O<sub>2</sub> setpoint so that no alarm occurs.

**Note** Factory settings:

Depending on the type of the O<sub>2</sub> sensor, one of the two O<sub>2</sub> control ranges has been preset at the factory:

Control range I: 1 % to 21 %

Control range II: 5 % to 90 %

Usage of the process gases:

For set values below 21 % O<sub>2</sub>, the device must be connected to a nitrogen supply system.

For set values above 21 % O<sub>2</sub>, the device must be connected to an oxygen supply system.

For set values of 21 % O<sub>2</sub>, the O<sub>2</sub> control is switched off and error monitoring is disabled as well.

**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 an automated routine for the start and the subsequent adjustment of the CO<sub>2</sub> measuring system. 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<sub>2</sub> measuring system is automatically adjusted to these values, and the workspace is supplied with the preset quantity of CO<sub>2</sub>.



Notes on using the auto-start routine:

To ensure that the specified accuracy of the CO<sub>2</sub> 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.

Causes for the failure to start the auto-start routine:

Prior to running the auto-start routine, set the CO<sub>2</sub> and O<sub>2</sub> (optional) 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<sub>2</sub> 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<sub>2</sub> control circuit,
- the water filling level is insufficient,
- the CO<sub>2</sub> 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).

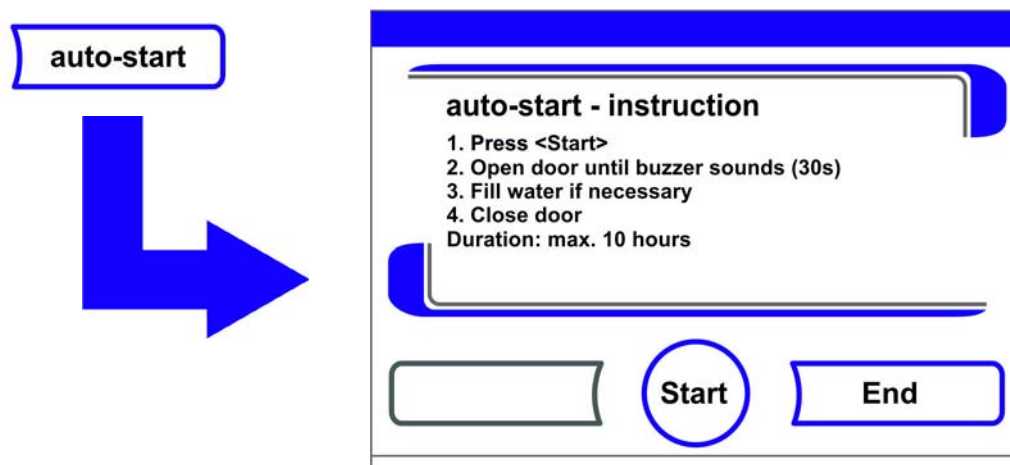
## Activating the Auto-Start Routine

Preparations for the start:

1. Make sure that the valves of the gas supply system are open.
2. Fill the reservoir with purified water. The filling level must not exceed the upper filling level mark.

Launching the auto-start routine:

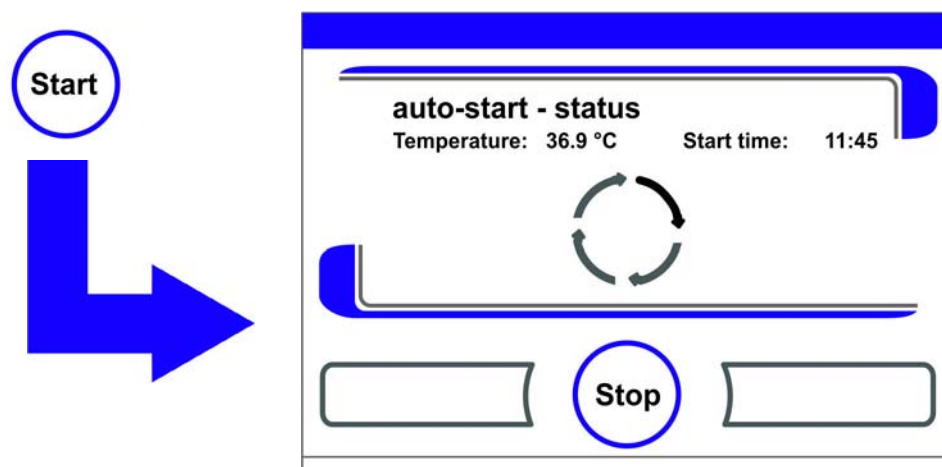
1. Press the auto-start key.
  - The auto-start instruction menu is displayed.



**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. 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.
  - The warning triangle is displayed as a failure message together with the audible signal.

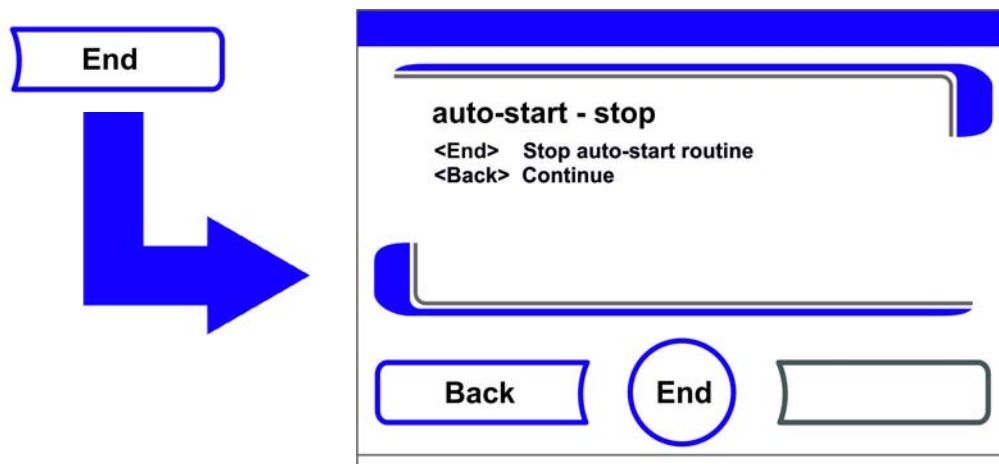


Figure 6-15. Interrupting the Auto-Start Routine

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

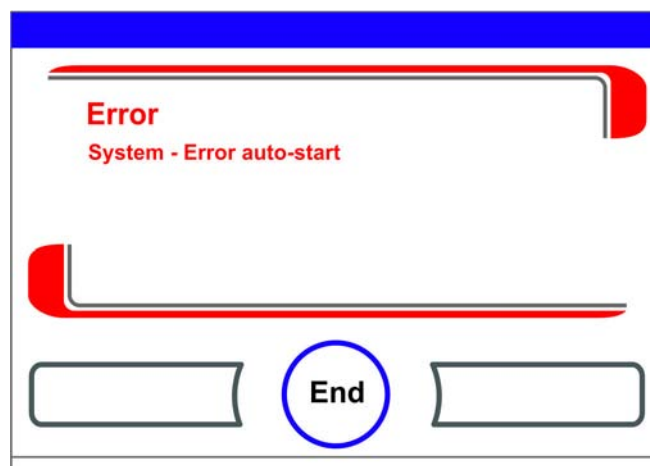


Figure 6-16. Error Message Subsequent to Aborted Auto-Start

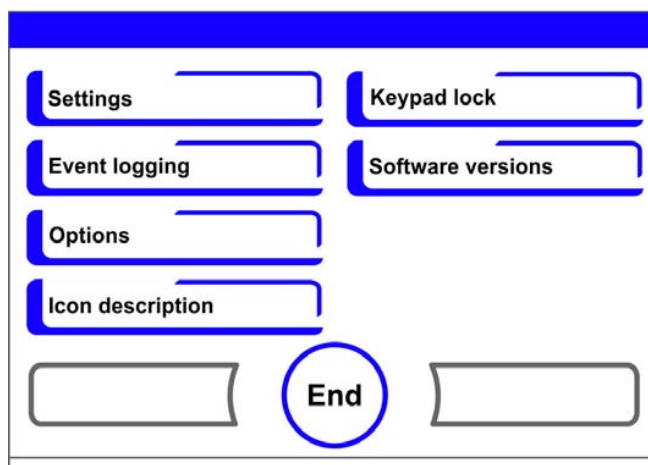
4. To accept the failure message:
  - Press the **End** key.
  - The system returns to the main menu.

## Launching Steri-Run

The Steri-Run sterilization routine is used to sterilize the complete workspace. The Steri-Run sterilization routine uses an automated program cycle to sterilize 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.

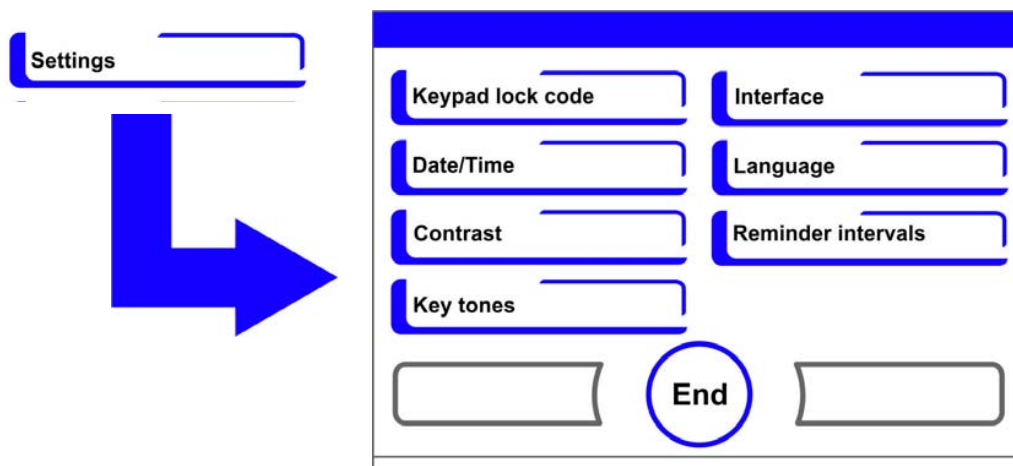


Figure 6-18. Settings/Setup Menu

## 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 6-40](#)).

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.

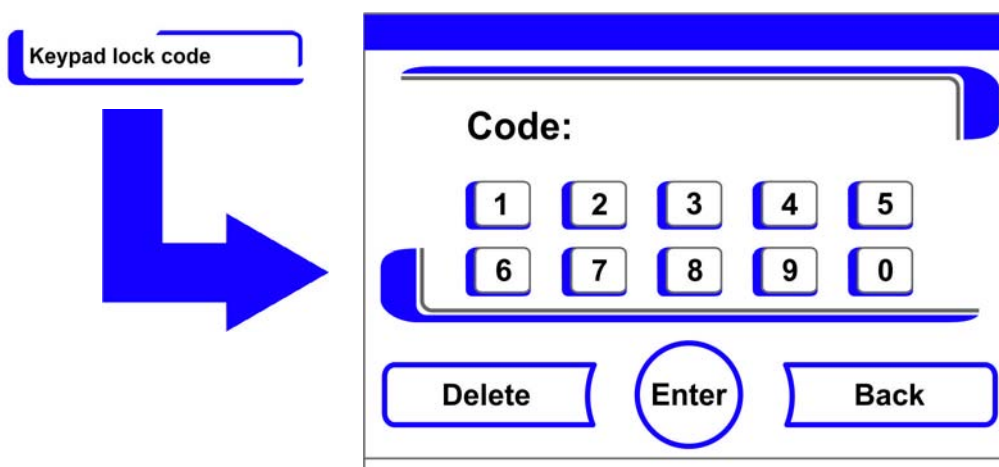
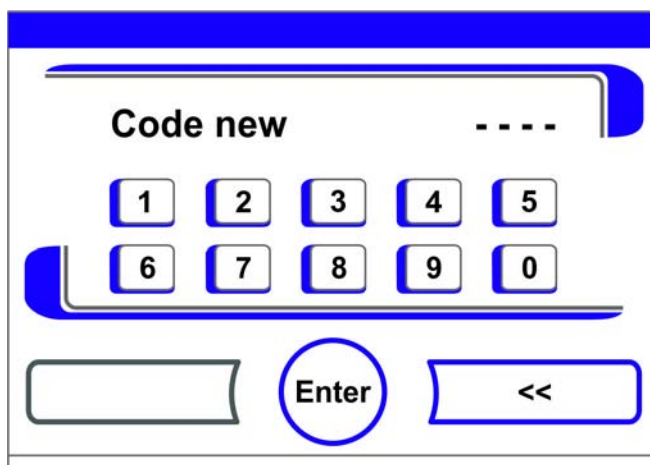


Figure 6-19. Changing the Keypad Lock Code

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:

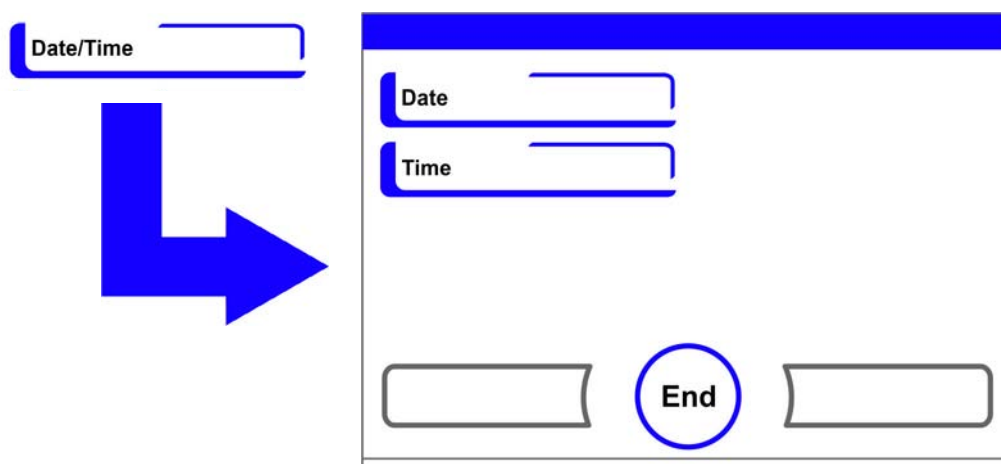
The user-defined code can be changed as often as required using the same procedure:

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

## Date/Time Setting

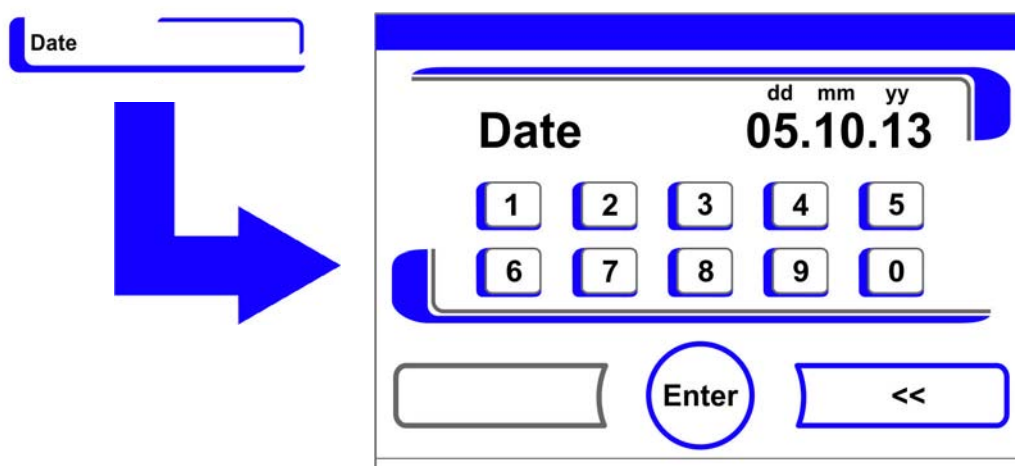
The input dialog allows date and time to be set to the required time zone.

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

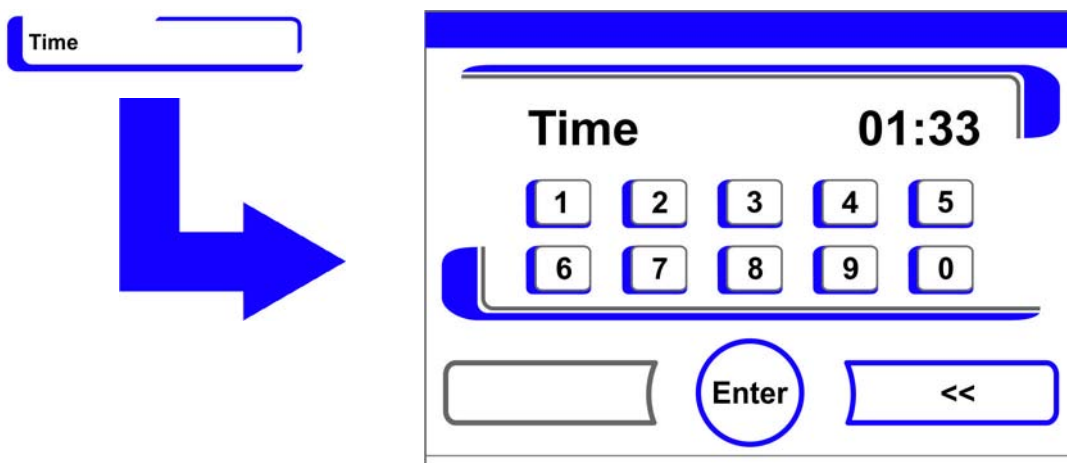
3. For changing the date, choose the **Date** option.
  - The input dialog shown in [Figure 6-22](#) is displayed.



**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

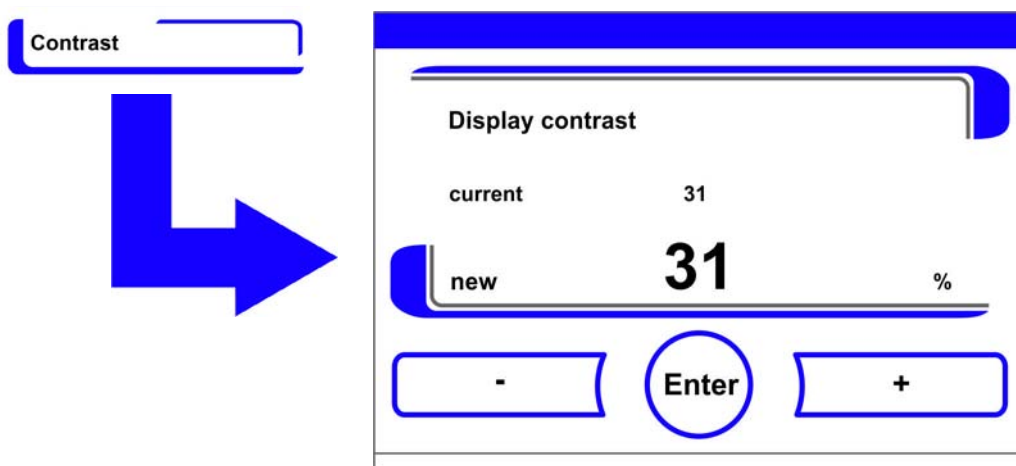
9. To enter the time:
  - Press the numeric keys.
  - The input numbers are displayed in the input box.
10. To set the cursor to the left to overwrite a value:
  - Press the **Backspace** (<<) key.
11. To accept and save the input value:
  - Press the **Enter** key.
12. The system returns to the **Date/Time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

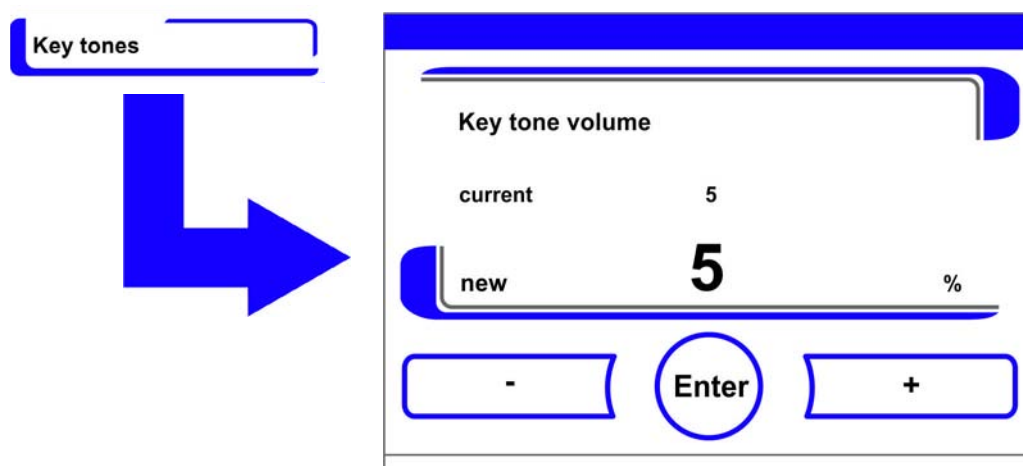
4. To increase the value:
  - Press the + key.
5. To reduce the value:
  - Press the - key.
6. The value change appears in the display. The **New** message indicates that the selection has been changed, but not saved yet.
7. To accept and save the change:
  - Press the **Enter** key.
  - The system returns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

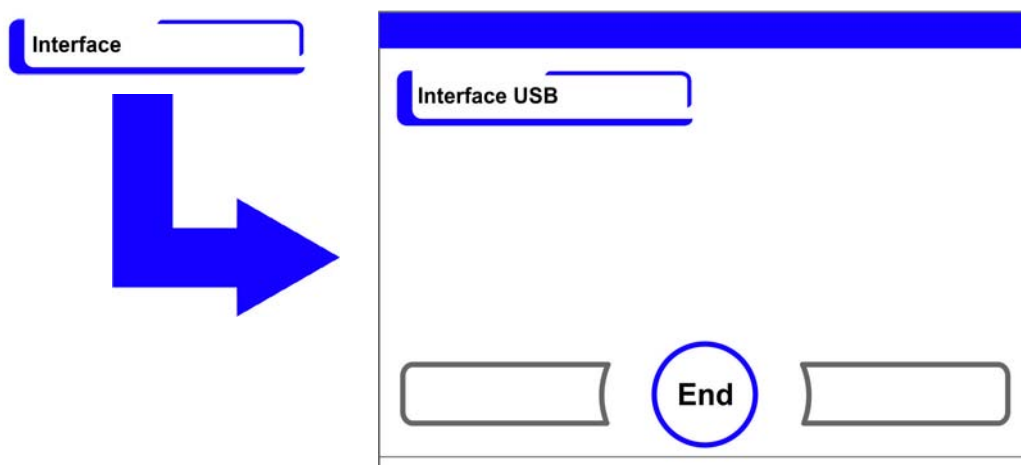
## USB Interface Baud Rate Setting

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).

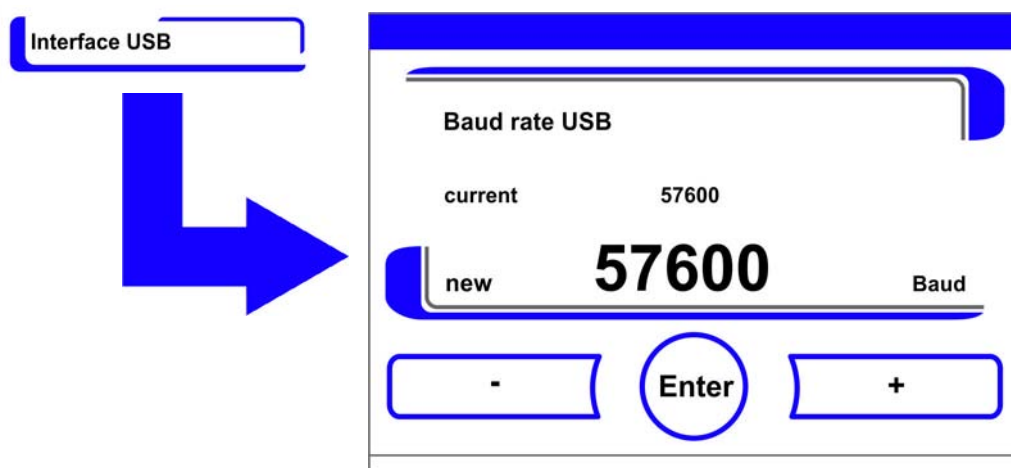
### Setting the Baud Rate

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.

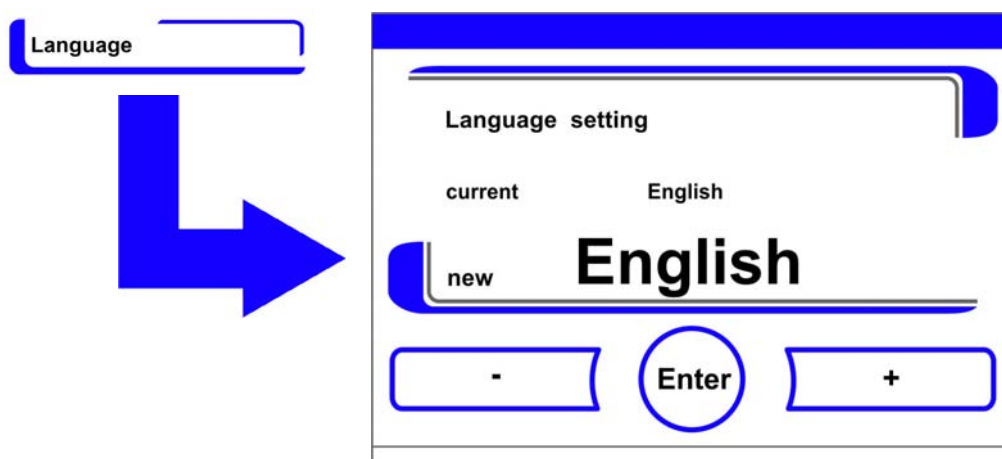
## Setting the Language of the Display Screen

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 sterilization routine.
- Service interval: Request service. The service message can be confirmed. In this case, the Request Service icon is displayed.

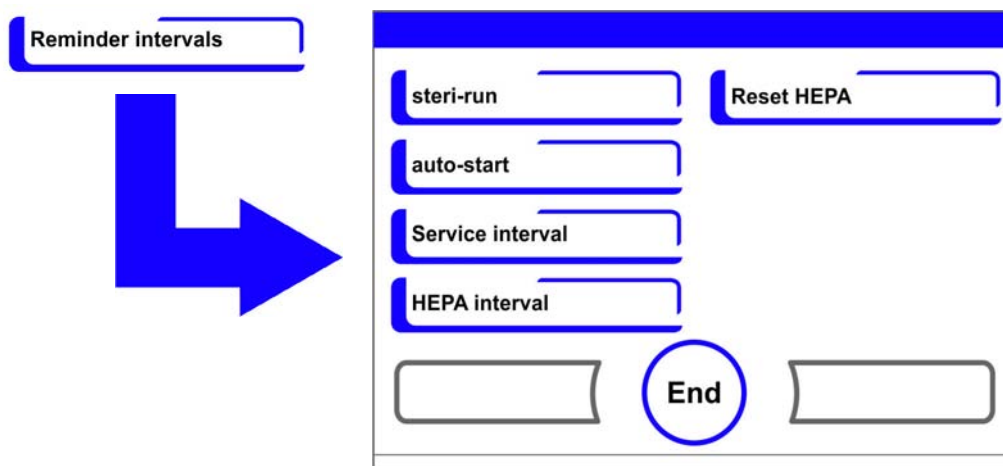
After the routines have been run successfully, the reminder messages are hidden.

## Factory Settings

|                                     |          |
|-------------------------------------|----------|
| Steri-Run sterilization routine     | 90 days  |
| auto-start routine                  | Off      |
| Service interval                    | Off      |
| Inner chamber, HEPA filter interval | 365 days |

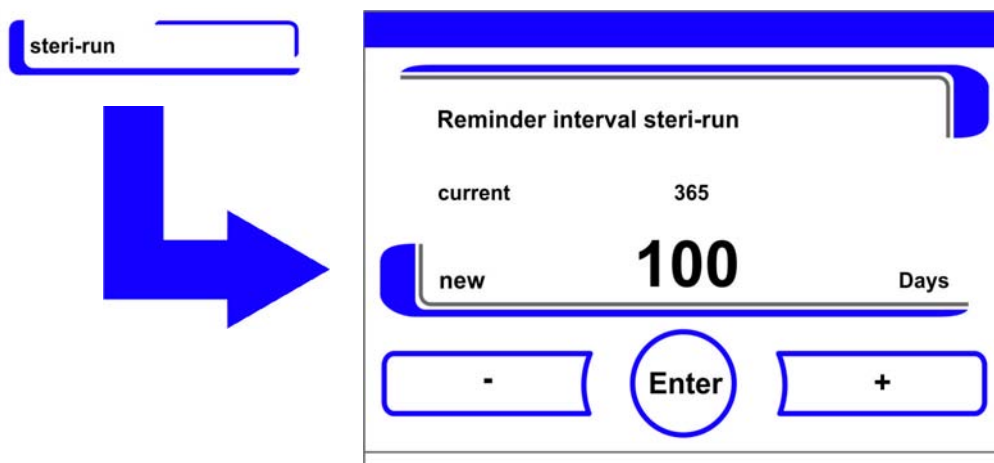
## Reminder Interval Setting

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.

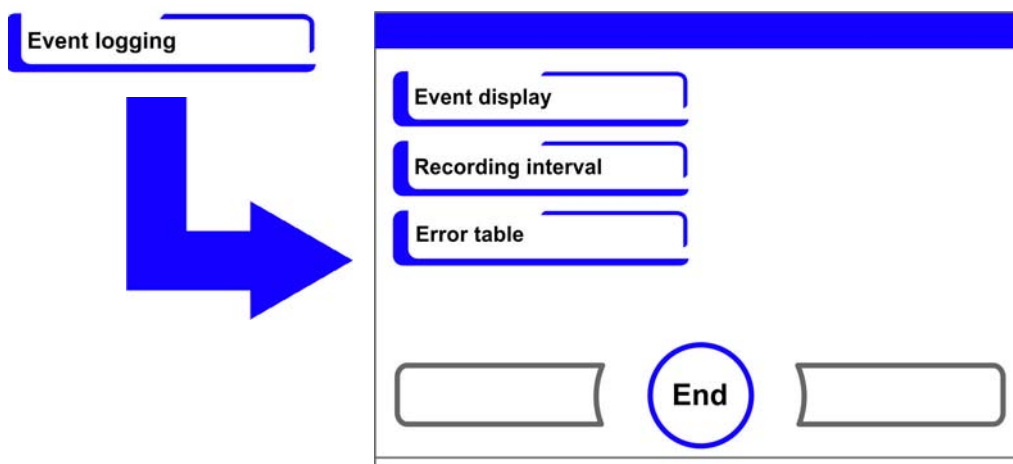


Figure 6-31. Event Logging Menu

## 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.

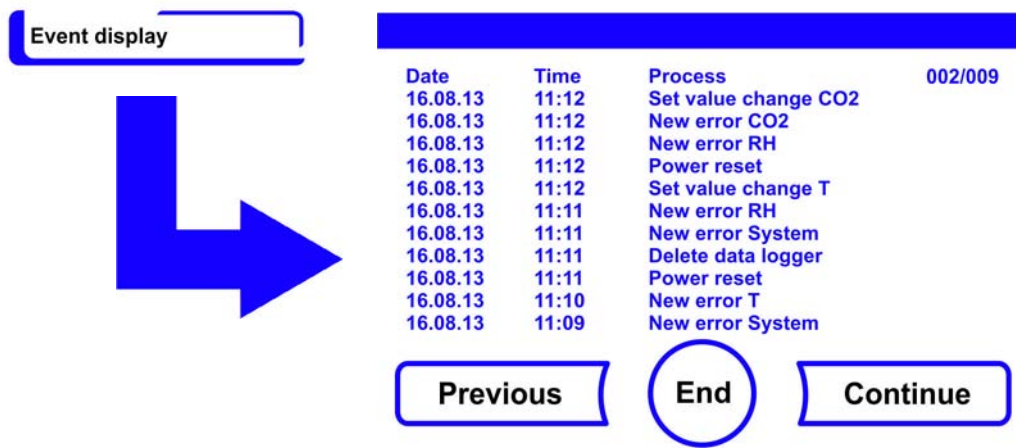


Figure 6-32. Event Display

1. To browse forward in the list:



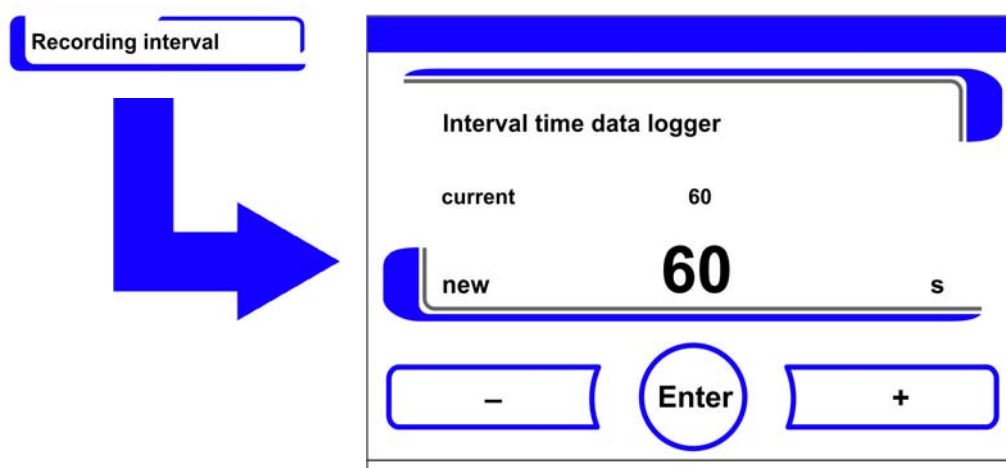
- Press the **Continue** key.
2. To browse backward in the list:
    - Press the **Previous** key.
  3. Exit the display:
    - Press the **End** key.
    - The system returns to the Event logging menu.

## 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 (“[Scaling the Trend Display](#)” on [page 6-41](#)).

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.

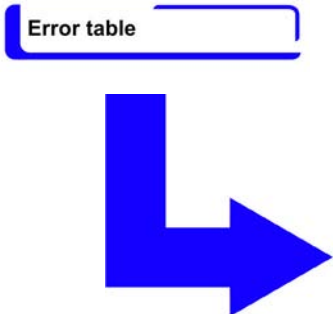
**Note** Event logger interval time:  
The logging cycle time does not affect the entries of the error table.

## 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.



The diagram shows a rectangular box labeled "Error table" with a blue border. A large blue arrow points from this box to the right, where a larger screen display is shown. The screen display has a blue header bar and contains a table of error logs. At the bottom of the screen, there are three buttons: a rectangular button on the left, a circular button labeled "End" in the center, and another rectangular button labeled "Continue" on the right.

| Loop | Date     | Time     | Error                   | 001/002 |
|------|----------|----------|-------------------------|---------|
| CO2  | 05.10.13 | 20:59:51 | Error communication     |         |
| RH   | 05.10.13 | 00:21:46 | No water                |         |
| CO2  | 28.09.13 | 00:31:32 | Error communication     |         |
| RH   | 28.09.13 | 00:31:19 | No water                |         |
| SYS  | 16.08.13 | 11:31:39 | IR sensor changed       |         |
| SYS  | 16.08.13 | 11:30:47 | Error EEPROM main board |         |
| RH   | 16.08.13 | 11:12:13 | No water                |         |
| T    | 16.08.13 | 11:12:11 | Sensor breakage         |         |
| RH   | 16.08.13 | 11:11:59 | No water                |         |
| RH   | 16.08.13 | 11:10:08 | No water                |         |
| T    | 16.08.13 | 11:09:56 | Sensor breakage         |         |

**Figure 6-34.** Displaying the Error Table

**Note** Troubleshooting:

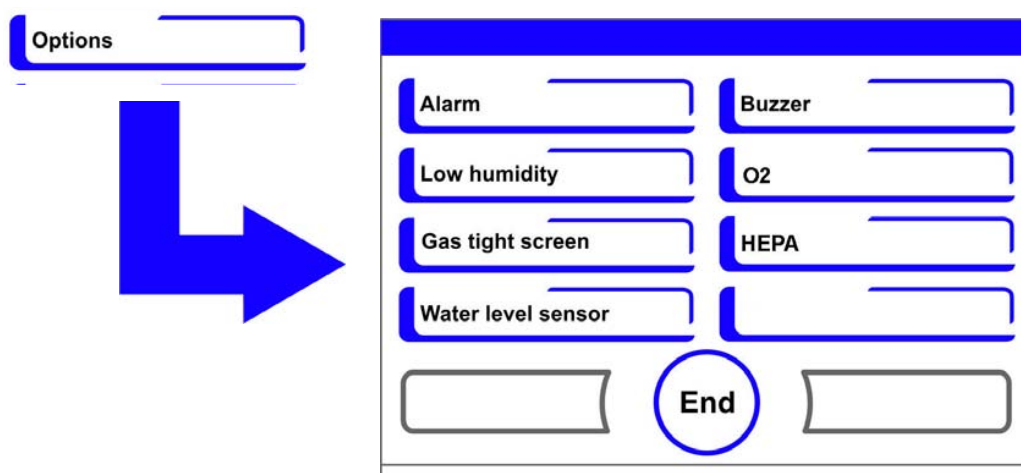
For a detailed overview of causes for errors and their correction, please refer to the end of this chapter!

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.
  - 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<sub>2</sub> gas supply (optional),
- HEPA filter.



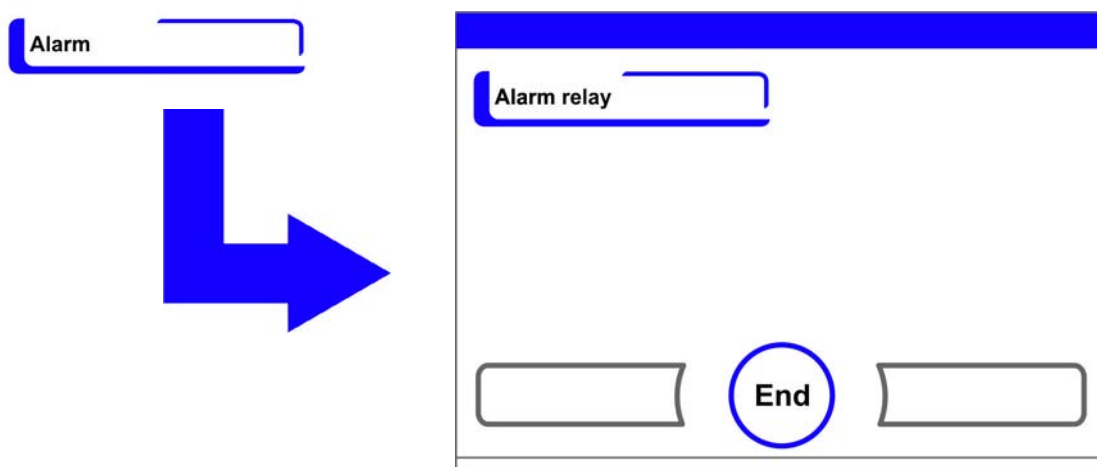
**Figure 6-35.** Options Menu

### 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 4-15.

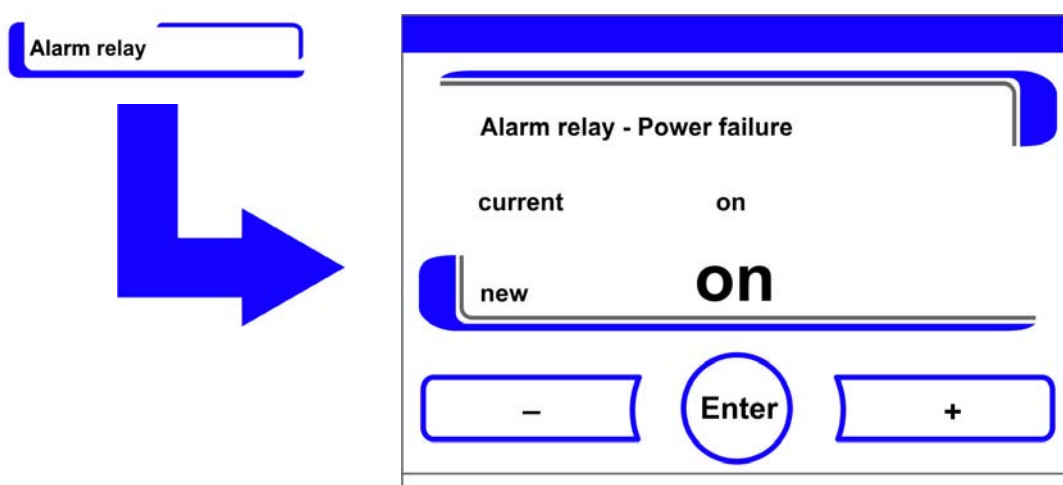
1. Press the **Menu** key.
2. Select the menu command **Options**.

- 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

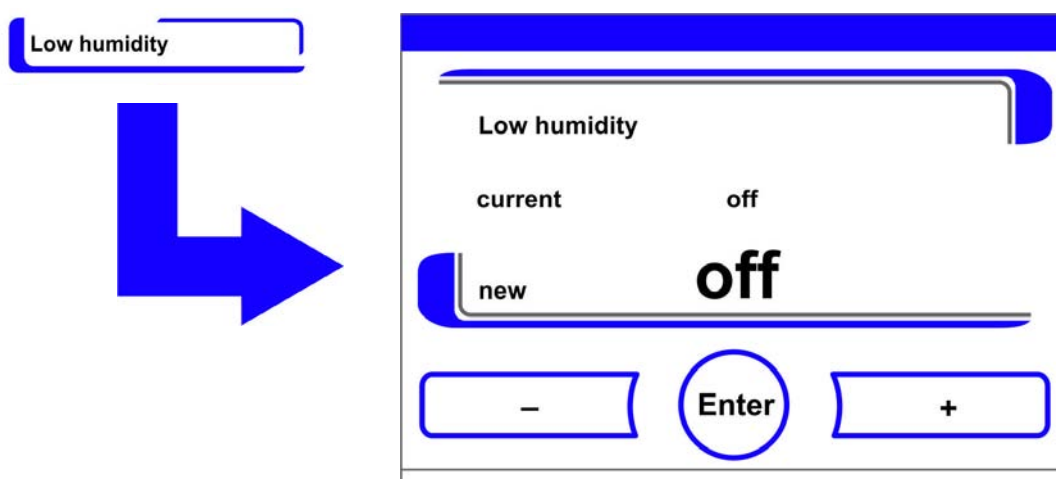
If condensation occurs on the culture containers due to high relative humidity, the humidity in the workspace can be set to a lower level. At the factory, the device control is preset to high humidity (approx. 93% relative humidity).

The relative humidity in the workspace is lowered from approx. 93% to approx. 90%.

The modification requires an extended adaptation 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.

## Setting the Gas Tight Screen

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<sub>2</sub> concentration,
- O<sub>2</sub> concentration,
- relative humidity.

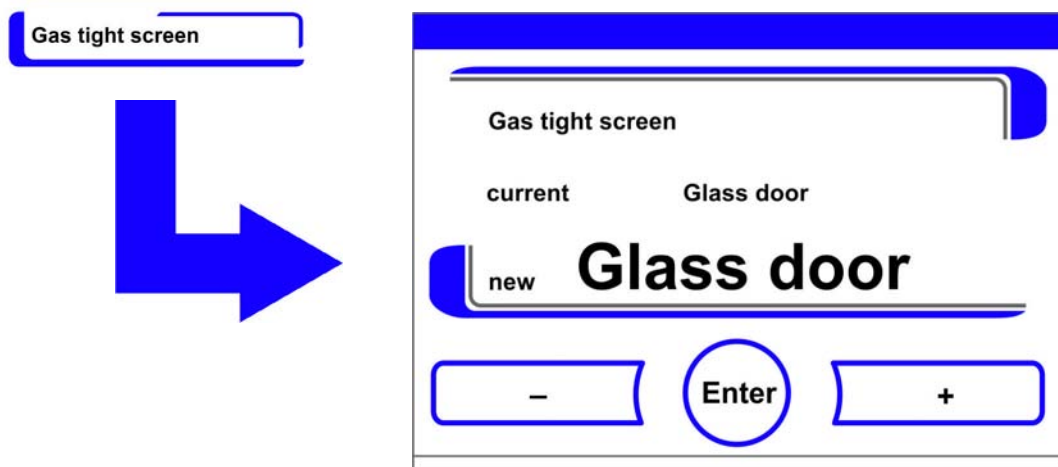
After conversion of the device, the device control system must be adjusted to the gas-tight screen option.

**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.

### Setting the Gas Tight Screen

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.** Setting the Gas Tight Screen

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.

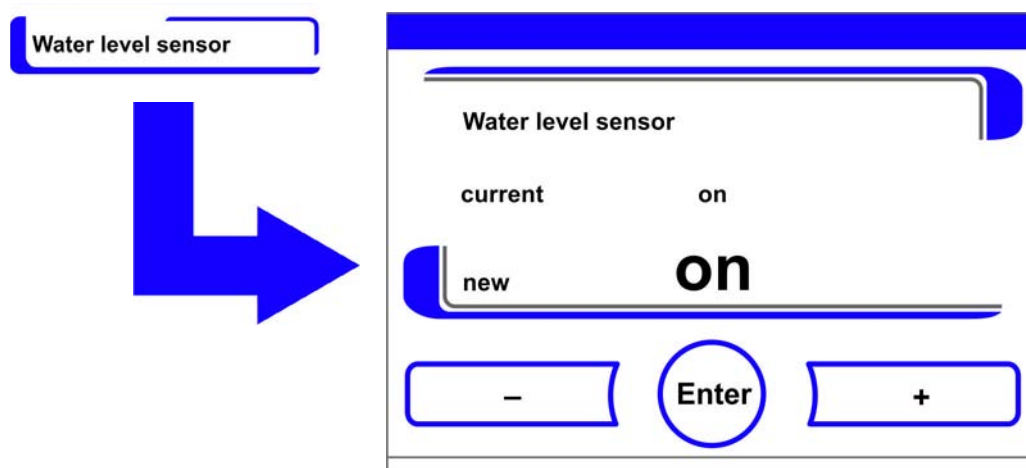
## Activating/De-activating the Water Level Sensor

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 water 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:

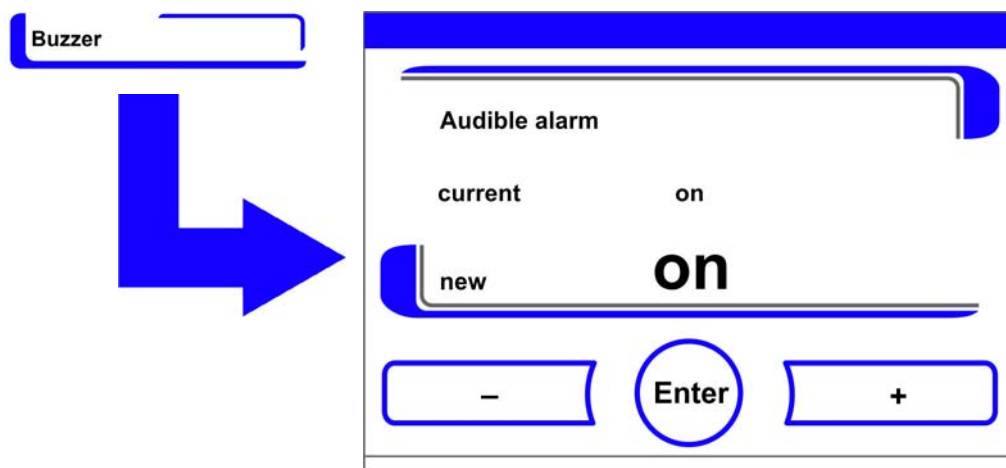
If the device-integral monitoring system detects an error:

- an audible alarm sounds in addition to the visual error message
- 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.** Setting the Alarm Relay

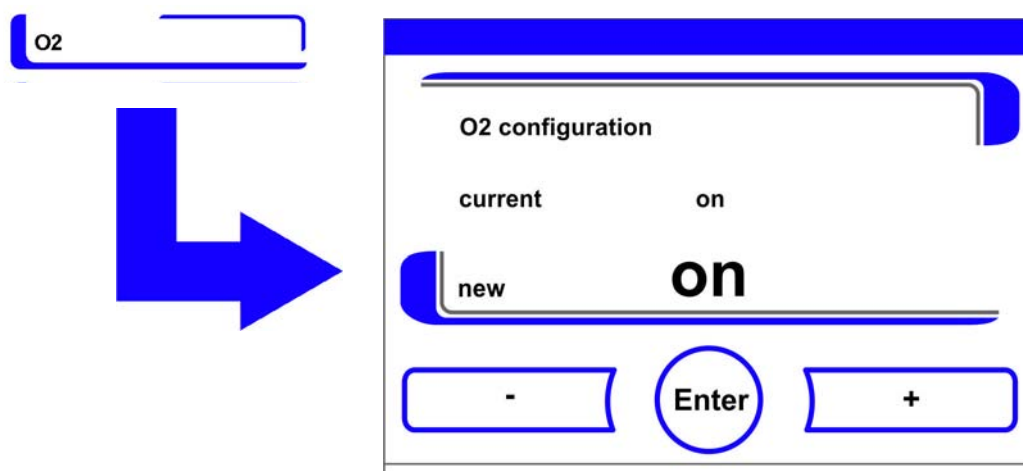
1. To toggle between two states:
  - Press the + key.
  - or
  - Press the - key.
2. To accept and save the change:
  - Press the **Enter** key.
  - The system returns to the **Options** menu.

## Switching the O<sub>2</sub> Control on and off

Depending on the requirements to the work process, the O<sub>2</sub> control can be switched on and off. This setting is possible only on versions with the optional O<sub>2</sub>/N<sub>2</sub> 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<sub>2</sub>.
  - The input dialog shown in [Figure 6-42](#) is displayed.





**Figure 6-42.** Switching the O<sub>2</sub> Control on and off

1. To toggle between two states of the O<sub>2</sub> 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<sub>2</sub> value:

When O<sub>2</sub> control is de-activated, the actual value readout shows three dashes (- - -) in the O<sub>2</sub> display field.

This procedure provides protection for the O<sub>2</sub> sensor. If the set value is set to 21%, the O<sub>2</sub> control loop is not monitored. This is true for both O<sub>2</sub> control ranges:

- Control range I: 1 % to 21 %
- Control range II: 5 % to 90 %

In this case, the O<sub>2</sub> display shows the actual value.

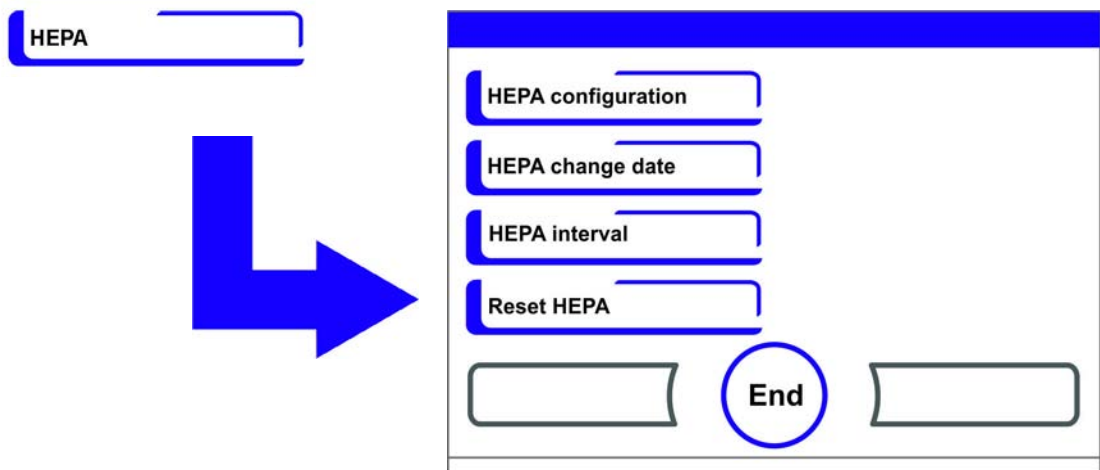
## Airing the Workspace

If the unit is operated with an O<sub>2</sub> or N<sub>2</sub> supply, the workspace must be vented after de-activating O<sub>2</sub> control.

## Activating / De-Activating the HEPA Filter:

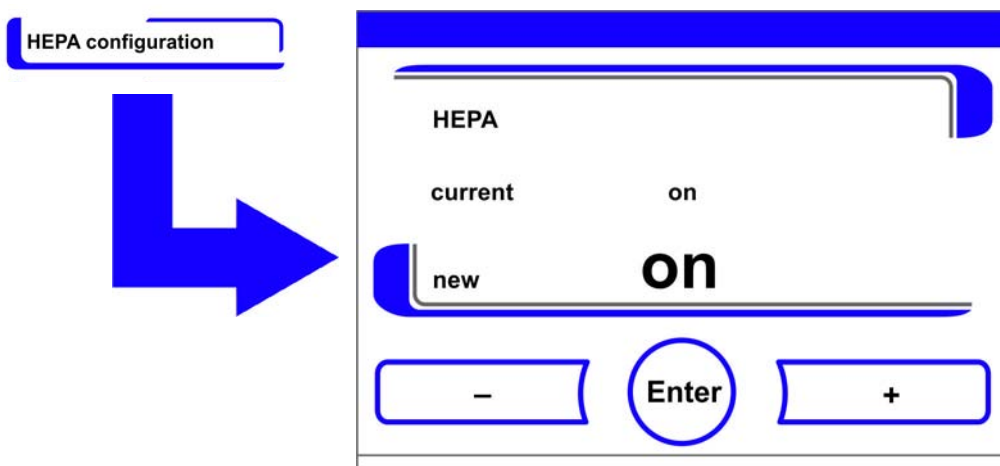
If the unit is to be operated without the built-in HEPA filter, the latter must be de-activated in the configuration menu to avoid malfunctions.

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.

## ISO 5

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).

## 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.

### Viewing 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.

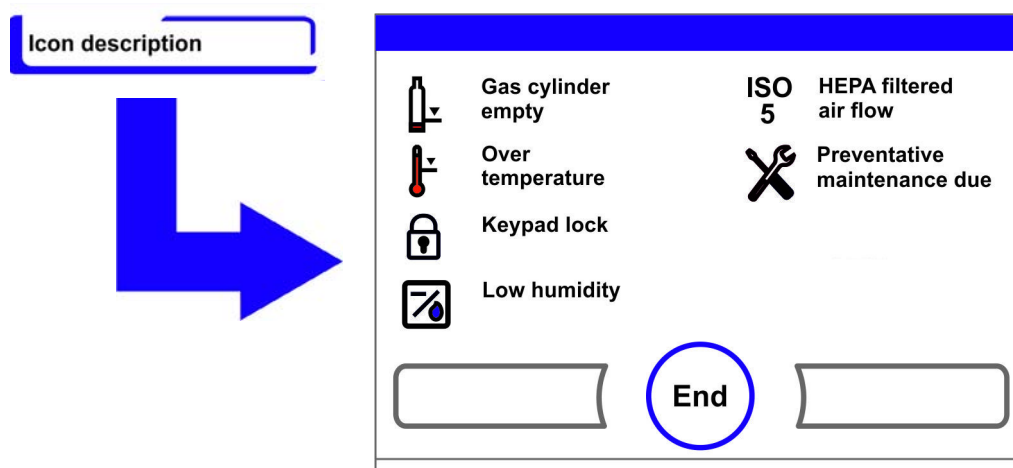


Figure 6-45. Icon Description

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

### Function of the Individual Icons:

#### Gas cylinder empty:



Inactive.

#### 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 6-40).

### 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:



Activity indicator showing the enabled state of the HEPA filter in the workspace (see “[Activating / De-Activating the HEPA Filter](#)” on page 6-38 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.

## 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.
  - 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.

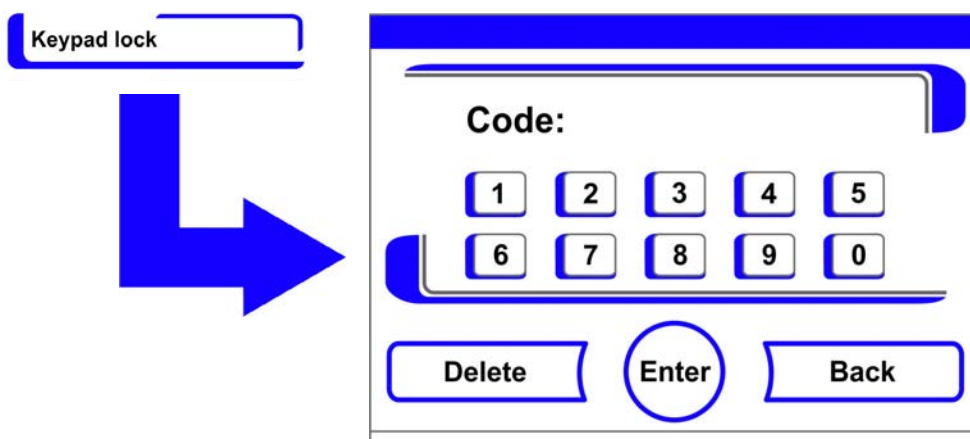


Figure 6-46. Enabling/Disabling the Keypad Lock

## Software Versions

This menu shows the unit software versions in the display.

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

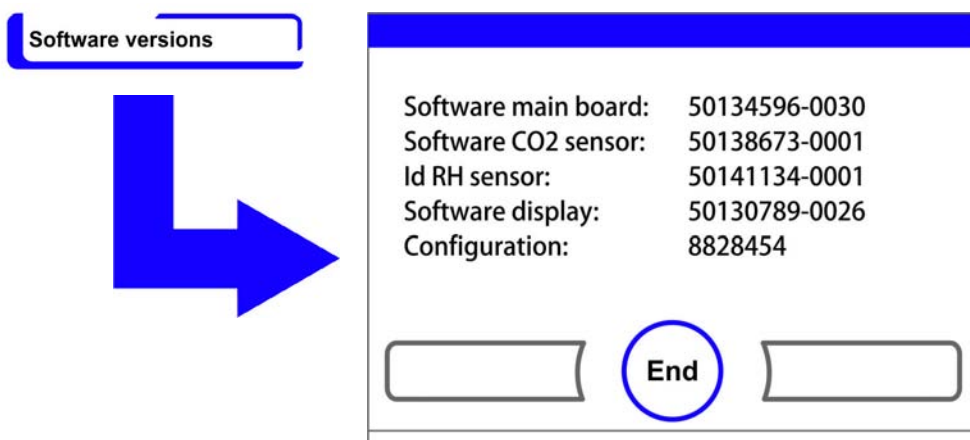


Figure 6-47. Software Versions

## Scaling the Trend Display

The trend display of the three control loops:

- temperature,
- 0...20% CO<sub>2</sub>,
- 0...100% O<sub>2</sub> (optional),

can be scaled to two different versions.

1. Full screen display
  - Press the **CO<sub>2</sub> display field** in the main menu.

- The CO<sub>2</sub> menu (Figure 6-9) is displayed.

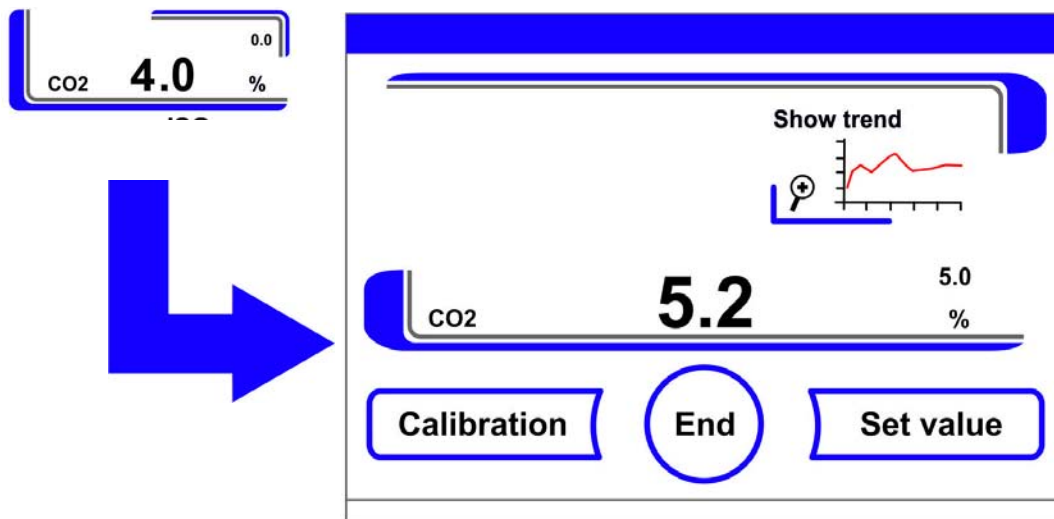


Figure 6-48. Viewing the CO<sub>2</sub> Concentration Graph Display

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

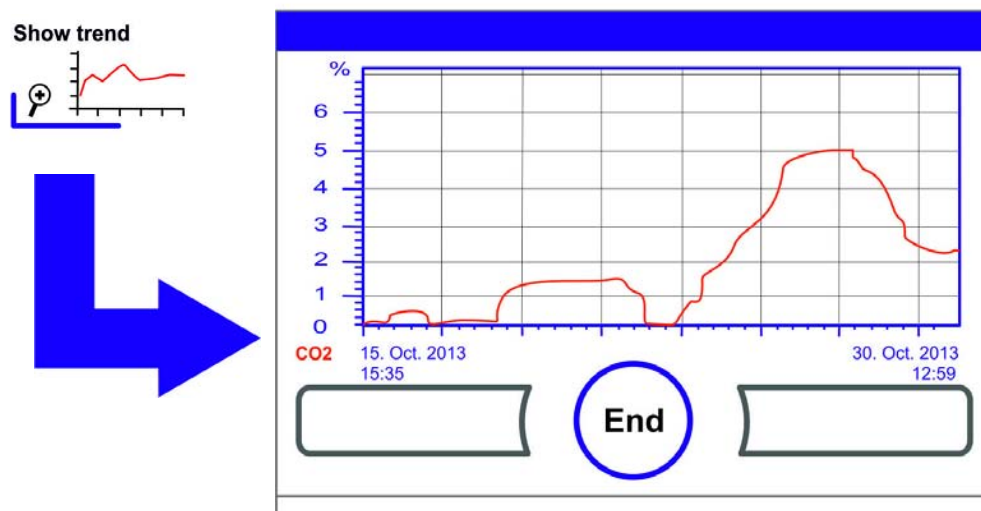


Figure 6-49. Viewing the CO<sub>2</sub> Concentration Graph Display

3. To display an enlarged section:
  - Open a rectangular section in the desired area of the diagram using a finger or a blunt 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.
  - 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<sub>2</sub>, O<sub>2</sub>, 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 sterilization 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.
  - The error message disappears.

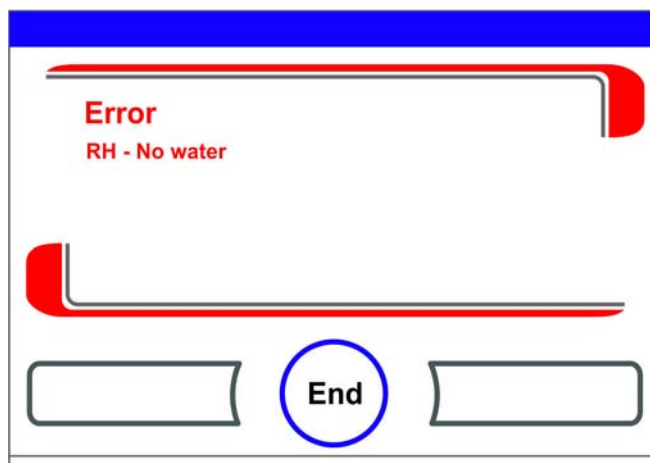


Figure 6-50. Event Error Messages

## 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.

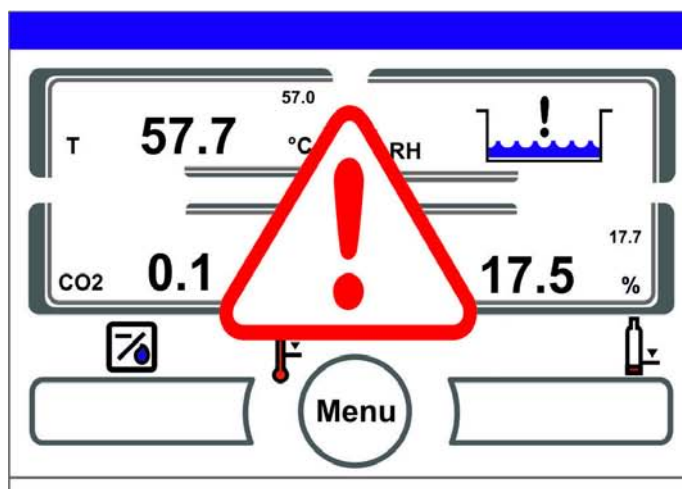
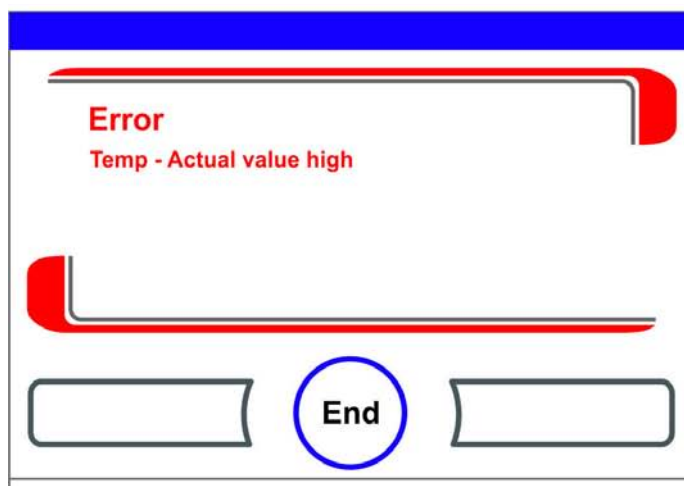


Figure 6-51. Failure Message Overtemperature

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 6-52.** Failure Message Overtemperature

2. To exit the error display:
  - Press the **End** key.
  - 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 6-46).

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 sterilization run at 180 °C. Refer to Chapter [“Steri-Run Sterilization Routine”](#) on page 8-7.

The sterilization 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 model number and serial number ready.

| Control loop      | Failure message  | Cause  | Remedy  | Alarm relay | Audible alarm | Log |
|-------------------|--|--|---|-------------|---------------|-----|
| System            | Device door open too long  | Doors open for more than 10 minutes  | Close device doors  | X           | X             | X   |
|                   | Failure: Display   | Display not communicating with the main board <sup>*1)</sup>   | Reset unit. If the error occurs repeatedly, call service.           | X           | X             | X   |
|                   | Failure: EEPROM main board   | EEPROM on main board is defective  | Reset unit. If the error occurs repeatedly, call service.           | X           | X             | X   |
|                   | Failure: 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.           |             |               |     |
|                   | Failure: 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   |
|                   | Failure: auto-start  | Error in auto-start routine  | Re-launch auto-start. If the error occurs repeatedly, call service. | X           | X             | X   |
|                   | Failure: ADC   | Measurement of reference resistance out of tolerance   | Reset unit. If the error occurs repeatedly, call service.           | X           | X             | X   |
|                   | Failure: Fan   | Actual value of the fan is out of tolerance.   | Reset unit. If the error occurs repeatedly, call service.           | X           | X             | X   |
|                   | Failure: Fan of the rear wall filter enclosure - Red warning indicator lights up | HEPA filter of the rear wall filter enclosure - the filter has a leak, e.g. because it has been damaged.<br>The fan does not provide full or any power | Change the HEPA filter  |             |               |     |
| IR sensor changed | New serial number detected   | Acknowledge the alarm  | X   | X           | X             |     |

## 6 Handling and Control

### Error Messages

| Control loop | Failure message                 | Cause   | Remedy  | Alarm relay | Audible alarm | Log |
|--------------|---------------------------------|---|---|-------------|---------------|-----|
| Temperature  | Sensor breakage                 | Measured value exceeds accepted limit                     | Request service.<br>Dry the sensor.                                 | 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 field 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%<br>CO <sub>2</sub> | Sensor breakage                         | Measured value exceeds accepted limit                                | Run auto-start. If the error occurs again, troubleshoot the unit on the basis of section “Measures After Power Outage” on page 6-45. If the error persists, call field service. | X           | X             | X   |
|                            | Actual value above                      | Actual value > Set value + 1% * <sup>4)</sup>                        | automatic   | X           | X             | X   |
|                            | Actual value below                      | Actual value < Set value - 1% * <sup>3)</sup> * <sup>4)</sup>        | 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 <sub>2</sub> exceeded / not attained        | Acknowledge the alarm   |             |               | X   |
|                            | Error communication                     | Sensor not communicating with the main board                         | automatic   | X           | X             | X   |
|                            | Failure: Gas cylinder changeover switch | Gas cylinder changeover switch not communicating with the main board | automatic   | X           | X             | X   |
|                            | No gas                                  | Both CO <sub>2</sub> cylinders are empty                             | Swap at least one CO <sub>2</sub> cylinder.   | X           | X             | X   |
|                            | RH sensor breakage                      | Measured value exceeds accepted limit                                | Call service. See also Chapter “Measures After Power Outage” on page 6-45.  | X           | X             | X   |
|                            | Gas cylinder A empty                    | Gas cylinder A is empty  | Replace gas cylinder A  |             |               |     |
| Gas cylinder B empty       | Gas cylinder B is empty                 | Replace gas cylinder B   |   |             |               |     |

## 6 Handling and Control

### Error Messages

| Control loop               | Failure message                         | Cause  | Remedy   | Alarm relay | Audible alarm | Log |
|----------------------------|---|--|--|-------------|---------------|-----|
| 0...100%<br>O <sub>2</sub> | Sensor breakage                         | Measured value exceeds accepted limit                                | Call field 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                         | Call field service   | X           | X             | X   |
|                            | Failure: Gas cylinder changeover switch | Gas cylinder changeover switch not communicating with the main board | automatic  | X           | X             | X   |
|                            | No gas                                  | Both O <sub>2</sub> gas cylinders are empty                          | Swap at least one O <sub>2</sub> cylinder.   | X           | X             | X   |
|                            | Gas cylinder A empty                    | Gas cylinder A is empty  | Replace gas cylinder A   |             |               |     |
|                            | Gas 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 “ <a href="#">Measures After Power Outage</a> ” on <a href="#">page 6-45</a> . If the error persists, call field service. | X           | X             | X   |
| Fan                        | The LED on the outside lights up red    | Fan in the rear wall enclosure doesn't work properly                 |  |             |               |     |

\*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 cultures. 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.

## **6 Handling and Control**

### Error Messages



# Shut-Down

## Table of Contents

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

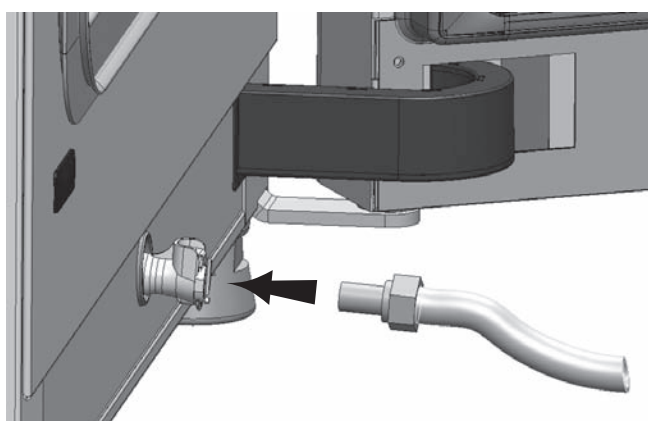
## Shutting the Device Down



### **WARNING** Contamination hazard!

The surfaces of the work space may be contaminated. If the interior space surfaces are contaminated, microorganisms may spread and grow throughout the chamber of the incubator. In case of a shut-down, the device must be disinfected!

1. Remove the culture containers and all accessories from the workspace.
2. Obtain a 3 l beaker or flask.
3. Place the open end of the drain into the collection beaker or flask and lock the quick connect valve safely into the drain port.
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. Disconnect the hose from the quick connect valve.

## 7 Shut-Down

### Shutting the Device Down

7. Start the Steri-Run sterilization routine (“[Launching Steri-Run](#)” on [page 6-16](#)).
8. Turn the device off using the power switch when the Steri-Run sterilization routine has been completed.
9. Unplug the power connector and protect it against accidental reconnection.
10. Close shut-off valves of the gas supply system.
11. Disconnect the gas pressure hoses from the sleeve at the rear of the device.
12. Until the device is completely cooled, 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
- “Disinfection Procedures” on page 8-2
- “Preparing for Sterilization / Steri-Run” on page 8-2
- “Wipe/Spray Disinfection of the Workspace” on page 8-3
- “Steri-Run Sterilization 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 the plastics to become brittle. Do not use any solvents containing hydrocarbons or strong acids or alkalis to clean the plastic parts and surfaces!

### Moisture-sensitive components!

Do not spray the filter materials areas of the four supply air filters or the grid of the HEPA filter on the rear wall filter enclosure, including its edges, with any chemical agent. When wiping the device clean, always make sure that moisture does not enter into these components.

### **Note** Contamination

In order to avoid contamination of the incubator or cultures, cleaning and disinfection of the equipment must be carried out after a contamination has occurred.

## Cleaning Exterior Surfaces:

1. Thoroughly remove dirt residues and deposits using a solution of tepid water and dishwashing soap.
2. Wipe the surfaces clean using a clean cloth and clear water.
3. Then, wipe the surfaces dry using a clean cloth.

## Disinfection Procedures

For Cell Locker cleaning and disinfection see separate Cell Locker operating instructions in the [Appendix](#)). The operator must prepare hygiene regulations for the disinfection of the device in accordance with the application of the device.

The following disinfection procedures are compatible with the device:

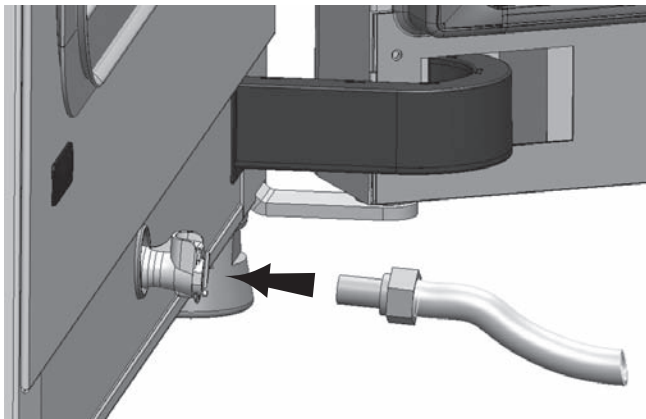
### Wipe/spray Disinfection:

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

The Steri-Run sterilization routine uses an automated program cycle to sterilize the complete workspace including the shelf system and the sensors.

## Preparing for Sterilization / Steri-Run

1. Remove all cultures from the workspace and store them in a safe place.
2. Obtain a 3 l beaker or flask to collect the water.
3. Place the open end of the drain hose into the collecting vessel and lock the quick connect drain hose valve safely into the drain port.
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 the airbox (1/[Figure 8-2](#)) out of its seat on the water reservoir cover panel and remove it.
8. Remove the HEPA filter (2/[Figure 8-2](#)) out of the airbox (1/[Figure 8-2](#)) and reinstall the empty airbox.

## Wipe/Spray Disinfection of the Workspace

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.
- Allow the alcohol disinfectant to air 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.

## 8 Cleaning and Disinfection

### Wipe/Spray Disinfection of the Workspace



#### 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 manufacturer and the hygiene supervisor.

#### Predisinfection:

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



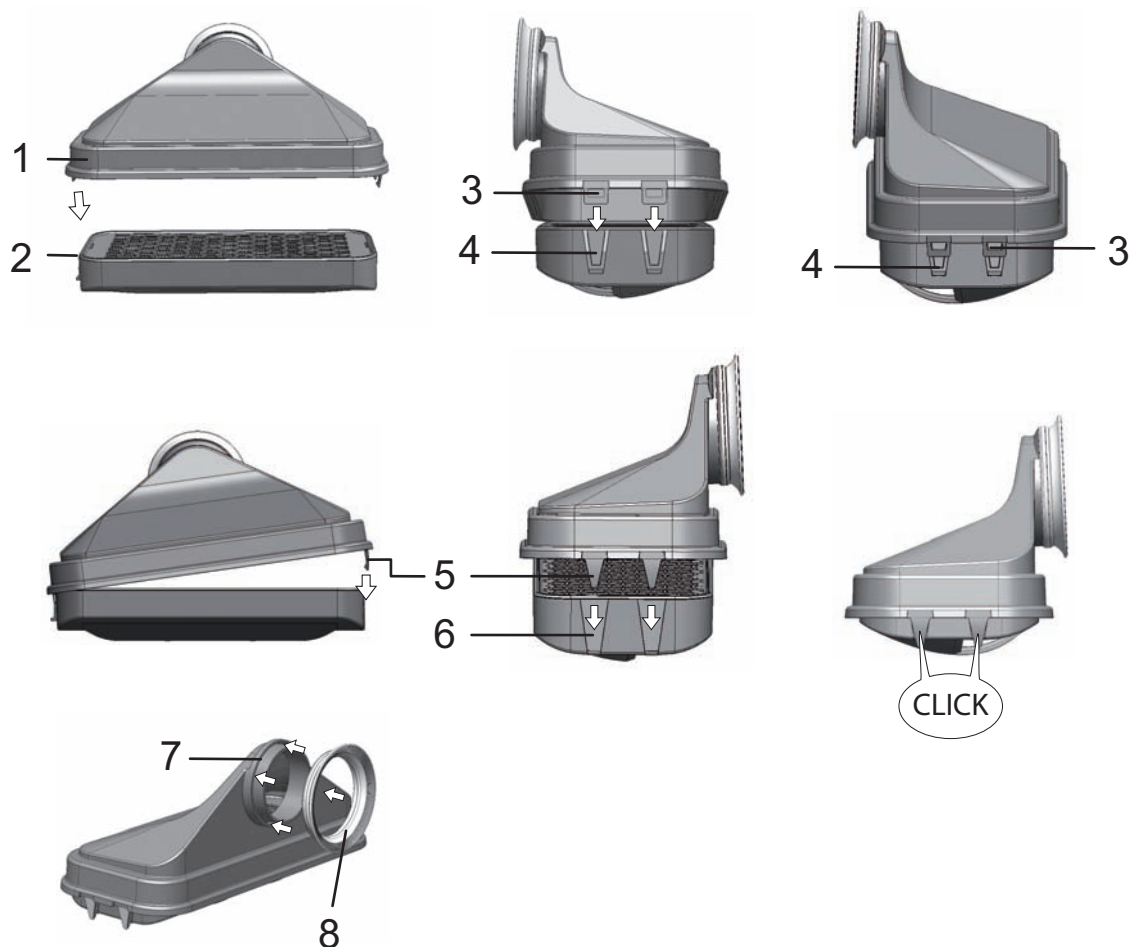
#### CAUTION Moisture-sensitive components!

Do not spray the CO<sub>2</sub> sensor or the O<sub>2</sub>/N<sub>2</sub> sensor behind the air duct with disinfectant.

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

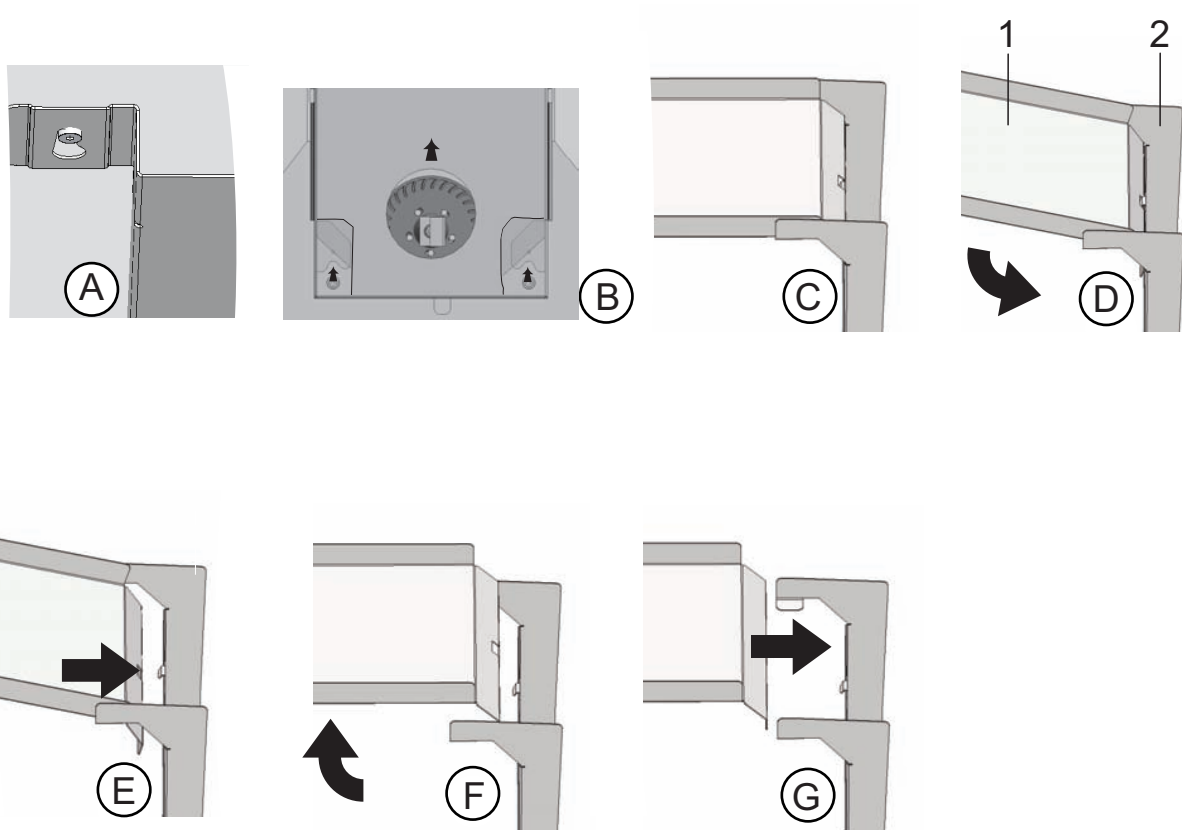
#### Removing Accessories and Shelf System:

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 in the Workspace](#)" 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 prefilter.  
The prefilter 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 soap.
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 70% ethanol one more time.
2. Allow the 70% ethanol to air dry.
3. Reinstall the shelf system and the removed components.



## Steri-Run Sterilization Routine

Steri-Run is an automated sterilization 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 sterilization routine takes less than 12 hours to complete. During this routine, a hot atmosphere at 180 °C with proven 12-log sterilization effect is created in the workspace for 90 minutes. The effectiveness of the Steri-Run sterilization routine has been certified by independent institutes. The germ reduction efficiency achieved is equal to 10<sup>12</sup> (12-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 sterilization routine:

The Steri-Run sterilization 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.
- The locking system has not locked the door

Overtemperature protection:

If the overtemperature protection was enabled on the device, the Steri-Run sterilization routine cannot be started before the fault has been corrected or reset.



**CAUTION** Limited operating temperature for Cell Locker Chambers!

Before a “Steri-Run sterilization run” the Cell Locker Chambers must be removed. The max. operating temperature for Cell Locker Chambers is 121°C/250 °F.

## Progress of a Steri-Run Sterilization Routine:

1. Before starting the sterilization run, the two silicon plugs inside and outside the access port must be fitted on the access port. The silicon plug on the outside should cover the free space inside the access port.
2. Before starting the 180°C sterilization routine, one (of two possible) gas inlet filters should be screwed into the pressure compensation opening. This is necessary to prevent particles from the workspace, which can be generated during the routine, from entering the clean room.



Gas inlet filter

3. If components of the shelf system have been removed for cleaning, reinstall them in the workspace.
4. Screw the additional gas inlet filter into the pressure compensation opening. This prevents particles from the workspace from entering the ambient air.
5. Turn on the device using the power switch.
6. Activate and start the sterilization routine.
7. After the completed Steri-Run routine, power the unit down.
8. Remove the airbox (1/[Figure 8-2](#)) and re-install the HEPA filter (2/[Figure 8-2](#)).
9. Unscrew the additional gas inlet filter from the pressure compensation opening.
10. 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 sterilization routine.

During the routine run or immediately after completion of the run, always wear safety gloves when touching these surfaces!

The door locking system prevents access to the workspace as long as the inner surfaces are hot due to the action of the Steri-Run sterilization routine.



### CAUTION Damage to the cultures!

During the Steri-Run sterilization routine, the workspace is heated up to 180 °C. Make sure that:

- all cultures are removed from the workspace,
- any added accessories are removed from the workspace.

## Operating Phases of Steri-Run sterilization:

The displayed remaining run time of the Steri-Run sterilization 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 estimation.

The routine is divided into three phases:

1. Heating phase,
2. Sterilization phase,
3. Cool-down.

Heating phase: approx. 2 h.

The workspace is heated up to 180 °C.

The incubator locks the door when the workspace temperature surpasses 65°C.

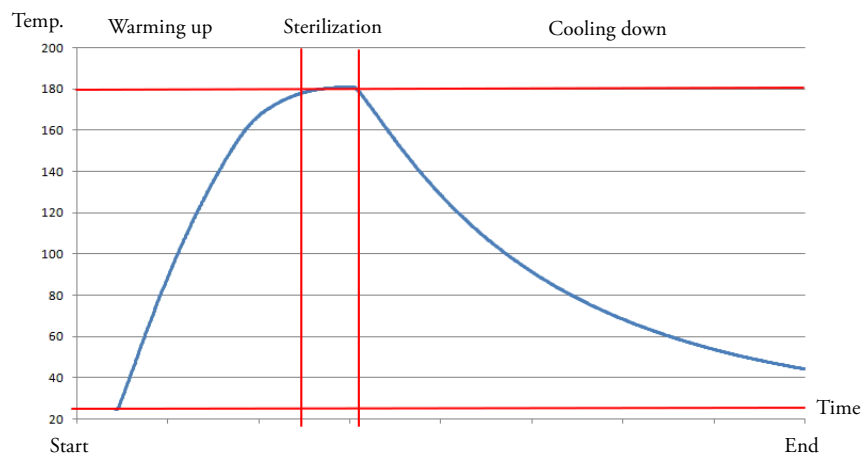
Sterilization phase: approx. 1.5 h.

After the sterilization temperature has been reached, the sterilization 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.

The door lock is released automatically when the temperature in the workspace drops below 65°C.



**Figure 8-4.** Steri-Run Sterilization Routine Phases

## Activate Steri-Run

The Steri-Run sterilization routine is used to sterilize the complete workspace.

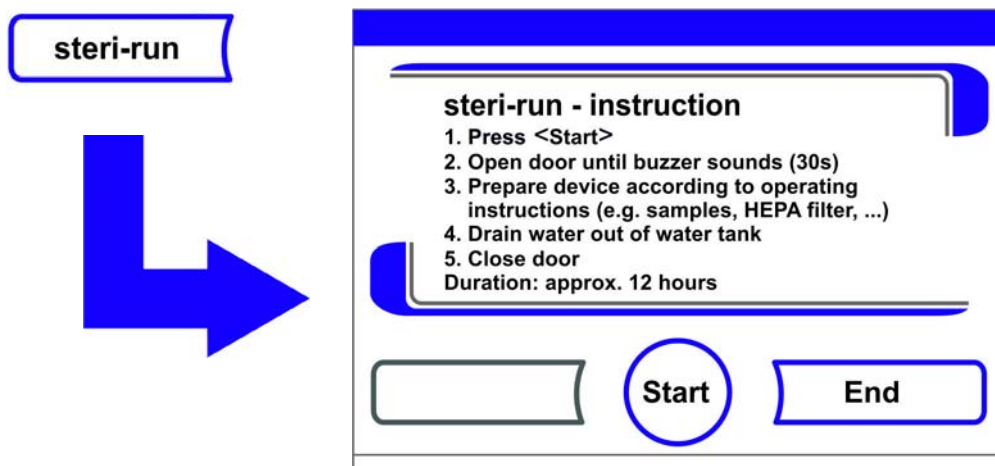
1. Press the **Steri-Run** key.

### Note

Before starting the sterilization run, the two silicon plugs inside and outside the access port must be fitted on the access port.

The silicon plug on the outside should cover the free space inside the access port.

- The Steri-Run instruction 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 until the audible alarm sounds after 30 seconds.
5. Remove all cultures from the workspace.
6. Drain water from the reservoir, wipe up any residual water.
7. Screw the additional gas inlet filter into the overpressure opening.
8. When the audible timer alarm is sounded, close both device doors.
  - Start Steri-Run.
  - The cycle of the Steri-Run sterilization routine starts. The device heats up, and the electromechanical door lock engages at 65°C.
  - While the Steri-Run sterilization routine is running, the display shows the current status and outputs the following information:
    - temperature,
    - start time,
    - phase,

- remaining run time.

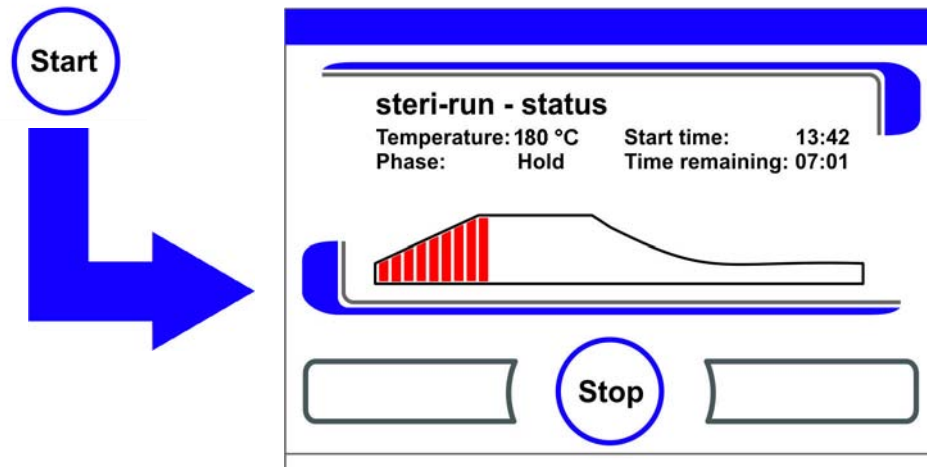


Figure 8-6. Activate Steri-Run

## Canceling Steri-Run

The Steri-Run sterilization 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.

### Note

As long as the workspace temperature is above 65°C, the door remains locked! For manual unlocking, see Chapter 8-13.

3. To resume Steri-Run:
  - Press the **Back** key.
  - The system returns to the status display, and the sterilization 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.

## Steri-Run Interruption due to Error

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

- the sterilization 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 sterilization 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.

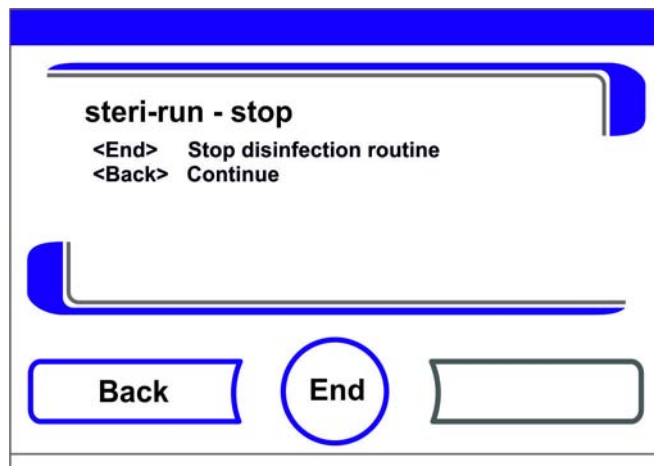
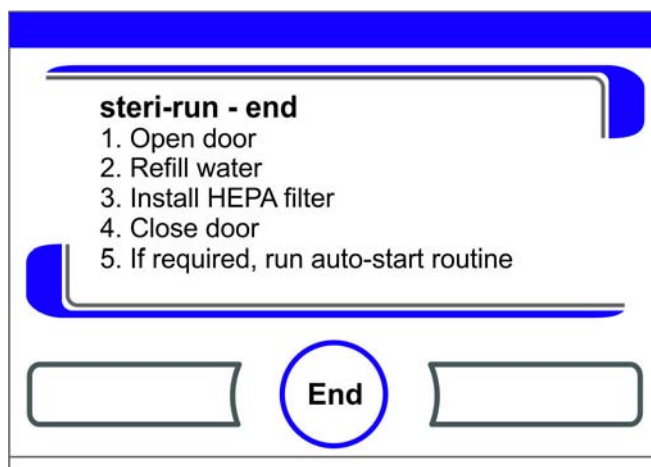


Figure 8-7. Interrupting / Canceling Steri-Run

## Completing Steri-Run

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



**Figure 8-8.** To stop Steri-Run

- To stop Steri-Run:
  - Press the **End** key.
  - The system returns to the main menu.

**Note** Opening door during Steri-Run sterilization:

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

**Note**

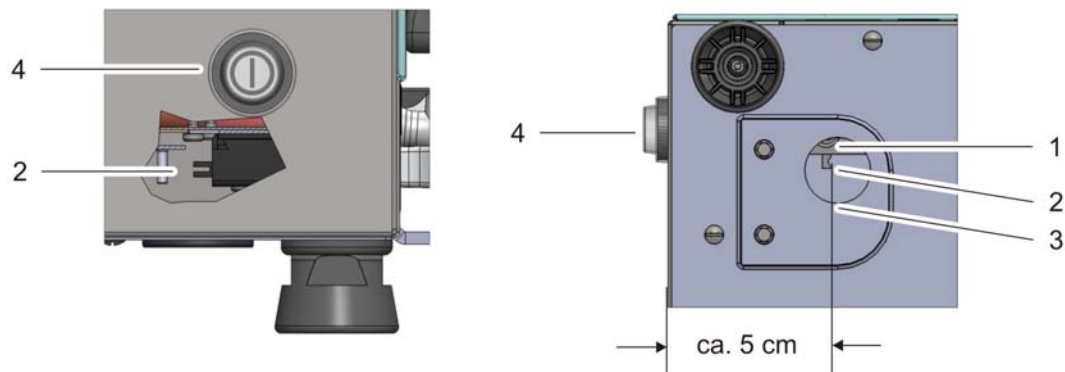
Risk of burns! Avoid opening the door unless in case of an emergency.

## Opening the Door after Canceling Steri-Run

The door cannot be opened immediately after the Steri-Run sterilization routine has been aborted by the user or 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 use the emergency release lever (item 2 in [Figure 8-9](#)):

- Locate the emergency release lever (2) 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 under the bottom panel and remove the round cover (3/[Fig. 8-9](#)).
- Insert a finger through the hole and pull the emergency release lever above it towards the power switch.
- The door lock disengages and releases the outer door for opening
- Replace the round cover (3/[Fig. 8-9](#)).



**CAUTION** Hot surfaces!

The handle and 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 sterilization routine. During the routine run or immediately after completion of the run, always wear safety gloves when touching these surfaces!



# Maintenance

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- “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
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- “CO<sub>2</sub> Calibration Procedure” on page 9-6
- “Replacing the HEPA Filter in the Workspace” on page 9-7
- “Replacing the Gas Inlet Filter” on page 9-10
- “Device Fuse Replacement” on page 9-11
- “Replacing the Outer Door Seal” on page 9-11

## 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 Chamber Maintenance see separate Cell Locker System operating instructions in the [Appendix](#)).

### Daily Check:

- Gas reserve of the CO<sub>2</sub> supply system.
- Gas reserve of the O<sub>2</sub>/N<sub>2</sub> supply system (optional).

### Annual Inspection:

- Tightness of the glass door seal.
- Permeability of the pressure compensation opening with insert.
- Functional check of the operating panel and of the device control.
- Perform electrical safety check in accordance with the relevant national regulations (e.g. IEC 61010-1, IEC 61010-2-010)

#### **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 sterilization routine.
- Perform temperature and CO<sub>2</sub>/O<sub>2</sub> comparison measurement.
- Check HEPA filter in the inner chamber and replace if necessary.
- Replace the HEPA filter in the rear wall filter enclosure.

### Sixfold Gas Tight Screen:

- Check cover gasket every 6 months. Replace if necessary.
- For Cell Locker Chamber membrane filters see separate Cell Locker System operating instructions (see [Appendix](#)).

### Annual Service:

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

**Note** Service contract:

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

## Preparing Temperature Calibration

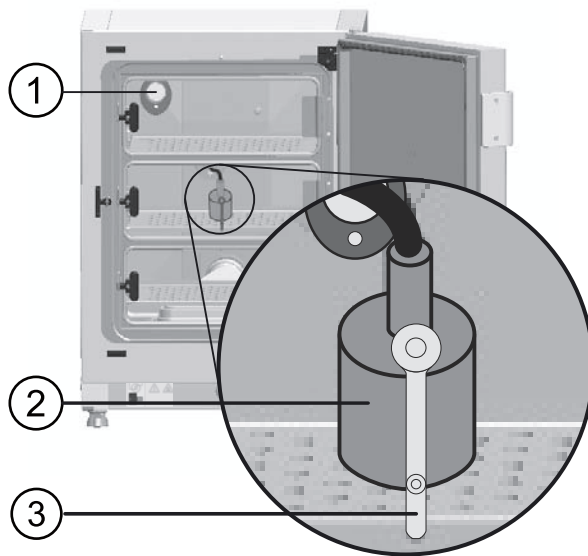
To determine the exact measured value of the incubator's integral temperature sensor, a temperature comparison measurement must be performed every three months. If a major temperature deviation is found during this check, temperature calibration is required. During this process, the temperature controller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

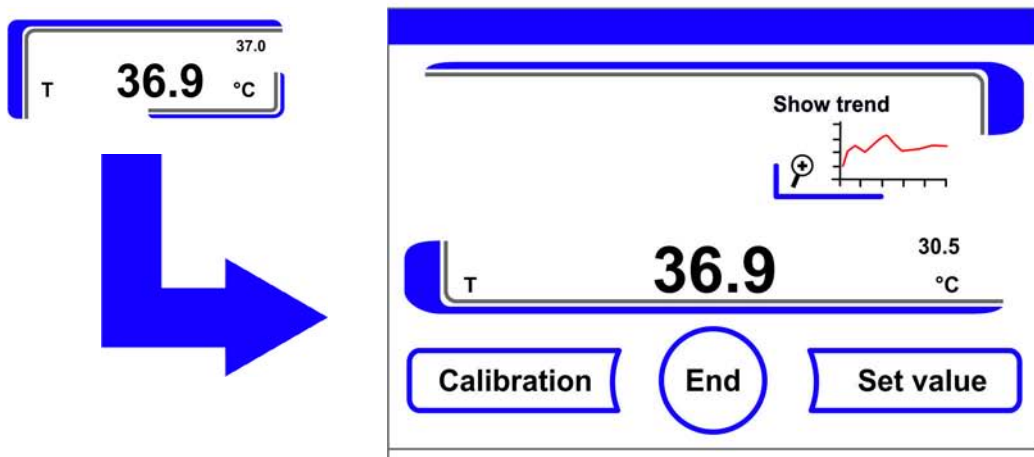
### Comparison Measurement Procedure:

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 port 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

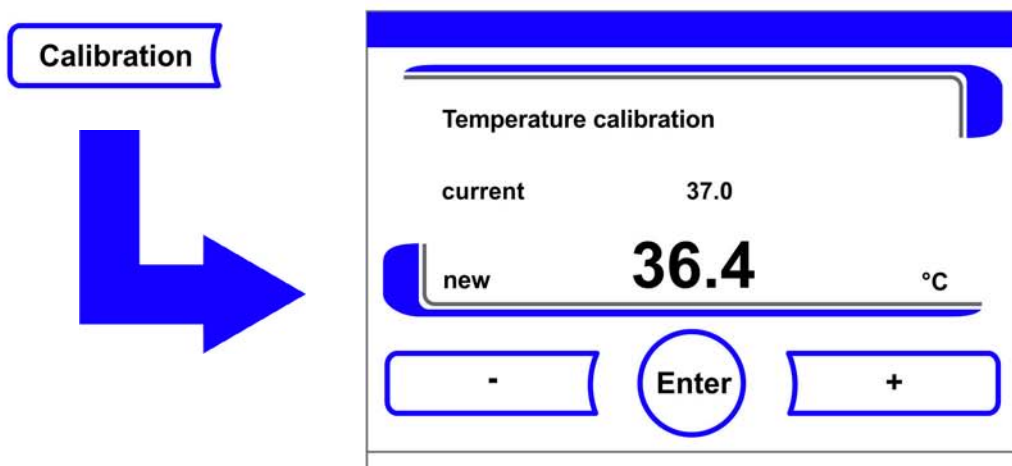
Measurement example:

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



**Figure 9-3.** Temperature Calibration Procedure

4. Enter the measured value (target value):

The targetting 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 targetting 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<sub>2</sub> Calibration

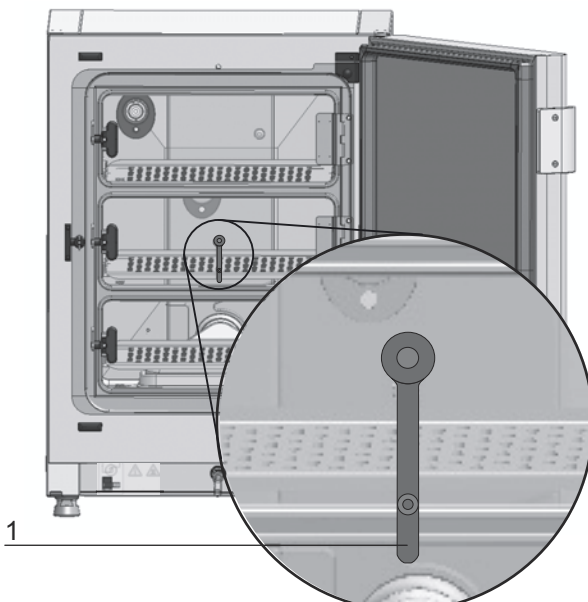
To determine the exact measured value of the device-integral CO<sub>2</sub> sensor, a CO<sub>2</sub> comparison measurement has to be performed every three months.

If a major deviation is found during this check, a CO<sub>2</sub> calibration is required.

During this process, the CO<sub>2</sub> control of the device is set to the value measured during the comparison measurement. Use a calibrated measuring instrument with an accuracy of  $< \pm 0.3\%$  CO<sub>2</sub> for this test.

### Suitable Instrument:

- Portable IR readout instrument.  
The measuring sample is withdrawn through the measurement port [1/Figure 9-4] of the glass door. The comparison measurement must be performed when the device is completely heated to the set temperature.



**Figure 9-4.** Gas-Tight Screen Measurement Port

## Comparison Measurement Procedure:

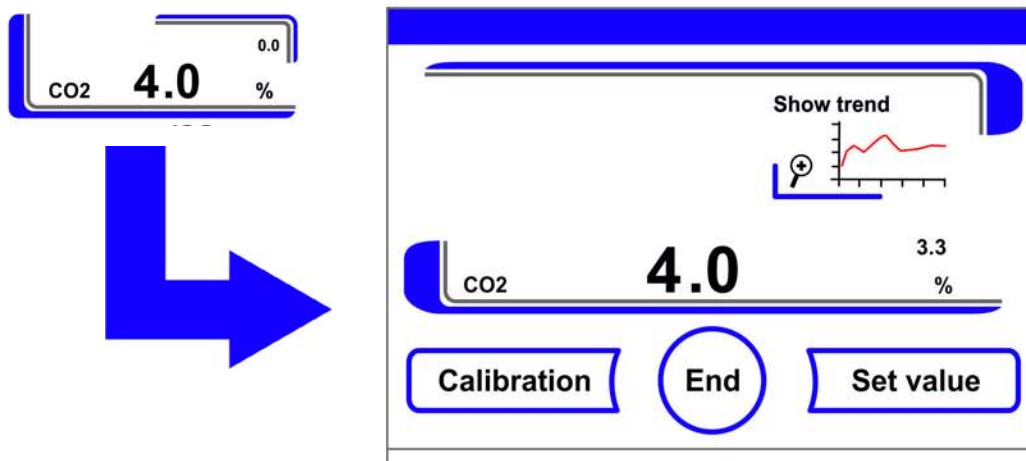
1. Turn on the device using the power switch.
2. Adjust the CO<sub>2</sub> concentration to 4% and wait until the unit has fully heated up and developed the correct humidity level. It takes at least 12 hours for develop and stabilize the humidity.
3. Insert the measuring instrument probe through the measurement port into the workspace. Wait until the CO<sub>2</sub> value displayed by the instrument has stabilized.
4. For devices equipped with the optional gas-tight screen, the measurement port is located:
  - in the central gas screen door in the case of a threefold gas-tight screen,
  - in the central left gas screen door in the case of a sixfold gas tight screen.
5. Remove the measuring probe, plug the measurement port and close the doors.
6. Calibrate the CO<sub>2</sub> control.

## CO<sub>2</sub> Calibration Procedure

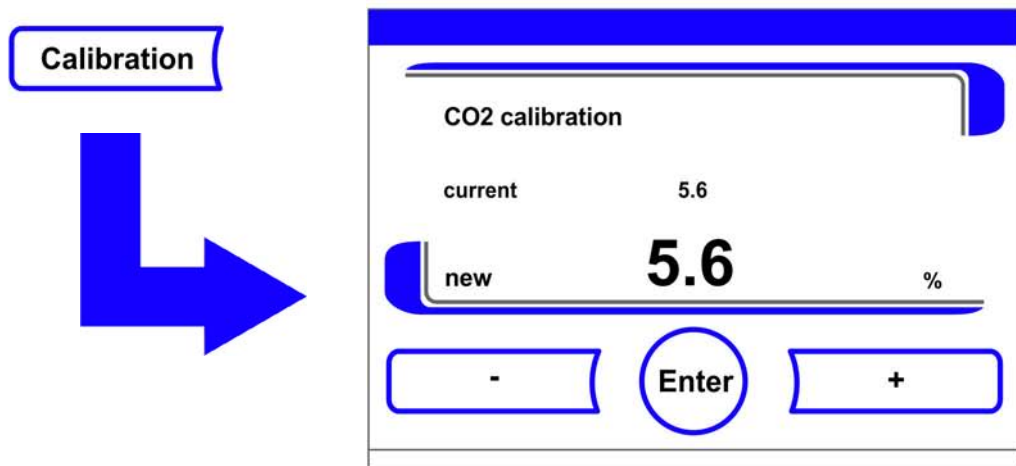
Measurement example:

- CO<sub>2</sub> set value: 4.0 %
- Reference value: 5.6 %

1. Press the CO<sub>2</sub> display key.
  - The CO<sub>2</sub> menu is displayed.



2. To exit the CO<sub>2</sub> menu:
  - Press the **End** key.
3. To enter the Calibration submenu:
  - Press the **Calibration** key.



**Figure 9-5.** CO<sub>2</sub> Calibration Procedure

4. Enter the measured value (target value):  
The targetting 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 targetting 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<sub>2</sub> display shows the actual value currently measured in the workspace.

**Note** Excessive CO<sub>2</sub> content:

Excessive CO<sub>2</sub> 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 in the Workspace

The HEPA filter in the workspace is installed under a plastic airbox at the bottom of the workspace, right before the rear wall.

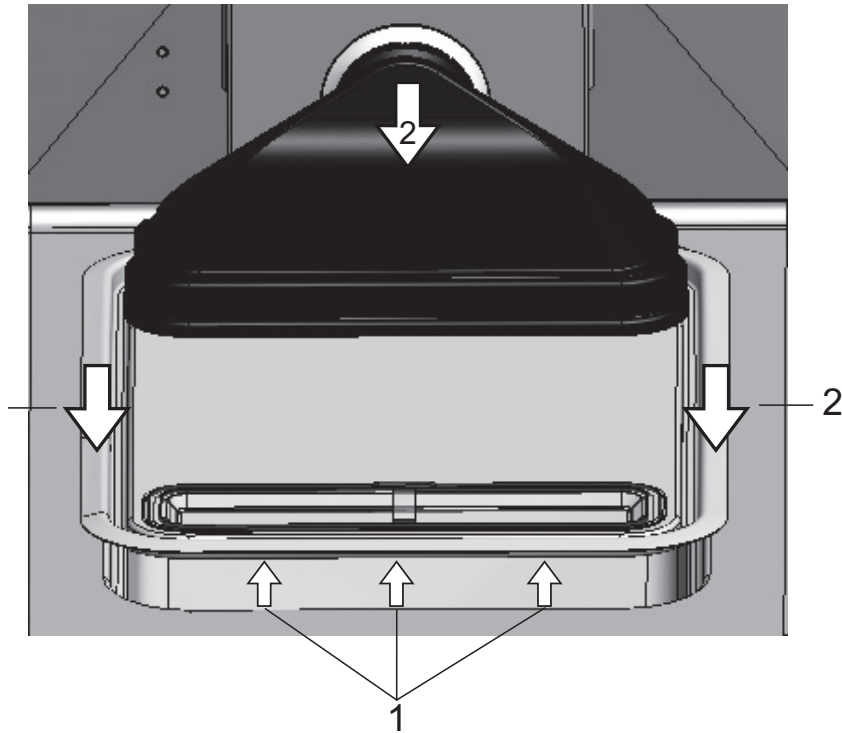
Steps for replacing the HEPA filter:

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

## 9 Maintenance

### Replacing the HEPA Filter in the Workspace

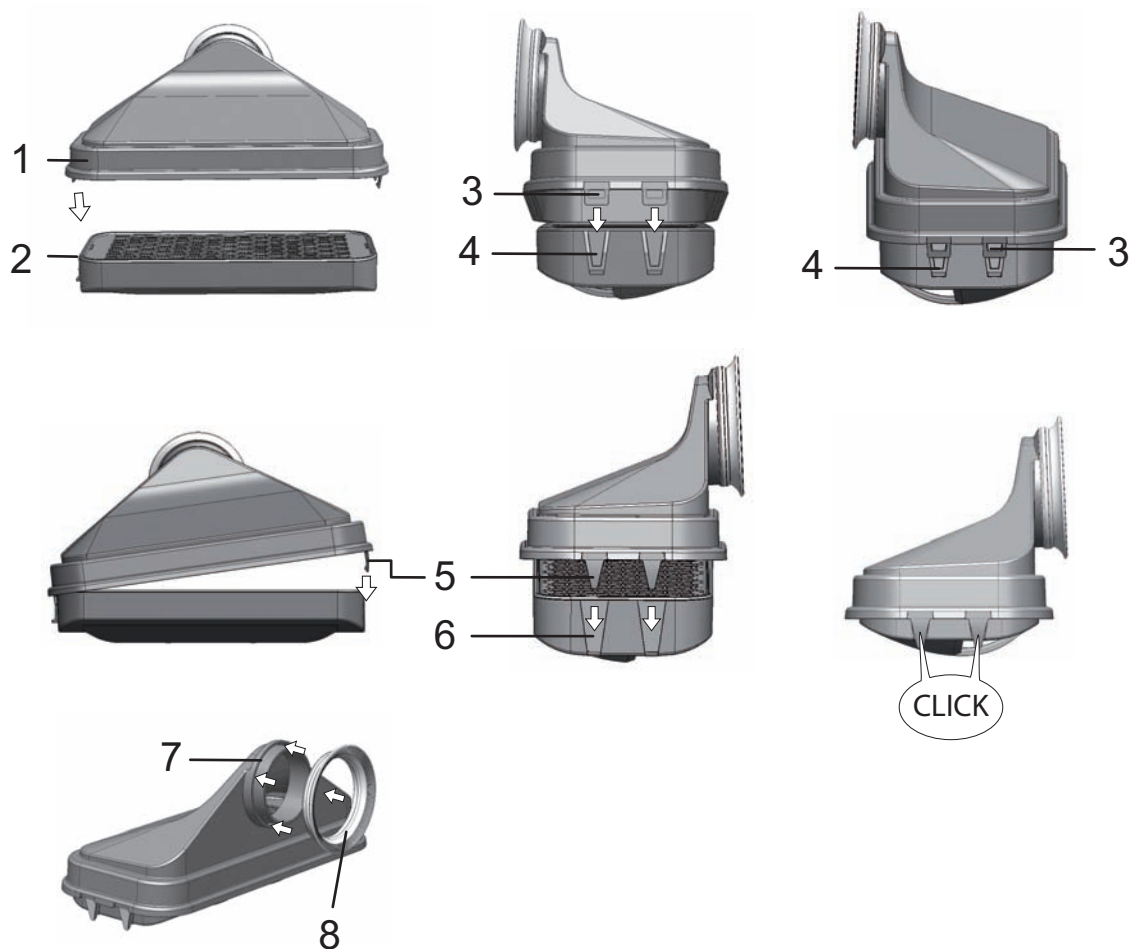
3. Lift the water reservoir cover at the front side (1/Figure 9-6).



**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 6-38](#).
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 HEPA Filter in the Rear Wall Filter Enclosure

The HEPA filter in the rear wall filter enclosure is fixed with 12 hexagonal bolts.



Front View



Back View



HEPA filter holder

Exhaust filter

Loosen the 12 hexagonal bolts and store them in a safe place.

Take the new HEPA filter out of the packaging and make sure that the inner filter surface is not touched.

Insert the new filter and screw in the 12 hexagonal bolts crosswise and then tighten them.

**Note** Checking the LED

When the HEPA filter is removed, the unit must be turned on briefly and the fan warning LED must turn red.

## Replacing the Gas Inlet Filter

The gas inlet filter (CO<sub>2</sub>/O<sub>2</sub>/N<sub>2</sub> 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 (3/[Figure 9-8](#)).
3. Remove the gas hose (4/[Figure 9-8](#)) from the gas inlet filter sleeve.

Procedure for all gas inlet filters:

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

Procedure for gas supply gas inlet filter:

6. 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.

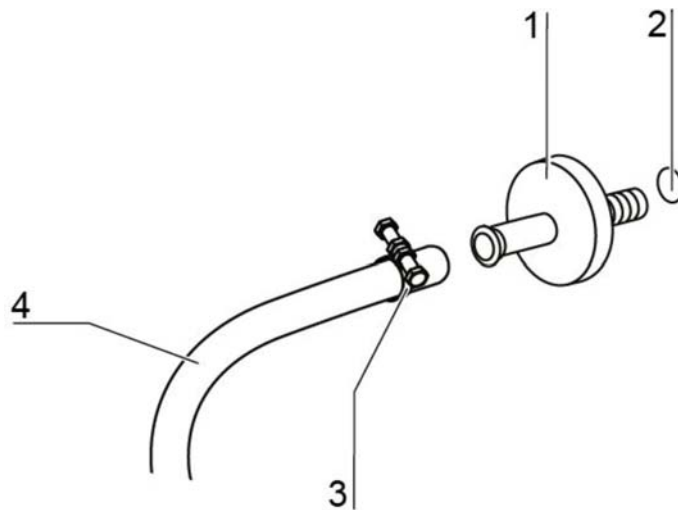


Figure 9-8. Gas Inlet Filter Installation

## Device Fuse Replacement

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

## Replacing the Outer Door Seal

### Note

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

When changing the door seal of a device, make sure that a door seal is used for the electromagnetic door lock.

### Note

The glass door seal cannot be replaced by the customer. Contact service.

## Spare Parts

|          |   |
|----------|---|
| 50164468 | Magnetic door seal 160L                   |
| 50164469 | Magnetic door seal 250L                   |
| 50164488 | Set of filter mats for supply air         |
| 50162778 | HEPA filter for exhaust air               |
| 50145367 | Sintered metal filter                     |
| 50141920 | Airbox HEPA filter                        |
| 50148315 | Airbox seal                               |
| 50142223 | Silicone plug                             |
| 50050737 | Gas inlet filter                          |
| 50145362 | PM Kit Vios                               |
| 50034772 | Connector plug for potential-free contact |
| 50164193 | Connection cable for 4-20mA interface     |
| 50062701 | Connection hose set                       |

## Waste Disposal

### Table of Contents

- “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 laminated on one side, shrink-wrapped in foil.  |
| 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.  |
| Outer Housing                 | Stainless steel 1.4307, brushed.   |
| Device backpanel              | Stainless steel 1.4307, brushed.   |

## 10 Waste Disposal

### Overview of the Materials Used

| <b>Component</b>                                       | <b>Material</b>  |
|--|--|
| Outer door   | Stainless steel 1.4307, brushed.   |
| 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,<br>Copper  |
| Insert for pressure compensation opening               | Stainless steel 1.4301 (base), 1.4404 (sinter filter)  |
| Glass screen   | Sodium silicate glass  |
| Cables   | Plastics- and silicon-sheathed copper stranded wire  |
| Elastomers, general                                    | Silicone   |
| Filter   | HEPA filter, micro-fine glass,<br>Membrane filter Cell Locker with ABS and silicone<br>Gas filter with polypropylene casing and<br>GF/PTFE membrane,<br>Prefilter, stainless steel 1.4401 wire mesh.<br>Air inlet filter |
| Packaging  | Corrugated cardboard, polyethylene foil,<br>styrofoam shaped elements and polypropylene  |
| Door seal magnet                                       | Permanent magnet   |
| Cell Locker Chamber                                    | Polycarbonate Makrolon 2528  |

# Specifications

## Table of Contents

- “Heracell Vios 160i CR” on page 11-2
- “Heracell Vios 250i CR” on page 11-6

## **Heracell Vios 160i CR**

| <b>Name</b>   | <b>Unit</b> | <b>Value</b>   |
|---|-------------|--|
| <b>Mechanical</b>   |             |  |
| Outer dimensions (W x H x D)  | mm          | 637 x 901 x 881  |
| Inner dimensions (W x H x D)  | mm          | 470 x 607 x 576  |
| Inner space volume,<br>of which useable volume                                    | l<br>l      | approx. 165<br>approx. 100   |
| Shelves (W x D)   | mm          | 423 x 465  |
| Quantity of components delivered  | pcs.        | 3  |
| Quantity, maximum   | pcs.        | 11   |
| Shelf loading capacity, maximum   | kg          | 10 per shelf   |
| Overall device loading capacity, maximum  | kg          | 30   |
| Weight, without accessories   | kg          | 95   |
| <b>Thermal</b>  |             |  |
| Thermal safety features to DIN 12880:2007-05                                      |             | Class 3.1<br>(Overtemperature controller,<br>providing alarming function<br>upon excessive temperature<br>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<br>(DIN 12880, part 2) at 37 °C   | °C          | ± 0.1  |
| Temperature deviation from set value, spatial (DIN<br>12880, part 2) at 37 °C *1) | °C          | <= ± 0.3   |
| Duration of the auto-start routine: to 37 °C<br>Ambient temperature 20 °C         | h           | 5...10   |
| Heat transfer to environment:<br>at 37 °C   | kWh/h       | 0.06   |
| during Steri-Run sterilization  | kWh/h       | 0.59   |
| <b>Humidity</b>   |             |  |
| Water qualities (sterile distilled)   |             | Electrical resistance:<br>50 K-Ohm-cm to 1 M-Ohm-cm<br>Conductivity: 1 to 20 µS/cm                                   |
| Capacities:<br>Incubation operation   | l           | max. 3 / min 0.5   |
| Constant humidity at 37 °C (high humidity mode)                                   | % rH        | approx. 93   |
| Constant humidity at 37 °C (low humidity mode)                                    | % rH        | approx. 90   |



| <b>Name</b>                               | <b>Unit</b>       | <b>Value</b> |
|---|-------------------|--------------|
| <b>Others</b>                             |                   |              |
| Sound pressure level (DIN 45 635, part 1) | dB(A)             | < 50         |
| Relative ambient humidity                 | % rH              | max. 80      |
| Location elevation                        | 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 CR

| Name  | Unit             | Value  |
|---|------------------|--|
| <b>CO<sub>2</sub> gas supply system</b>   |                  |  |
| 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  |
| <b>CO<sub>2</sub> measuring cell</b>  |                  |  |
| Accuracy at 37 °C and 5% CO <sub>2</sub>  | %CO <sub>2</sub> | ± 0.3  |
| <b>O<sub>2</sub> gas supply system</b>  |                  |  |
| 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  |
| <b>O<sub>2</sub> measuring cell</b>   |                  |  |
| Accuracy at 37 °C and 21% O <sub>2</sub>  | %O <sub>2</sub>  | ± 0.5 (option: 1.....21% O <sub>2</sub> )<br>± 2.0 (option: 5.....90% O <sub>2</sub> )   |
| <b>Electrical</b>   |                  |  |
| Rated voltage   | V                | 1/N/PE 230 V, AC (± 10%)<br>1/N/PE 220 V, AC (± 10%)<br>1/N/PE 120 V, AC (± 10%)<br>1/N/PE 100 V, AC (± 10%)   |
| Rated frequency   | Hz               | 50/60  |
| Degree of protection (IEC 60529) - (with the exception of the rear wall, including its edges) |                  | IP 54  |
| Protection class  |                  | I  |
| Overvoltage category (EN 61010)   |                  | II   |
| Pollution severity (EN 61010)   |                  | 2  |
| Rated current   | A                | <b>230 V:</b><br>Sterilization: 4.6<br>Incubation: 2.4<br><b>220 V:</b><br>Sterilization: 4.4<br>Incubation: 2.3<br><b>120 V:</b><br>Sterilization: 8.3;<br>Incubation: 4.6<br><b>100 V:</b><br>Sterilization: 7.2;<br>Incubation: 3.9 |

| <b>Name</b>     | <b>Unit</b> | <b>Value</b>   |
|-----------------|-------------|--|
| Circuit breaker |             | 16 A   |
| Rated power     | kW          | <b>230 V:</b><br>Sterilization: 1.10<br>Incubation: 0.56<br><b>220 V:</b><br>Sterilization: 0.97<br>Incubation: 0.51<br><b>120 V:</b><br>Sterilization: 1.01<br>Incubation: 0.55<br><b>100 V:</b><br>Sterilization: 0.72<br>Incubation: 0.39 |
| EMV class       |             | B  |

## Heracell Vios 250i CR

| Name   | Unit  | Value  |
|--|-------|--|
| <b>Mechanical</b>  |       |  |
| Outer dimensions (W x H x D)   | mm    | 774 x 964 x 934  |
| Inner dimensions (W x H x D)   | mm    | 607 x 670 x 629  |
| Inner space volume,<br>of which useable volume   | l     | approx. 255<br>approx. 162   |
| Shelves - Standard (W x D)   | mm    | 560 x 500 (22.05 x 19.68 inch)   |
| Shelf - gas-tight screen option  | mm    | 500 x 400  |
| Quantity of components delivered   | pcs.  | 3  |
| Quantity, maximum  | pcs.  | 12   |
| Shelf loading capacity, maximum  | kg    | 4 per shelf  |
| Overall device loading capacity, maximum   | kg    | 42   |
| Weight, without accessories  | kg    | 119  |
| <b>Thermal</b>   |       |  |
| Thermal safety features to DIN 12880:2007-05   |       | Class 3.1<br>(Overtemperature controller,<br>providing alarming function<br>upon excessive temperature<br>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<br>(DIN 12880, part 2)                       | °C    | ± 0.1  |
| Temperature deviation from set value, spatial (DIN<br>12880, part 2) at 37 °C <sup>*1)</sup> | °C    | ± 0.3  |
| Duration of the auto-start routine: to 37 °C<br>Ambient temperature 20 °C                    | h     | 5...10   |
| Heat transfer to environment:<br>at 37 °C  | kWh/h | 0.07   |
| during Steri-Run sterilization   | kWh/h | 0.75   |
| <b>Humidity</b>  |       |  |
| Water quality (sterile distilled)  |       | Electrical resistance:<br>50 K-Ohm-cm to 1 M-Ohm-cm<br>Conductivity: 1 to 20 µS/cm                                   |
| Capacities:<br>Incubation operation  | l     | max. 3 / min 0.5   |

| <b>Name</b>                                     | <b>Unit</b>       | <b>Value</b> |
|---|-------------------|--------------|
| Constant humidity at 37 °C (high humidity mode) | % rH              | approx. 93   |
| Constant humidity at 37 °C (low humidity mode)  | % rH              | approx. 90   |
| <b>Others</b>                                   |                   |              |
| Sound pressure level (DIN 45 635, part 1)       | dB(A)             | < 50         |
| Relative ambient humidity                       | % rH              | max. 80      |
| Location elevation                              | 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 CR

| Name   | Unit             | Value   |
|--|------------------|---|
| <b>CO<sub>2</sub> gas supply system</b>  |                  |   |
| 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   |
| <b>CO<sub>2</sub> measuring cell</b>   |                  |   |
| Accuracy at 37 °C and 5% CO <sub>2</sub>   | %CO <sub>2</sub> | ± 0.3   |
| <b>O<sub>2</sub> gas supply system</b>   |                  |   |
| 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   |
| <b>O<sub>2</sub> measuring cell</b>  |                  |   |
| Accuracy at 37 °C and 21% O <sub>2</sub>   | %O <sub>2</sub>  | ± 0.5 (option: 1.....21% O <sub>2</sub> )<br>± 2.0 (option: 5.....90% O <sub>2</sub> )  |
| <b>Electrical</b>  |                  |   |
| Rated voltage  | V                | 1/N/PE 230 V, AC (± 10%)<br>1/N/PE 220 V, AC (± 10%)<br>1/N/PE 120 V, AC (± 10%)<br>1/N/PE 100 V, AC (± 10%)  |
| Rated frequency  | Hz               | 50/60   |
| Degree of protection (IEC 60529) - (with the exception of the rear wall edge and the HEPA filter opening in the rear wall) |                  | IP 54   |
| Protection class   |                  | I   |
| Overvoltage category (EN 61010)  |                  | II  |
| Pollution severity (EN 61010)  |                  | 2   |
| Rated current  | A                | <b>230 V:</b><br>Sterilization: 5.5<br>Incubation: 3.3<br><b>220 V:</b><br>Sterilization: 5.3<br>Incubation: 3.2<br><b>120 V:</b><br>Sterilization: 10.4<br>Incubation: 6.3<br><b>100 V:</b><br>Sterilization: 8.9<br>Incubation: 5.3 |

| <b>Name</b>     | <b>Unit</b> | <b>Value</b>   |
|-----------------|-------------|--|
| Circuit breaker |             | 16 A   |
| Rated power     | kW          | <b>230 V:</b><br>Sterilization: 1.26<br>Incubation: 0.76<br><b>220 V:</b><br>Sterilization: 1.16<br>Incubation: 0.69<br><b>120 V:</b><br>Sterilization: 1.25<br>Incubation: 0.75<br><b>100 V:</b><br>Sterilization: 0.89<br>Incubation: 0.53 |
| EMV class       |             | B  |

## **11 Specifications**

Heracell Vios 250i CR



# Data Communication

## Contents

- “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 / 250i CR” 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 a computer and the 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 / 250i CR** program (see “Program Heracell Vios 160i / 250i CR” 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 / 250i CR** and connect with a computer.

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.



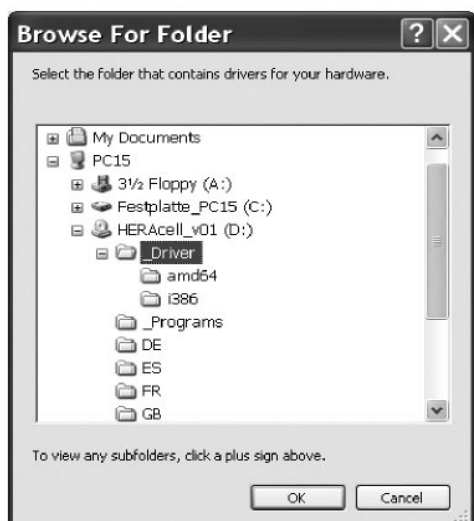
2. Select the Install from a list or specific location (Advanced) option.



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 / 250i CR** (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 computer and the incubator **Heracell Vios 160i / 250i CR** 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:  $x^8 + x^2 + x^1 + 1 = 0x07$   
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:  $x^8 + x^2 + x^1 + 1 = 0x07$   
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:  $x_8 + x_2 + x_1 + 1 = 0x07$   
 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 checksum  |
| ?1              | Unknown command 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 digits  |
| 0010    | Date and time display<br>[hours:minutes:seconds];<br>[day:month:year] | 17 bytes / decimal value<br>with the format xx:xx:xx;xx:xx:xx |
| 0011    | Date<br>[day:month:year]  | 8 bytes / decimal value<br>with the format xx:xx:xx           |
| 0012    | Time<br>[hours:minutes:seconds]                                       | 8 bytes / decimal value<br>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<sub>2</sub> and O<sub>2</sub>,
- the internal function parameters of operating functions and data logging.

## Reading Basic Parameters

| Address | Description   | Remarks  |
|---------|---|--|
| 2000    | Device status <sup>*1)</sup> (Error-)<br>Status of the control loops<br>temperature,<br>CO <sub>2</sub> , O <sub>2</sub> , rH, ref. temp. | 33 bytes / hexadecimal value<br>with the format<br>xxxxxxxx;xxxx; ...<br>;xxxx;xxxx;xxxx |
| 2010    | Specified, actual and reference<br>temperature <sup>*2)</sup>   | 23 bytes / decimal value<br>with the format<br>+xxx.xx;+xxx.xx;+xxx.xx                   |
| 2020    | Specified and actual CO <sub>2</sub><br>content <sup>*2)</sup>  | 15 bytes / decimal value<br>with the format +xxx.xx;+xxx.xx                              |
| 2030    | Specified and actual O <sub>2</sub> content <sup>*2)</sup>  | 15 bytes / decimal value<br>with the format +xxx.xx;+xxx.xx                              |
| 204a    | Actual water level (100% or 0%)   | 7 bytes / decimal value<br>with the format +xxx.xx                                       |
| 204b    | Low humidity indicator (1 active, 0<br>inactive)  | 2 bytes / hexadecimal<br>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 <sup>*1)</sup> and<br>Remaining run time<br>[hours:minutes]<br>Sterilization, date<br>and time of last start                        | 25 bytes / decimal value<br>with the format<br>xx;+xxx:xx;xx.xx.xx;xx:xx      |
| 2105    | Status of run <sup>*1)</sup> , current<br>CO <sub>2</sub> offset + waiting period<br>[minutes:seconds]<br>auto-start, Date and time of last start | 25 bytes / decimal value<br>with the format<br>xx;xx.x;+xxx:xx;xx.xx.xx;xx:xx |
| 2140    | Status of as cylinder changeover<br>switch<br>Read CO <sub>2</sub> <sup>*3)</sup>   | 2 bytes / hexadecimal<br>with the format xx                                   |
| 2141    | Status of as cylinder changeover switch<br>Read O <sub>2</sub> <sup>*3)</sup>   | 2 bytes / hexadecimal<br>with the format xx                                   |
| 2300    | Read the Error Log<br>(current errors) <sup>*4)</sup>   | Up to 241 bytes / hexadecimal value<br>Format, see section on this topic      |
| 2301    | Read the Error Log<br>(older errors) <sup>*4)</sup>   | Up to 241 bytes / hexadecimal value<br>Format, see section on this topic      |
| 2400    | Query (Start) of data stored in the<br>data logger <sup>*5)</sup>   | Up to 224 bytes / hexadecimal value<br>Format, see section on this topic      |
| 2401    | Query of other data stored in the<br>data logger <sup>*6)</sup>   | 224 bytes / hexadecimal value<br>Format, see section on this topic            |
| 2402    | (Repeat) query for last data logger<br>query <sup>*7)</sup>   | 224 bytes / hexadecimal value<br>Format, see section on this topic            |
| 2410    | Read out writing cycle of the data<br>logger in hours/minutes/seconds   | 8 bytes / decimal value with the<br>format xx:xx:xx                           |

\*1) See table with notes on sterilization 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) sterilization 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 | Cool-Down                         | Set tolerance band                 |
| 0x09 | Dry                               | Establish stable humidity          |
| 0x0A | Wait for enable                   | Perform reverse voltage adjustment |
| 0x0B | Cancellation                      | Waiting period 2                   |
| 0x0C | -                                 | Determine offset                   |
| 0x0D | -                                 | Read offset, check                 |
| 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  $1+(10 \times 2) = 21$  data bytes plus separator.

A data set always delivers the date, the time, the faulty control loop, the device status, and the error message.



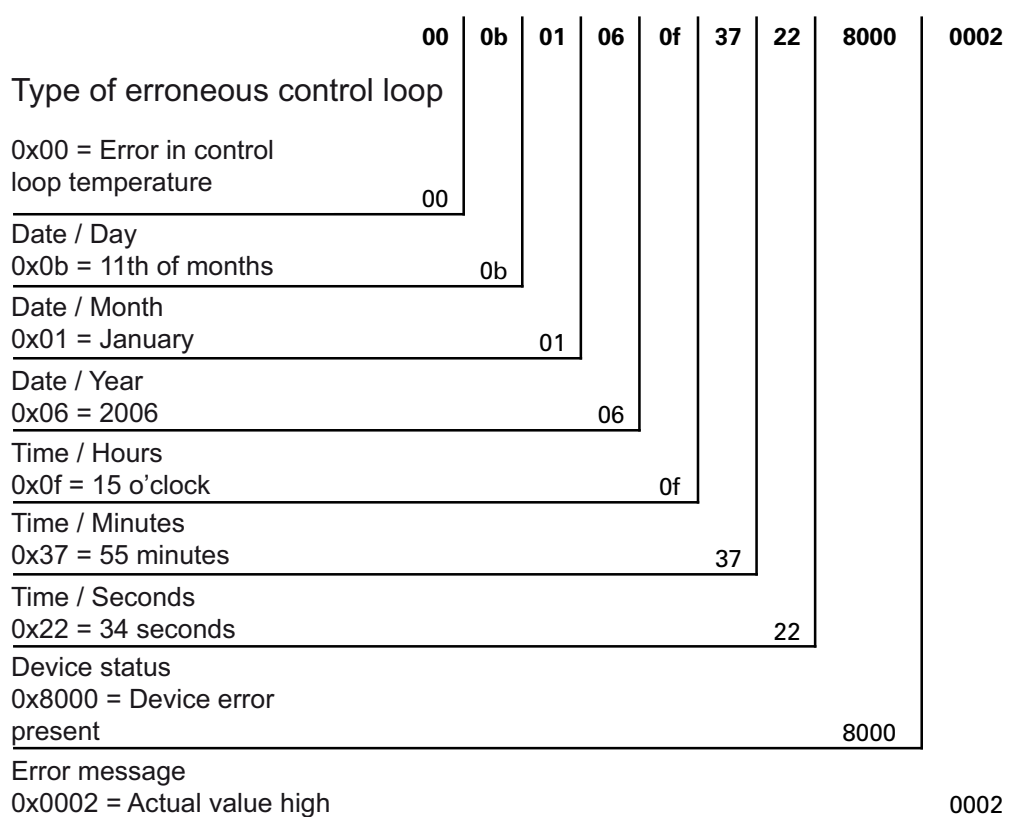
Example of a response:

!: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 11 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 <sub>2</sub> control loop |
| 0x02     | O <sub>2</sub> control loop  |
| 0x07     | Water level                  |
| 0x08     | General device status        |

## Overview of the Possible Error Messages in Bit Coding General Device Status, Temperature and CO<sub>2</sub> Control Loop

| Bit    | General device status                                 |
|--------|---|
| 0x0002 | Device Door open too long                             |
| 0x0004 | Display fails to communicate                          |
| 0x0008 | Mainboard parameter implausible (EPROM faulty)        |
| 0x0010 | Data logger defective (unit can continue to function) |
| 0x0020 | Error for sterilization / 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 | Sterilization 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 <sub>2</sub> control loop error status |
|--------|---|
| 0x0001 | Sensor breakage                           |
| 0x0002 | Actual value high                         |

| Bit    | CO <sub>2</sub> 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, cylinders A and B empty                     |
| 0x0200 | Gas cylinder A empty                                |
| 0x0400 | Gas cylinder B empty                                |

## O<sub>2</sub> Control Loop and Water Level

| Bit    | O <sub>2</sub> 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, cylinders A and B empty                     |
| 0x0200 | Gas cylinder A empty                                |
| 0x0400 | Gas 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”).

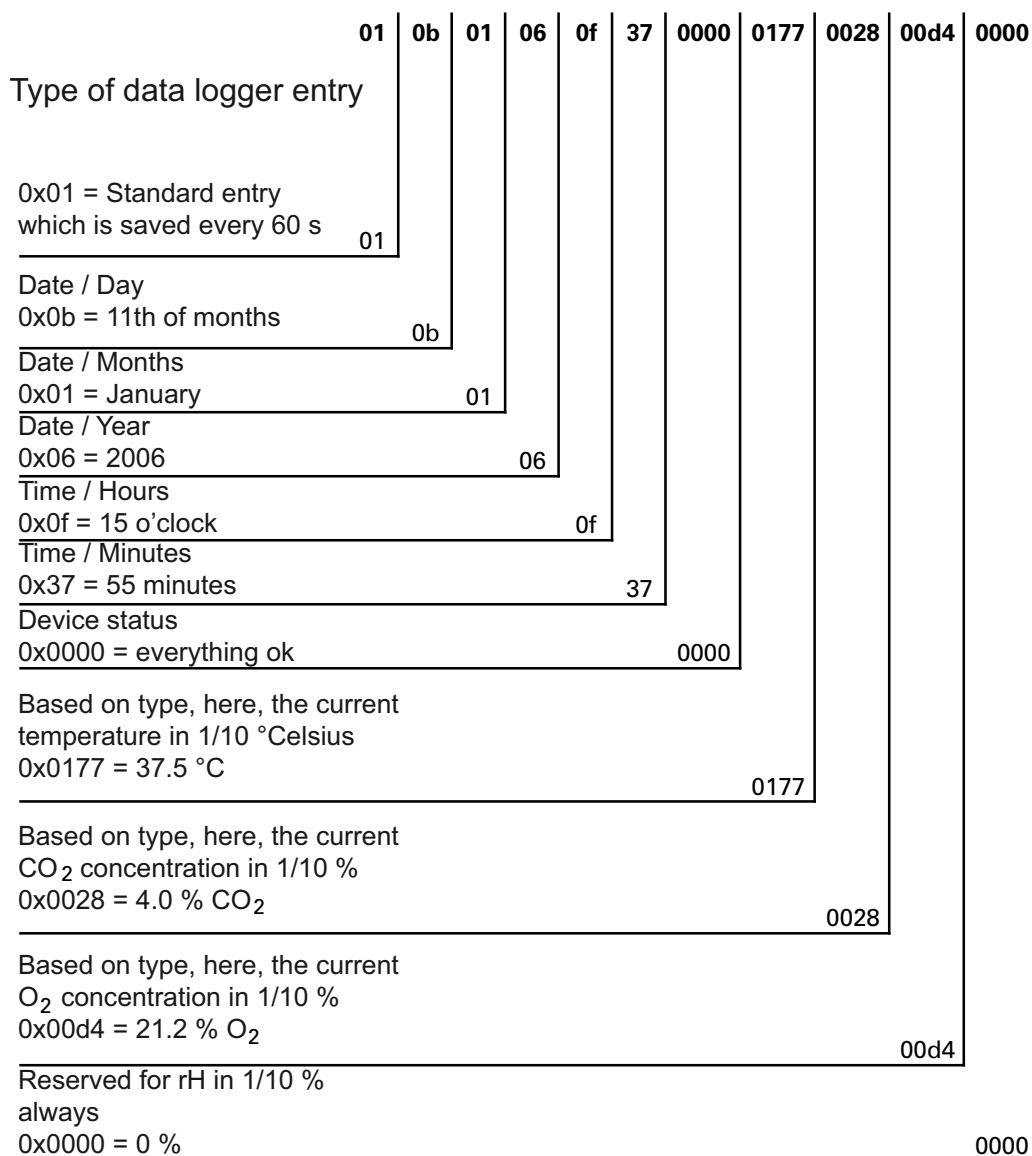
Therefore, a response consists of up to 7 X 16 = 112 bytes, i.e. 224 ASCII characters. The date and time (without seconds), the device status and the type of data logger entry are always transmitted in a data set (byte 0-7, and ASCII characters 0-15). Also, depending on the entry, the current actual 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 11 January 2006 at 15:55 hrs.
- The device status reports no particularities.
- the temperature is 37.5°C,
- gas concentration 4.0% CO<sub>2</sub>, 21.2% O<sub>2</sub>.

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

## Overview of Event Entries, Part II

| Code | Event                            | Information (byte 8-15)  |
|------|----------------------------------|--|
| 0x52 | auto-start completed with error  | Status / error registration for temperature, CO <sub>2</sub> , O <sub>2</sub> and rH |
| 0x53 | auto-start stopped manually      | Status / error registration for temperature, CO <sub>2</sub> , O <sub>2</sub> and rH |
| 0x60 | Start Steri-Run                  | Status / error registration for temperature, CO <sub>2</sub> , O <sub>2</sub> and rH |
| 0x61 | Steri-Run successfully completed | Current actual values for temperature, CO <sub>2</sub> , O <sub>2</sub> and rH       |
| 0x62 | Steri-Run completed with error   | Status / error registration for temperature, CO <sub>2</sub> , O <sub>2</sub> and rH |
| 0x63 | Steri-Run stopped manually       | Status / error registration for temperature, CO <sub>2</sub> , O <sub>2</sub> and rH |
| 0x70 | Gas monitor cylinder A empty     | Gas monitoring status (2 bytes), 4 bytes empty                                       |
| 0x71 | Gas monitor cylinder B empty     | Gas monitoring status (2 bytes), 4 bytes empty                                       |
| 0x72 | Gas monitor manual changeover    | Gas monitoring status (2 bytes), 4 bytes empty                                       |
| 0x90 | Start low humidity               | Current actual values for temperature, CO <sub>2</sub> , O <sub>2</sub> and rH       |
| 0x91 | Stop low humidity                | Current actual values for temperature, CO <sub>2</sub> , O <sub>2</sub> and rH       |
| 0xe0 | Delete data logger               | Current actual values for temperature, CO <sub>2</sub> , O <sub>2</sub> 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:

Byte 1: indicates the event (e.g. door open 0x31, measured value entry 0x01)

Byte 2: day of entry

Byte 3: month

Byte 4: year

Byte 5: hour

Byte 6: minutes

Byte 7 and 8: device status

Byte 9 to 16: 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 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

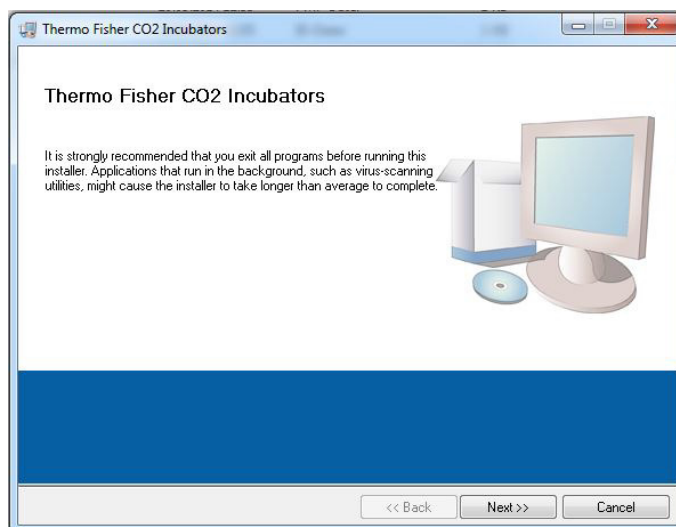
else{
    str_cpy (&string[string], „ok;“, 3);
    string += 3;
}
}

// 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 / 250i CR*

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



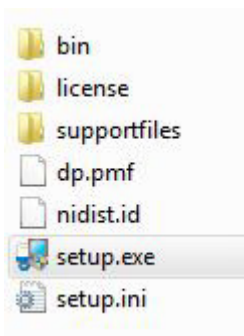
This program is used for:

- 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.

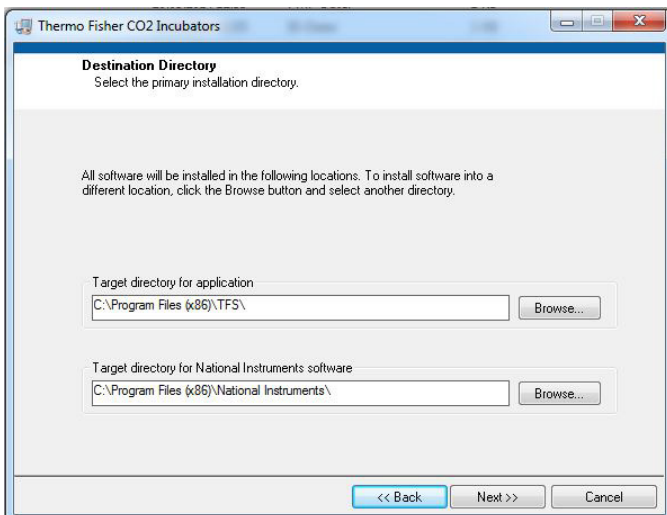
## Installing the *Heracell Vios 160i CR* & *Heracell Vios 250i CR*

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:

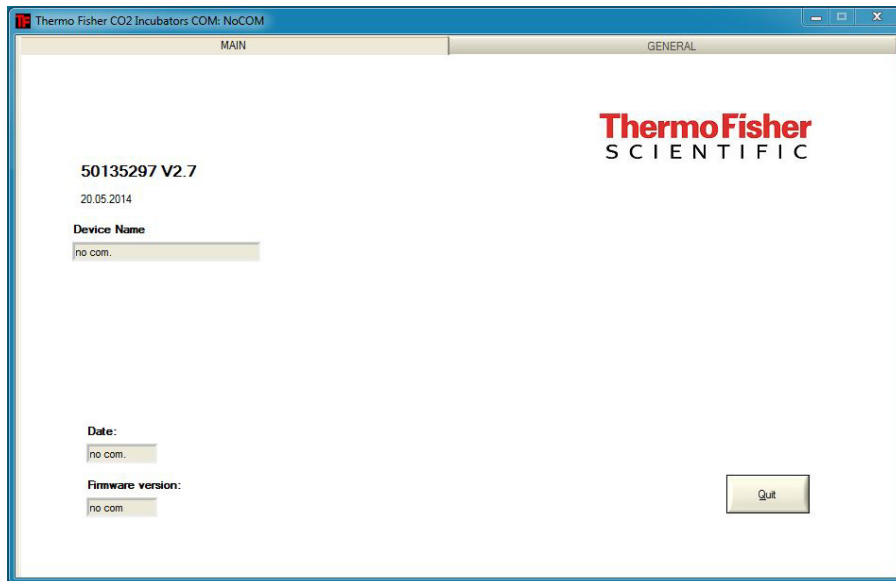
- confirm the license agreement,
- confirm the extent of installation,
- after the message on the completeness of the installation has been displayed, close the installation surface and restart the computer.

## Operating the *Heracell Vios 160i CR* & *Heracell Vios 250i CR*

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

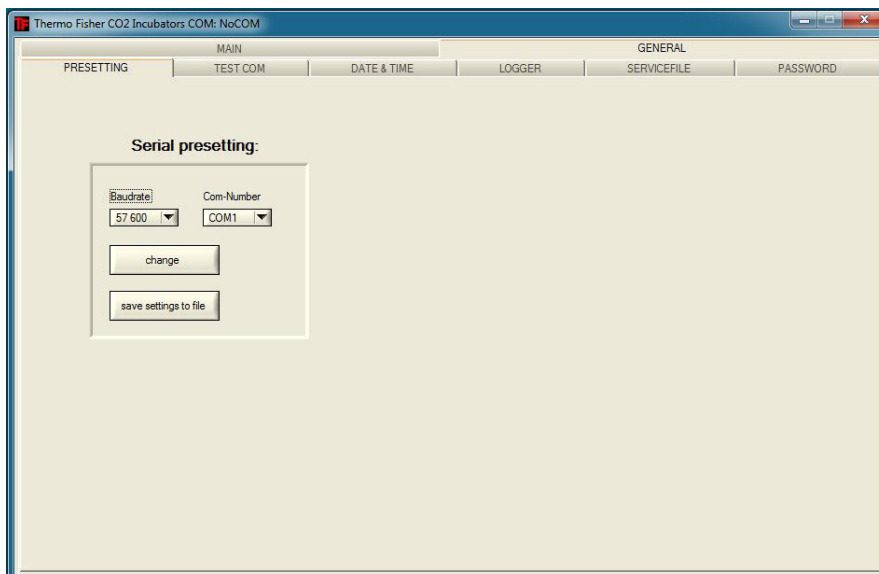


- GENERAL with the submenus:
  - PRESETTING for setting the transmission speed and for selecting the serial port,
  - TEST COM for testing the communication connection between the computer and the incubator,
  - DATE & TIME for adjusting date and time to the desired time zone,
  - ERROR LOGGER for reading 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 computer. 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.

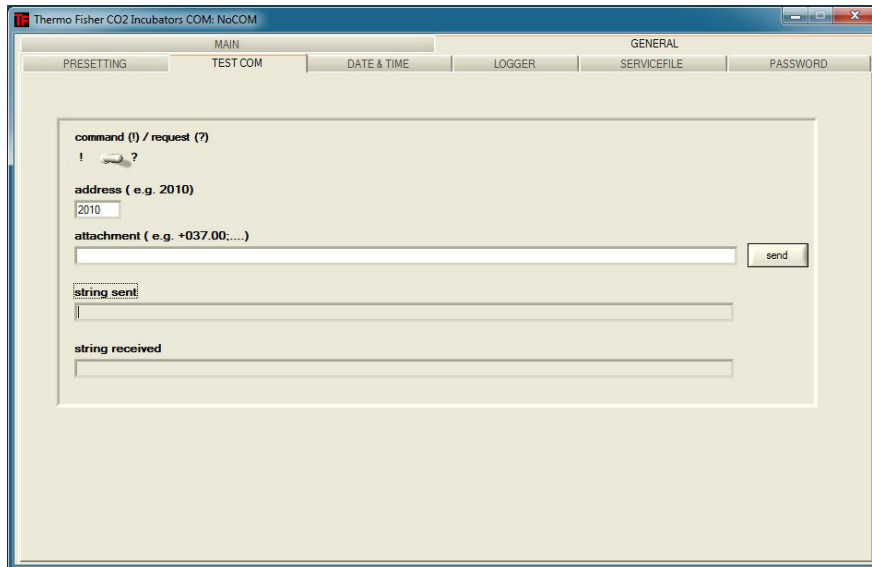
**Note** Transmission speeds:

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

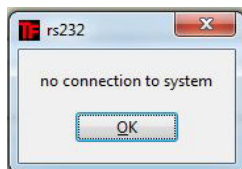


## TEST COM

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



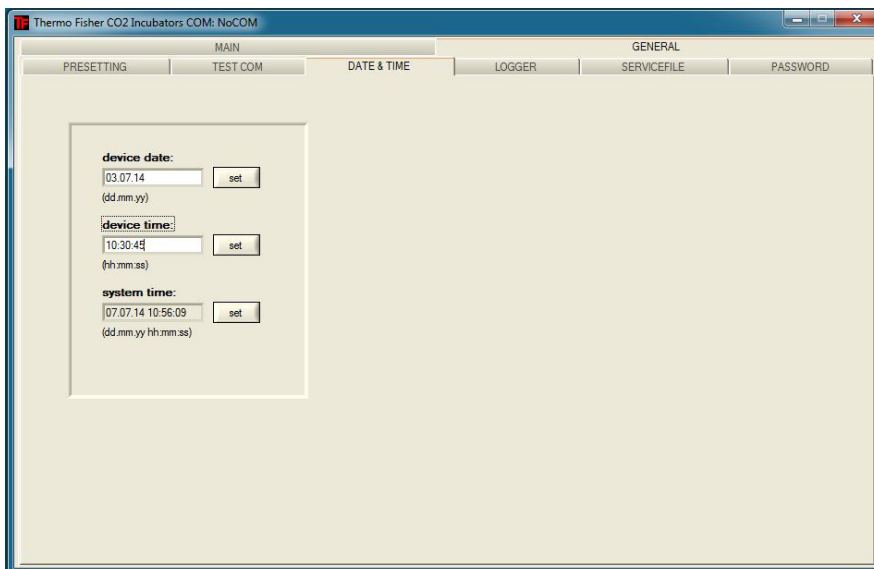
1. Example of a query for the currently measurable temperature values of the incubator:
  - Query: ? (default, not changeable)
  - Address: 2010 (Address temperature value: set value, actual value, reference value)
2. Send the query to the incubator:
  - Press the SEND key.
  - If the incubator returns 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

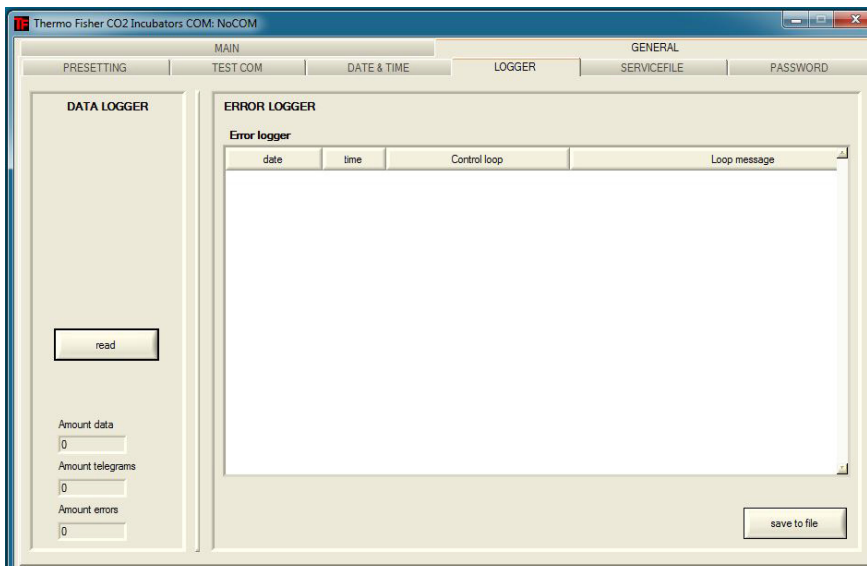
The submenu DATE & TIME is used for adjusting date and time to the desired time zone.



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.

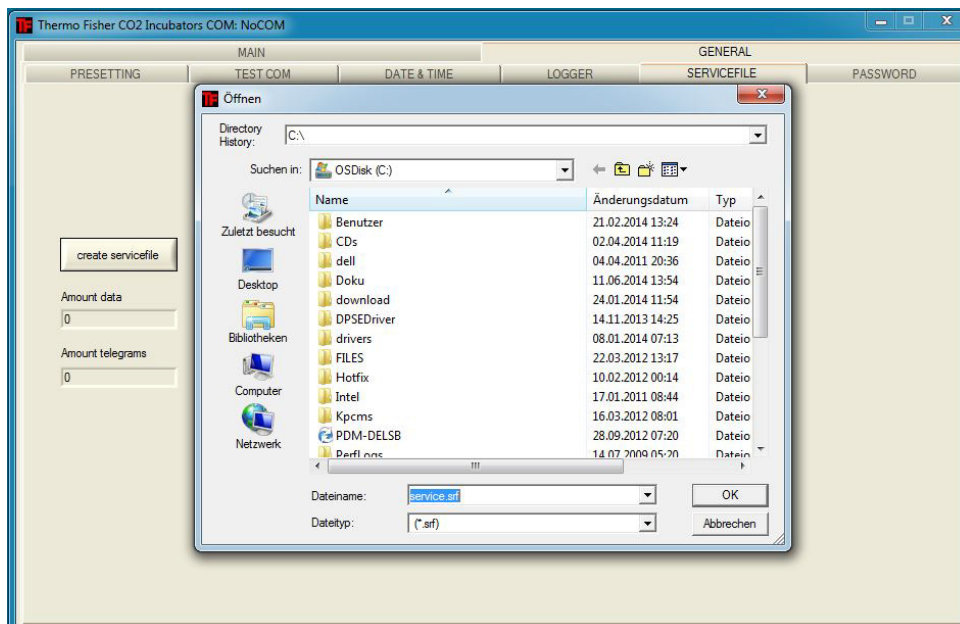
The data sets can be stored in the metaformat \*.CSV.

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:  
Because the data logger can contain up to 10,000 data sets, the data transmission to a computer 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.

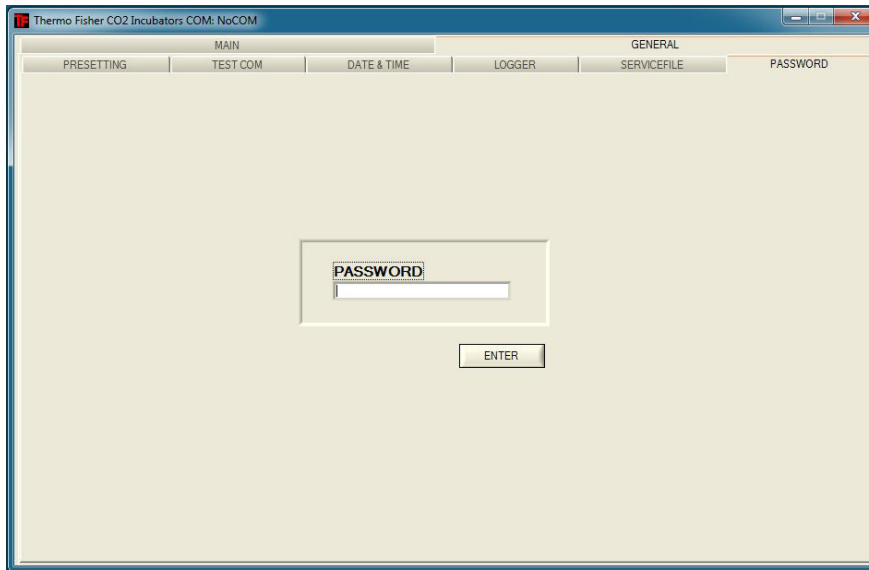


1. Create the service file:
  - Press the CREATE SERVICEFILE key.
  - Define file name and saving directory in the Windows dialog box.
2. Start saving process:
  - Press the OK key.

**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.







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## Sixfold Gas Tight Screen for Cell Locker System

The sixfold gas tight screen is a segmented inner door concept designed for the Cell Locker system.

The sixfold gas tight screen divides the existing interior of the CO<sub>2</sub> incubator into 6 separate chambers (Cell Lockers). 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.



Sixfold gas tight screen for *CELL LOCKER*

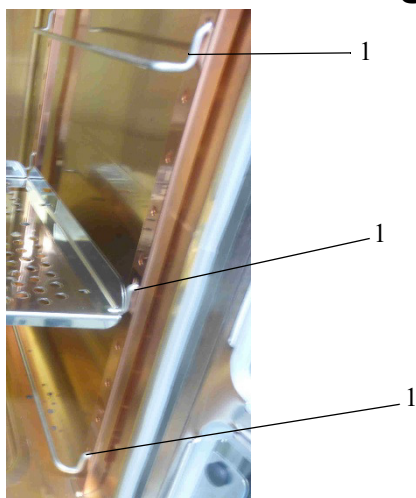


*CELL LOCKER*

**Note** Performance Change

Due to the design of the sixfold 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 attached guiding rails.

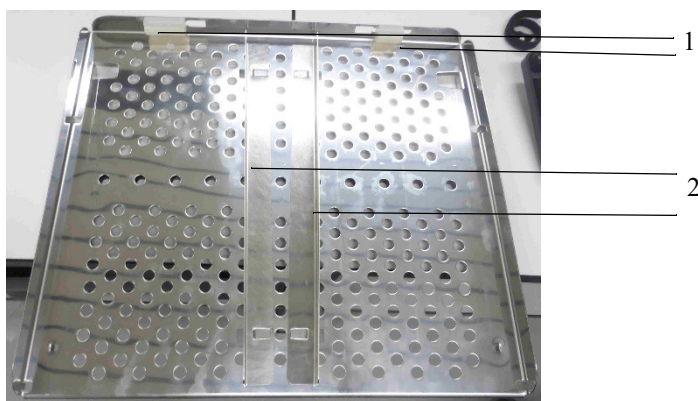


Figure: Perforated Shelf with Attached Guiding Rails

Do not remove silicone stoppers (1).

Before the perforated shelf with attached guiding rails can be installed, the guiding rails (2) must be attached to the shelf.

The guiding rails can be removed, if necessary for cleaning.

Place the perforated shelf with the attached guiding rails (1) and middle openings in the lower position.

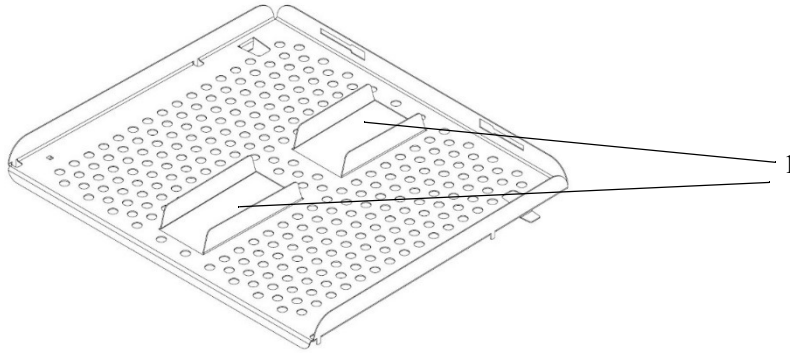


Figure: Perforated Shelf with Attached Guiding Rails for the Lower Position

This guiding rails cannot be removed.

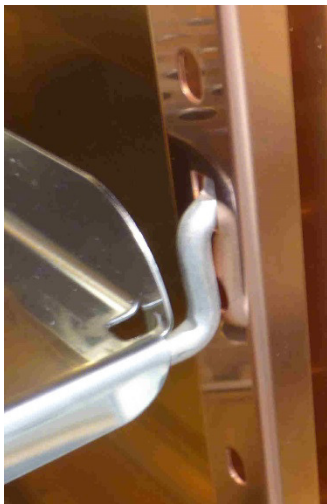


Figure: Perforated Shelf Installation

Place the perforated shelf 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 sixfold gas tight screen.

**A Sixfold Gas Tight Screen for Cell Locker System**  
Installation of the Shelving