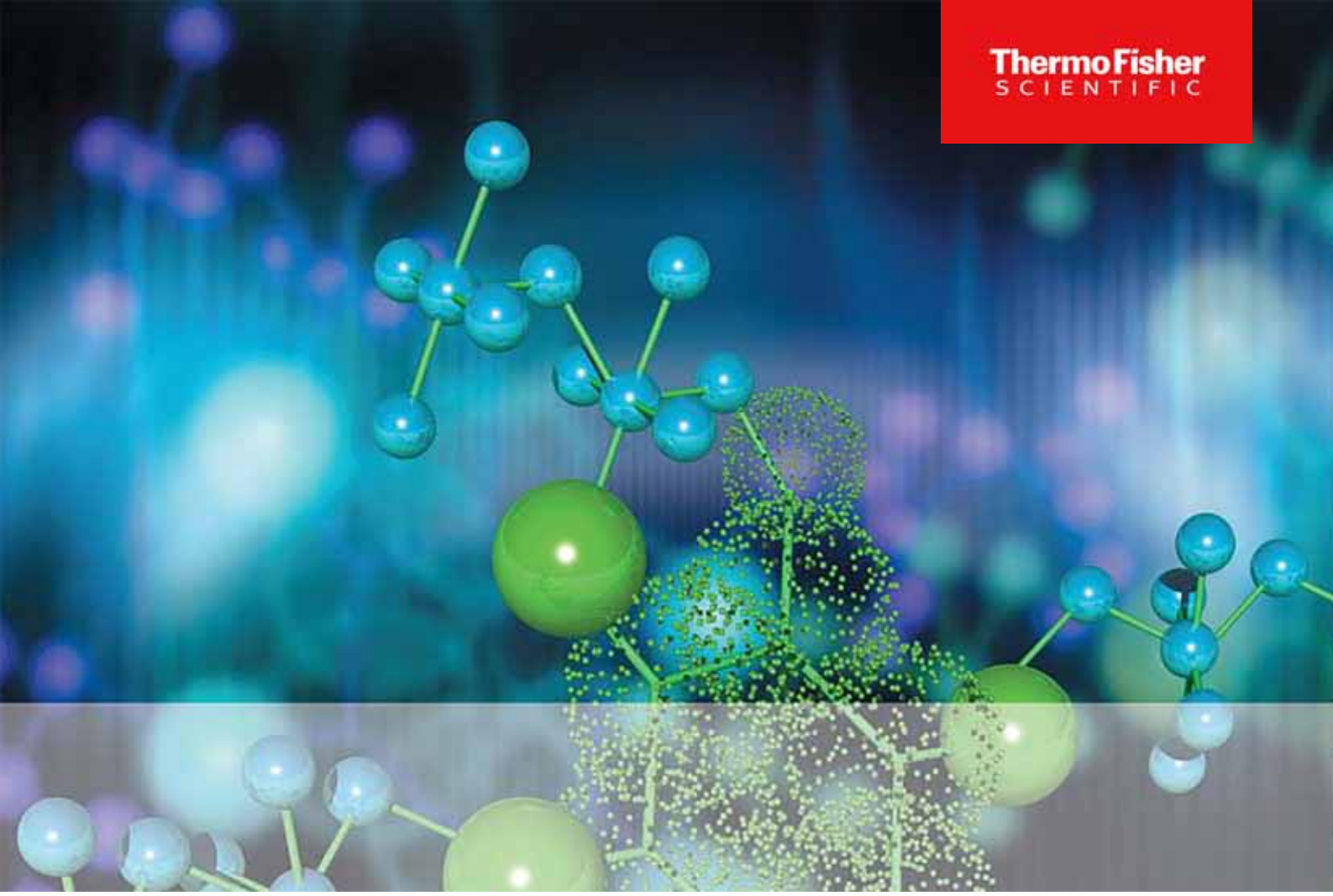

Thermo Scientific

CO_2 Incubator

Heracell VIOS 250i AxD

Incubator with Automatic Door Opener

Operating Instructions

50169867_Rev._

March 2024

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Original instructions

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Preface

General Notes

These operating instructions describe HERAcell VIOS 250i AxD with automatic door opener. The product is manufactured according to the current state of the art and have been tested for proper functioning before delivery.

However, the device may present potential hazards, particularly if it is operated by inadequately trained personnel or if it is not used in accordance with the intended purpose.

Therefore, the following must be observed to prevent accidents:

The device may only be operated by operating personnel and maintained and repaired only by trained personnel. All personnel must be familiar with and understand the contents of this manual before carrying out any work on or with the device.

Safety instructions on the device must be kept legible and must not be removed.

Keep these operating instructions near the device so that safety instructions and important information on operation can be looked up at any time.

If individual points have not been covered in sufficient detail in these operating instructions, please contact Thermo Fisher Scientific for your own safety.

The device may only be operated with original spare parts and original accessories.

The regulations of occupational health and safety must be observed at all times!

Requirements for Personnel

CAUTION

Persons who are undergoing training or have not yet been conclusively trained in the use of the device may only work on the device under the permanent supervision of an experienced person.

Operating Personnel

Trained Specialist Personnel

Trained technical personnel are persons who have suitable technical training and/or many years of experience in the relevant field of work. Based on their knowledge and experience, they are able to recognize and avoid hazards emanating from laboratory equipment. They meet the country-specific requirements for compliance with a minimum age.

Instructed Users

Instructed Users are untrained and inexperienced persons who have been trained by trained technical personnel in such a way that they can avoid hazards emanating from the device.

Service Personnel

Trained Personnel

Trained personnel are persons who have been trained by Thermo Scientific in the use of the equipment and who are authorized to repair, maintain and service the equipment.

Qualified electricians

Qualified electricians are persons who, due to their training and professional experience, are familiar with and can avoid all risks and hazards arising from the laboratory equipment and can also avoid all risks to the equipment itself as far as possible.

Identification of the Device and of the Documentation

Identification Data

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

Certifications and Conformity:

Certification: CE Certification
Certification mark: TÜV GS, cTUVus

Responsibility of the Operator

The operator is responsible for the proper condition of the device. In particular, he must ensure that

- the device is in perfect condition before commissioning
- the device is used properly and as intended for the intended use

- that the performance of the products is suitable for the customer‘s specific use or application
- the incubator is operated only by operating personnel
- such personnel wear the required protective equipment at all times when working on or with the equipment
- appropriate deportation procedures will be implemented if hazardous materials have been spilled on or in the incubator
- he has knowledge of all rules and regulations and also communicates these to the staff
- written procedural instructions are prepared for personnel working with this equipment

These must be based on:

- this operating manual
- the valid safety data sheets
- the company‘s hygiene guidelines
- the corresponding technical rules
- the safety and assembly instructions of the robotic system - if used in combination with the incubator

In particular, these shall include procedural instructions:

- which disinfection measures are to be applied to the device and the aids used
- which protective measures must be observed when processing certain agents
- for wearing protective equipment, e.g. when handling microbiological and biological samples
- which safety measures must be observed when using gases and pressurized gas containers
- what measures are to bet taken in the event of accidents
- which precautions and rules of conduct are required when entering and working in a clean room

- that repair work on the device is only carried out by trained personnel, who in particular have knowledge of the handling of gases and gas containers
- that the specified maintenance intervals are observed
- that the device is only operated in a clean, tidy and suitable environment
- that it is ensured that unauthorized persons do not gain access to the device

Briefing of the Personnel

Personnel working on equipment with CO_2 supply must be instructed on the special handling of CO_2 before starting work:

- the proper operation of compressed gas containers and gas supply systems

- the obligation to report damage and defects in the CO_2 supply lines
- Measures to be taken in the event of accidents and malfunctions

The instructions are to be repeated at appropriate intervals. The special operating instructions of the gas supplier are to be included in the instruction

Validity of the Instructions

- The contents of these operating instructions may be changed at any time and without notice
- For translations into foreign languages, the English version of these operating instructions is binding
- Keep this instructions close to the device so that safety instructions and important information are always accessible.

If you have any questions that you feel are not covered in sufficient detail in these operating instructions, pealse contact thermo Scientific for your own safety.

Warranty

Thermo Scientific warrants the operational safety and functions of the CO_2 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.

Explanation of Safety Information and Symbols

Safety Information and Symbols used in the Operating Instructions

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

WARNING 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 application hints and useful information.

Additional Symbols for Safety Information

Wear safety gloves!

Wear safety goggles!

Wear mask!

Pull out main plug!

Read operation instructions!

Danger of tipping!

Danger of crushing!

Bio hazard!

Environmental pollution!

Lift the device with at least 4 people!

Device is heavy! Don‘t lift alone!

Lift with mechanical assistance!

Observe correct handling of gas!

Harmful liquids!

Electric shock!

Hot surfaces!

Fire hazard!

Explosion hazard!

Suffocation hazard!

Symbols on the Device

CE conformity mark: confirms conformity according to EU Guidelines

TÜV-tested safety

cTUVus certification

Danger of crushing!

Observe operating instructions!

Hot surfaces!

Operational Safety Rules

DANGER

The operator of the unit must provide an emergency stop for the robotic system.

CAUTION

The operator of the unit needs to take care about safety, expecially during automatic opening and closing of the door.

CAUTION

Danger of crushing!

During opening and closing of the door, make sure no persons or obstacles are within a radius of 1 m around the door hinges!

CAUTION

In the event of a door opening error, disconnect the power to the unit and correct the error before restarting the unit!

CAUTION

There is a possibility that an unsuitable robot may be a source of danger to people. We recommend the use of a collaborative robot.

Intended Use of the Device

DANGER

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 substances or liquids that:

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

This CO_2 incubator can be used for the preparation and cultivation cell cultures including further manufacturing of cells for cell and gene therapy. A controlled set of physiological ambient conditions are produced within the CO_2 Incubator by exerting precise controls over the following parameters:

- Temperature
- CO_2 content

- O2/N2 content
- Relative humidity

Typically, the CO_2 incubator equipped with the automatic door opener has been designed for installation and operation within a closed robotic system and for mounting on a robotic system in the following applications:

- Laboratories for cell biological and biotechnological experiments of safety levels L1, L2 and L3.
- Microbiological laboratories according to DIN EN 12128
- Research laboratories
- The device is designed exclusively for professional use.
- The device must only be operated indoors
- The device must not be operated in areas subject to explosion hazards.
- The device must only be operated by qualified operating personnel

It is the customer's responsibility to ensure that the performance of the product is suitable for customer's specific uses or applications.

The Automated Single Outer Door allows Heracell VIOS 250i AxD instruments to be integrated into an automated production environment by providing a trigger signal from the outside to open and close the door so that sample vessels can be inserted and removed by robots.

In a conventional laboratory environment without robots, the Automated Single Outer Door allows the door to be opened without the use of hands. This allows the user to introduce samples, such as preloaded racks, into the incubator without having to set them down and pick them up again in between. This saves additional shock to the specimens, time and space requirements.

If necessary, the special environment, characterized by the coexistence of humans and robots, must be taken into account.

Standards and Directives

The device complies with the following standards and guidelines:

- Machinery Directive 2006/42/EC
- IEC 61010-1:2020/AMD1:2016
- IEC 61010-2-010:2019
- EMC Directive 2014/30/EU
- IEC 61326-1:2014/30/EU

For other countries, the applicable national regulations are binding.

US (FCC)

Note This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Modifications: Any modifications made to this device that are not approved by Thermo Fisher Scientific may void the authority granted to the user by the FCC to operate this equipment.

Note

Canada (ICES-001)

This ISM device complies with Canadian ICES-001.

Safety Notes on Gases

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

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

Safety Notes on Carbon Dioxide (CO_2)

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

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

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

Safety Notes on Oxygen (O_2)

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

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

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

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

Fire hazard!

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

- Do not smoke in the vicinity of oxygen systems.

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

Safety Notes on Nitrogen (N_2)

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

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

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

Delivery

Content

Packaging

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

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

Acceptance Inspection

Upon delivery, check immediately for:

- completeness,
- possible damage.

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

Standard Equipment

Quantity of components supplied	**Pieces**
Water reservoir cover panel	1
Max. water level sensor	1
Rear wall air duct	1
Air duct top	1
Airbox with sealing package	1
Prefilter	1
Shelves	3
Support rails for shelves	4
Shelf support for inserts	6
Plug for access port	1
Power Cord	1
CO_2 connecting hose set	1
User Manual	1
Quick-release connector with hose for water draining	1
Device key for manual opening the door	2

Optional Equipment

Components delivered with oxygen supply control option	**Pieces**
O_2 sensor head	1
O_2 connecting hose set	1
Components delivered with filter option	
HEPA-filter or VOC filter	1
Components delivered with 250 liter units with split inserts	**Pieces**
Support brackets	3
Split inserts	6

Components deliverable with units with integrated 24 V power supply	Pieces	Order number
Internal 24V DC power supply connection cable for robot control	1	50171190
Spare key for manual opening of the door	1	50171289
Foot switch for barrier-free door opening	1	50171290

Description

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Variants

There are two variants to choose from:

- Device with internal 24 V supply with the option of manual operation
- Device with external 24 V supply for exclusive integration into a robotic system

Front View

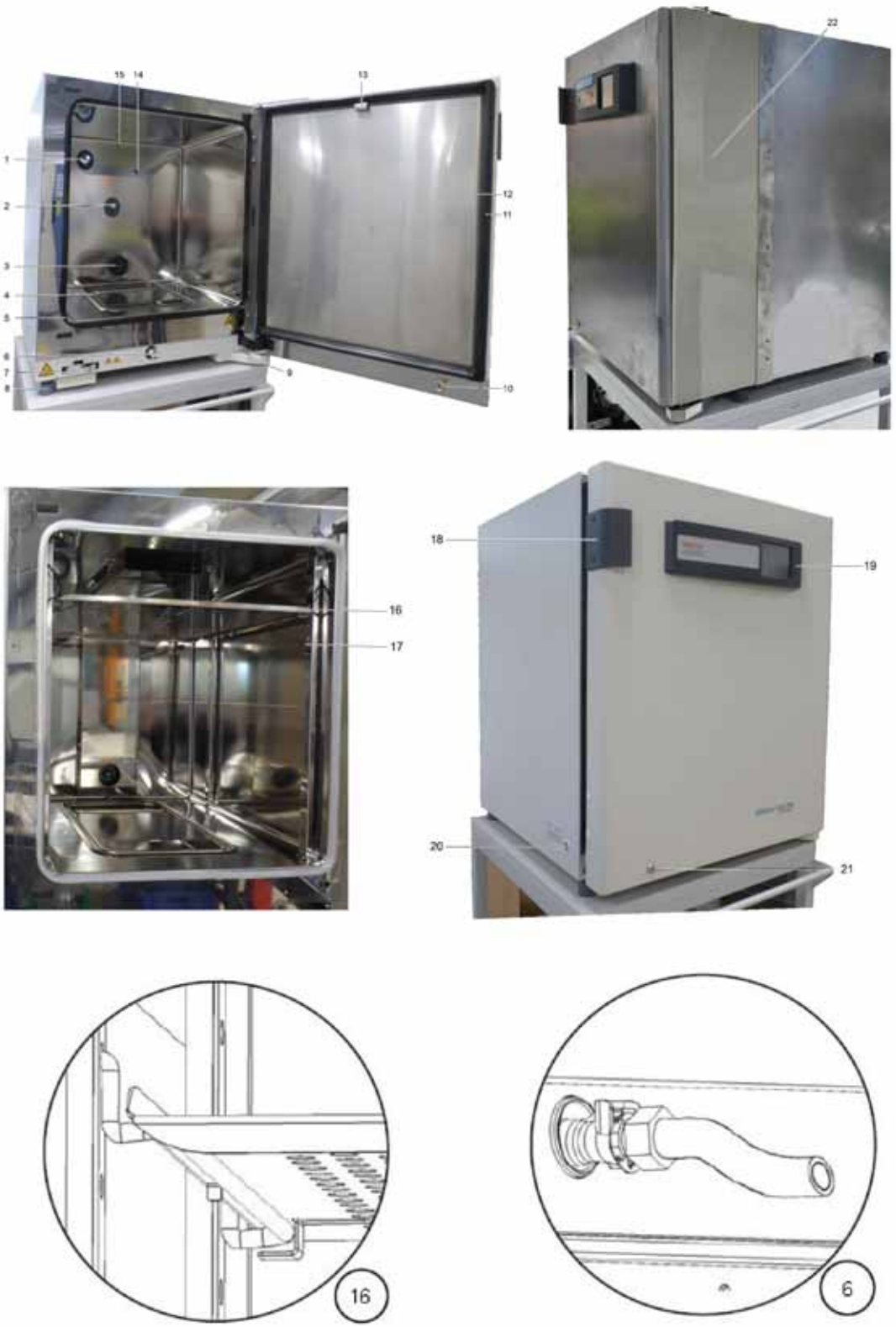

Figure 2-1. Front View

Position	Unit
1	Pressure compensation opening/Access port with plug
2	CO_2-sensor
3	Fan Inlet
4	Airbox with HEPA-Filter (Not shown)
5	Door seal, replaceable
6	Water drain
7	Door lock
8	Stand, height-adjustable
9	Door drive belt with cover
10	Lock cylinder
11	Magnetic door seal, replaceable
12	Solid Door
13	Door magnet
14	O2-sensor
15	Temperature sensor
16	Insert with shelf support
17	Support rail
18	Door handle
19	iCan™ Touchscreen (Control Panel)
20	Power switch
21	Manual Door Release Keylock
22	Pinch Protection[a]

[a] Optional

Rear View

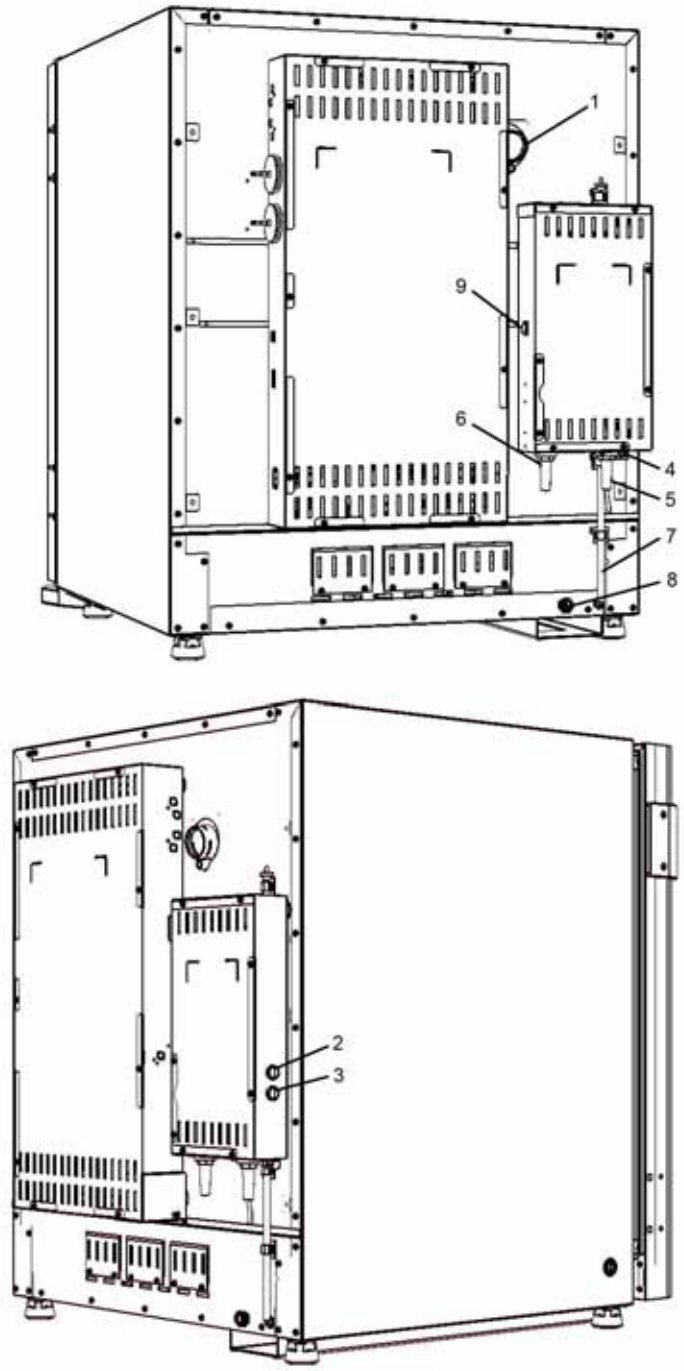

Figure 2-2. Components rear right side

Position	Unit
1	Access Port
2	Open/Close button for open/close manually
3	Init button for resetting the status of the door
4	Port for connecting an external door opener (Connector 1)

Position	Unit
5	Cable Connection Robotic System[a]
6	24 V Power Cable[a]
7	Water Level Indicator[a]
8	Filler neck water[a]
9	Switch to turn on / off 24 V DC external supply[a]

[a] Optional

Water Filling Aid

Figure 2-3. Water Filling Aid

Components Rear Left Side and Gas Supply

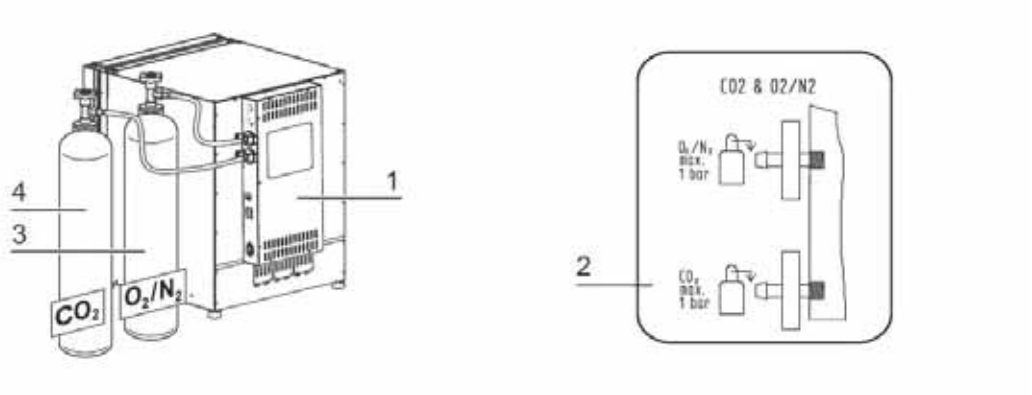

Figure 2-4. Components Gas Supply[1]

Position	Unit
1	Control box with supply interface for combined gas connection (optional)
2	Diagram: CO_2 and O_2/N_2 gas connection
3	O_2 /N_2 gas cylinder
4	CO_2 gas cylinder

Safety Devices

The device is equipped with the following safety devices:

- A door switch interrupts the $CO_2/O_2/N_2$ supply and the workspace heating when the door is opened.
- An over temperature 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 optional switch to disconnect the door drive from an external 24 V power supply.
- An optional protective cover against mechanical hazards (door hinge area).

Workspace Atmosphere

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

[1] Figure similar.

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

Temperature

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

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 250i AxD*** : 3 l.

Necessary Water Quality

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

CAUTION Termination of Warranty

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

CAUTION No tap or ultrapure water in humidity reservoir

Sterile distilled water or water treated to an equivalent quality level is the recommendation for use in the integrated humidity reservoir. The acceptable conductivity should be within the range of 1 to 20 µS/cm (resistivity should be within the range of 50 K-Ohm-cm to 1 M-Ohm-cm). The pH should be in the range of 7-9. Ultrapure Type 1 water or deionized (DI) water with a resistivity approaching or equal to 18.2 M-Ohm-cm, contains very few ions and will actively pull ions from interior components, damaging stainless steel, copper, and glass. If there is only access to DI or Type 1 water, one option is to add a sterile solution of weak sodium bicarbonate to raise the pH and add ions (recommend 84 mg/l (1 mmol/l).

CAUTION No chloride containing disinfectans

While stainless steel is resistant to corrosion, it is not corrosion proof. Many chemicals have a negative effect on stainless steel, especially chlorine and derivatives with oxidizing activity.
The addition of chloride-containing disinfectants or copper sulfate into the water as a constant disinfectant is not recommended because these can damage the connecting stainless steel/copper joint of the drain.For cleaning the interior, the recommendation is mild soap solution in water then rinse to remove residues. Wipe the interior surfaces and parts with a diluted quaternary ammonium disinfectant. Follow this by wiping with 70% alcohol to remove any remaining traces of the disinfectant.

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

Instructions for activating the Low Humidity function are given in section “Low Humidity Setting“ on page 5-42.

Prefilter

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

HEPA-Filter and Air Duct

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

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

Figure 2-5. HEPA-Filter and Airbox

Instructions for activating the HEPA-filter monitor are given in section “Activating/De-activating the Water Level Sensor“ on page 5-43.

The air duct feeds the flow of air from the fan along the rear wall (3/Figure 2-6) to the workspace ceiling, thus ensuring an optimum temperature distribution. At the same time, it directs the incoming stream of process gases into workspace and ensures that the gases are optimally intermixed.

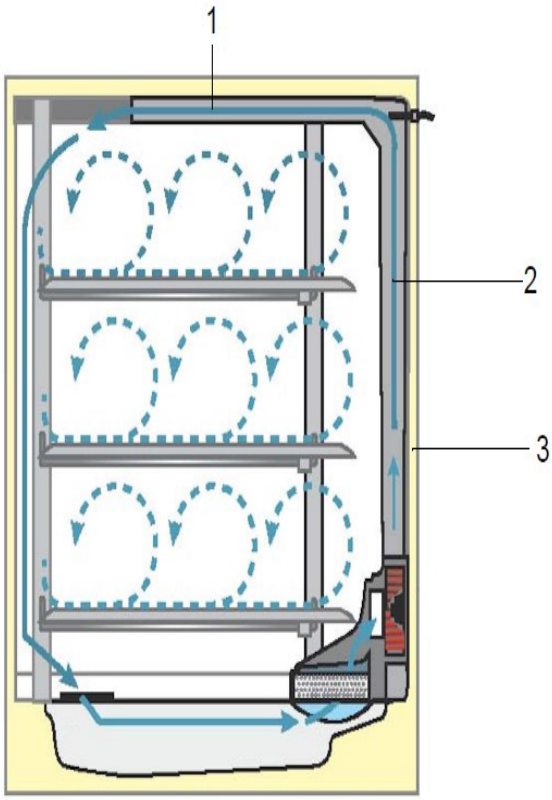

Figure 2-6. Air Duct

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

Position	Unit
1	Ceiling duct
2	Rear wall duct
3	Back wall of the workspace

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

CO_2 Supply

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

- Purity 99.5 % min
- medical gas quality.

N_2 Supply

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

Door Switch

A door switch is installed at the upper edge of the workspace opening (Figure 2-1, Pos. 14 + 15). When the door switch is activated by opening the 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.

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 (16/Figure 2-1).
- O_2 sensor (optional) for the acquisition of the oxygen content in the workspace atmosphere (15/Figure 2-1).
- CO_2 sensor for the acquisition of the CO_2 content in the workspace atmosphere (2/Figure 2-1) (IR sensor).
- The water level sensor (1/Figure 2-7) alerts the user when the water reservoir (2/Figure 2-7) 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 5-52).

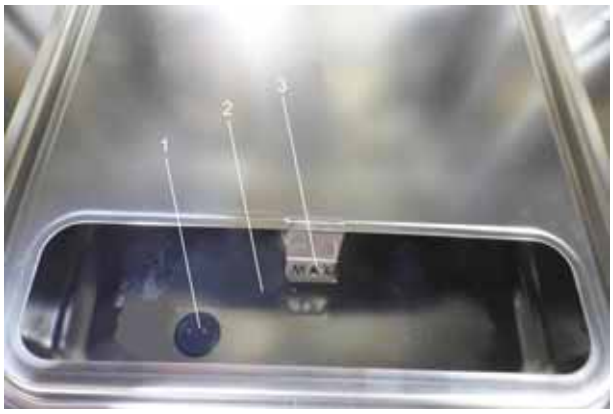

Figure 2-7. Sensors for Water Level

- Additionally, a mechanical/visual indicator for the maximum water level is available to assist the user in filling the water reservoir (see/Figure 2-7).

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

The over temperature 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 Over temperature icon to indicate the response of the thermal protection, and the temperature display is highlighted in red.

Note

After the over temperature alarm occurs, switch the device on and off again to permanently acknowledge the error.

Supply Interface

Standard Interfaces

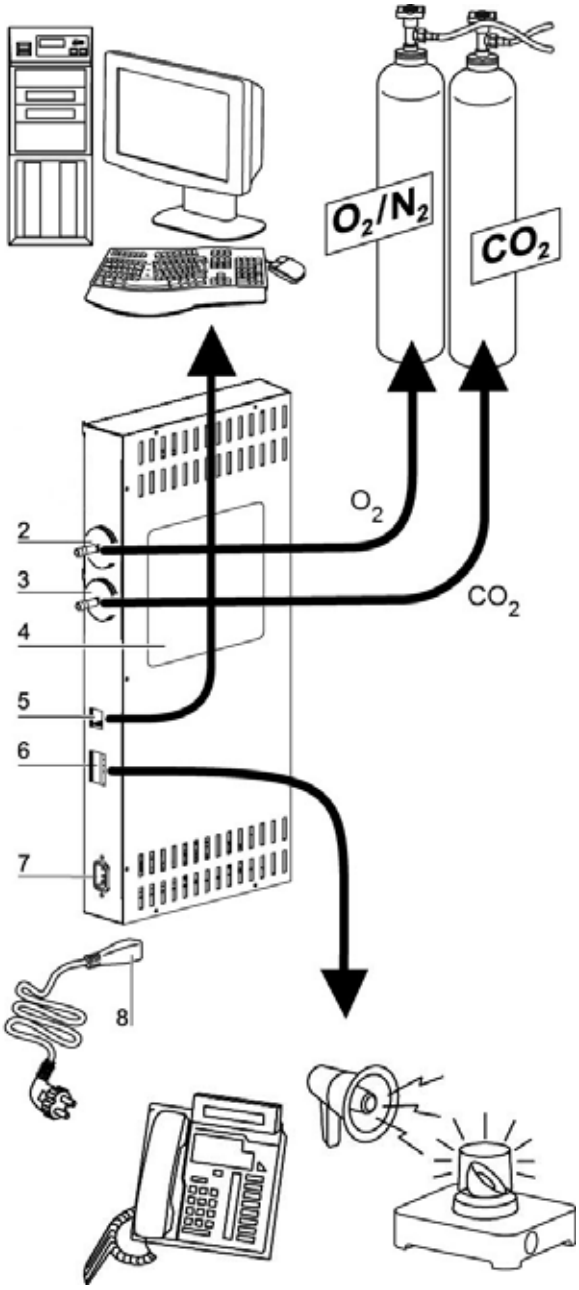

Figure 2-8. Interfaces - main box

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

Mounted on the right side (Figure 2-8) of the control box are the connectors for the basic functions of the unit as well as various optional elements:

Position	Unit
1	-
2	O_2 connector (not available with CO_2 and O_2/N_2gas supply; hidden)
3	CO_2 connector
4	Label
5	USB interface
6	Alarm contact
7	Power supply connection

Gas Connection

The gas supply lines between the device and the gas supply system are connected using the supplied connecting hoses. CO_2 and O_2/N_2 are supplied to the unit through dedicated connectors (2 and 3/ Figure 2-8).
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 (HEPA-filter quality).
The illustration shows the optional combined gas connection.

Label

The label (4/Figure 2-8) contains information about gas supply, an alarm contact terminal legend, and notes about the electrical fusing of the device.

USB Interface

The USB interface (5/Figure 2-8) allows for connecting the incubator to a PC. This connection - USB 1.1 / USB 2.0 / USB 3.0 full speed compatible - allows the fast (and temporary) acquisition of the major operating parameters (temperature, CO_2-/O_2-/N_2 concentration, error codes, etc.).

Alarm Contact

The device can be connected to an on-site, external alarm system (such as a private branch telephone exchange, a facility monitoring system, visual or audible alarm indicators.
For this purpose, a potential-free alarm contact is preinstalled in the device. This contact is broken out to the control box on the backside of the unit (6/Figure 2-8).

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 (7/Figure 2-8). The mains socket must be easily identifiable by the user and freely accessible at all times.

Second Box

DANGER Fire Hazard!

Don‘t remove the 24 V-Power Cable! There is a risk of fire!

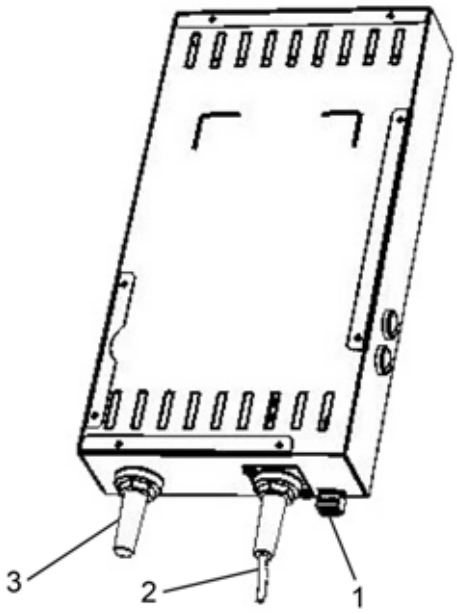

Figure 2-9. Interfaces - second box

Position	Unit
1	Port for connecting an external door opener (connector 1; customer side)
2	Cable Connection Robotic System
3	24 V Power Cable[a]

[a]The input for „auto-door“ (24 VDC / max. 2.2 A) at S-Box has minimum to fulfill the requirements in compliance to Limited-energy circuit (UL 61010-1, chapter 9.4), or LPDS (IEC 606950-1), or NEC Class2.

Workspace Components

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.

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

- The standard version is equipped with an interior container made of stainless steel.
- Depending on the material of the interior container, workspace components such as the air duct and shelving is also made of the same stainless steel or copper material.
- The airbox for the HEPA-filter is made of thermally resistant plastics material and must remain installed while the Steri-Run sterilization routine is running.
- 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

Water Reservoir

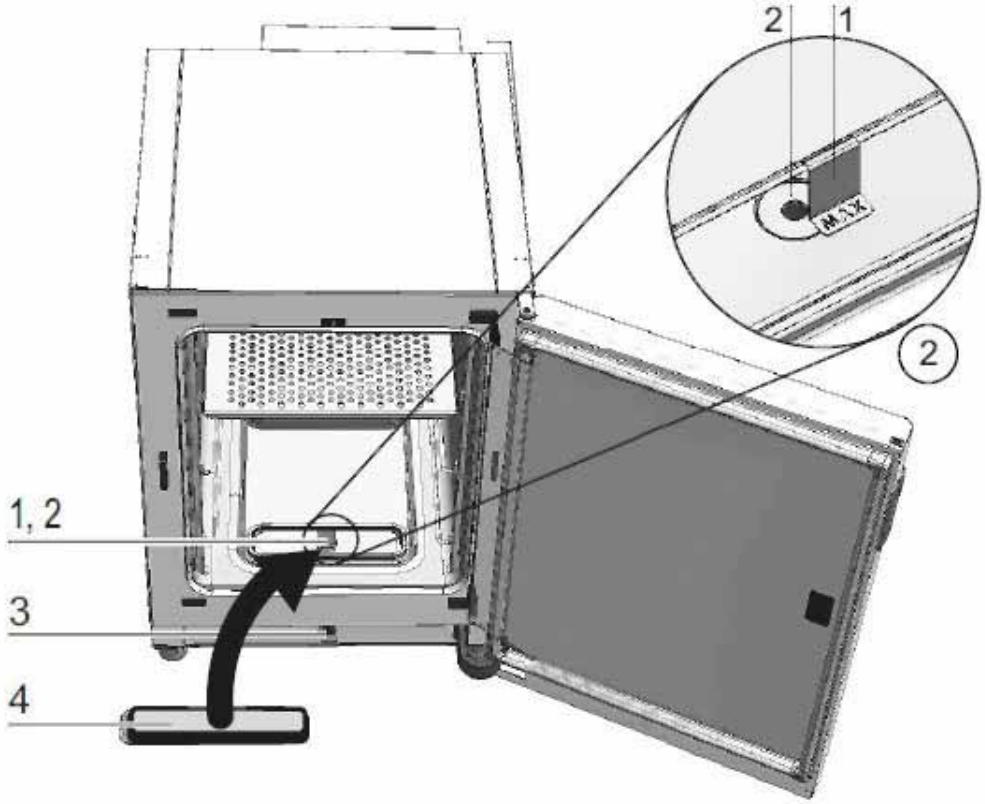

Figure 2-10. Water reservoir[2]

The water reservoir is sunk into the interior container bottom and separated from the workspace by means of a cover panel. A drain (2/Figure 2-10) provided in the front section of the water reservoir allows for quickly draining the water through a fill and drain valve (3/Figure 2-10) located at the front or in the rear section[3] of the device.

Placed on the front section of the water reservoir cover is a pre-filter (4/Figure 2-10). The pre-filter consists of a dual-layer wire mesh with a silicone frame and is autoclavable as well as heat-resistant. The pre-filter must remain installed in the device during the Steri-run sterilization routine, but needs to be removed for refilling the water reservoir.

The water reservoir is monitored by the water level sensor described in section “Sensor System“ on page 2-11.

A fill level indicator at the front or at the rear[3] with the punched-out word “MAX“ (1/ Figure 2-10) is suspended above the water reservoir to indicate the maximum fill level. The maximum fill volume of the water reservoir is 3 liters.

[2] Figure similar.

[3] Depends on variant. Connections at the rear side are not shown here.

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.

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 door of the unit and the perimeter of the door opening are heated as well. The workspace of the device always remains visible, despite high humidity.

Rear Panel Openings

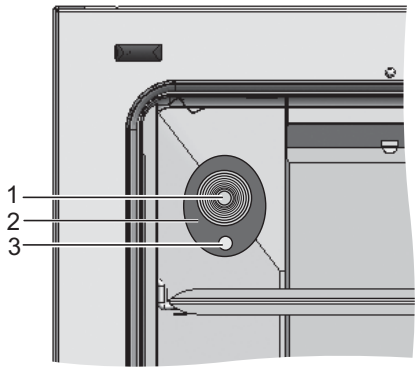

Figure 2-11. Rear Panel Openings

The access port with insert (Figure 2-11 Ø 42 mm / 1.66 inch) can be sealed with a plug (1/Figure 2-11) and allows for feeding cables, tubes or additional sensors into the workspace of the unit.

The pressure compensation opening (3/Figure 2-11) located directly beneath the access port in the rear wall of the unit ensures pressure compensation between the workspace of the unit and the operating room.

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

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

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

Shelf System

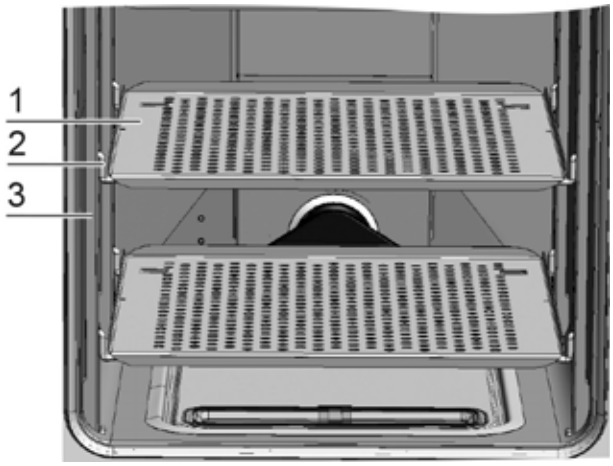

Figure 2-12. Shelf System Components

The support rails (3/Figure 2-12) of the shelf system are perforated every 42 mm (1.66 inch) so that the support hooks (2/Figure 2-12) can be inserted variably for any culture container size required. The shelves (1/Figure 2-12) have an integrated tilt protection and withdrawal stop. ***HERACELL VIOS 250i AxD*** models come equipped with a single-piece bottom insert, as shown on the left side in Figure 2-12. For details on using the shelf system, see “Start-up“ on page 4-1.

Installation

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Environmental Conditions

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

- Operation is only permitted in a Class B laboratory environment.
- If you operate the device with a robotic system, make sure that the EM limits for class b are complied with.
- Draft-free and dry location.
- The minimal distance to adjacent surfaces must be observed on all sides, see "Space Requirements" on page 3-2.
- The operating room must be equipped with appropriate room ventilation.
- Solid, level, fire-proof surface.
- Vibration-proof substructure (floor stand, lab table) capable of bearing the weight of the device and of accessories (particularly if several devices are stacked).
- The electrical system of the device has been designed for an operating height of up to 2000 m above sea level.
- To ensure a constant incubation temperature of 37 °C, the ambient temperature must be within a range of +18 °C to +34 °C.
- Relative humidity up to 80% (max.).
- No direct exposure to sunlight.
- Devices that produce excessive heat must not be placed near the location of ***HERACELL VIOS 250i AxD***

Room Ventilation

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

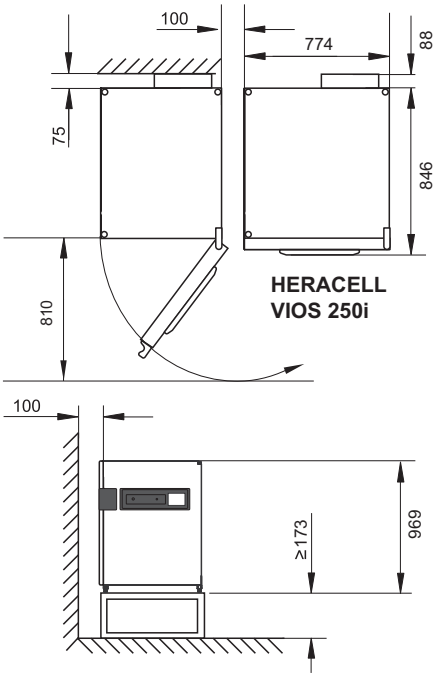
- Therefore, the ***HERACELL VIOS 250i AxD*** must only be installed in rooms with sufficient ventilation.
- Do not install the device in room recesses without ventilation.
- The room ventilation should be a technical ventilation that complies with the national requirements for laboratories or some other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

Space Requirements

WARNING EMERGENCY STOP!

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

Note When setting up the unit, also take in account the space required by your robotic system for loading and unloading.



All dimensions in mm.

Figure 3-1. Device Dimensions

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.

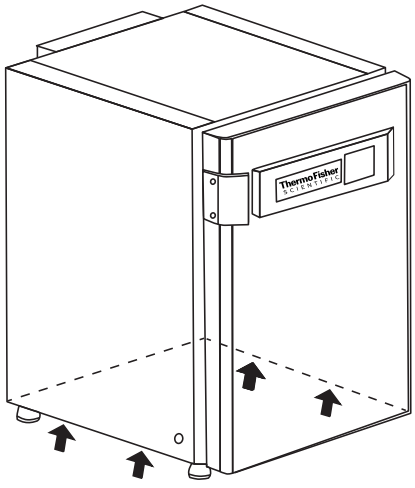


Figure 3-2. Lift Points

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

CAUTION Heavy loads! Lift with care!

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

CAUTION

Do not lift the device at the door operator (fig. 2-1, 10) or the belt cover.

Stacking and Stacking Variants

Stacking

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

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

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

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

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

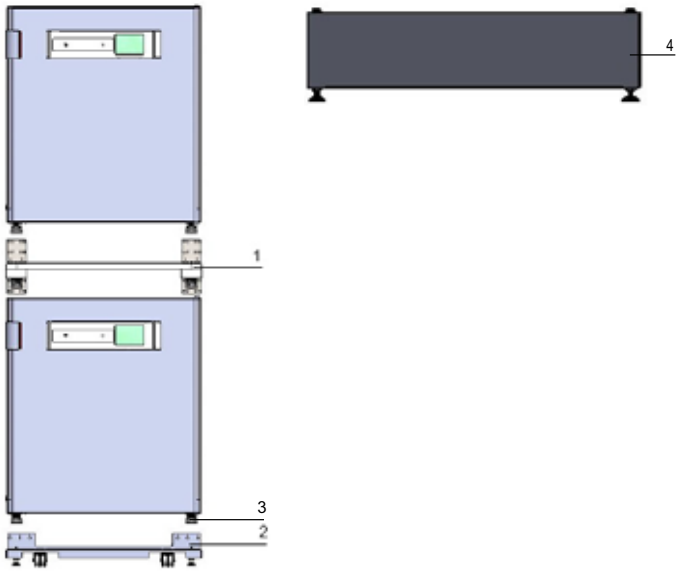


Figure 3-3. Stacking

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

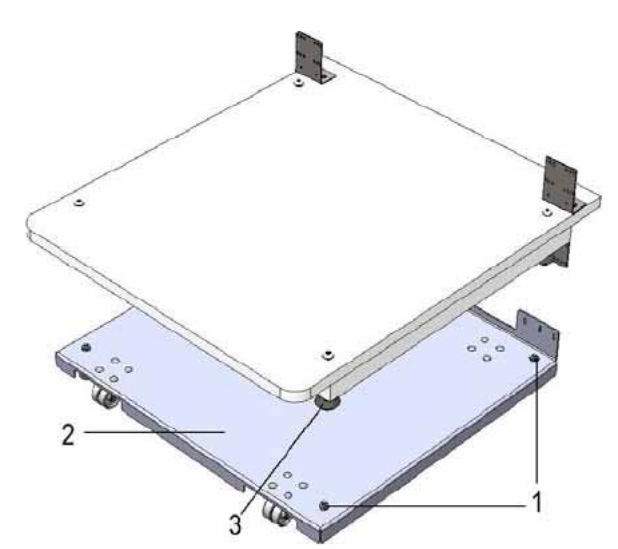


Figure 3-4. Stacking adapter and base rack with stacking elements

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

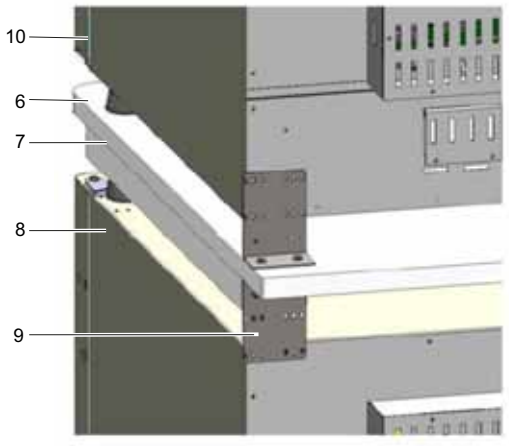


Figure 3-5. Fastening the adapter plate to the lower unit

4. Use the fastening screws supplied to bolt the adapter plate (7/Figure 3-5) to the rear wall of the lower unit (8/Figure 3-5).
5. Fasten adapter plate (7/Figure 3-5) to the opposite corner of the unit using two screws.
6. Place the device to be stacked with the device stands (6/Figure 3-5) onto the stacking elements (1/Figure 3-4) at the top of adapter plate.

The devices are secured to one another by their own weight, only for the adapter plate (7/Figure 3-5) to the upper unit (10/Figure 3-5).

7. Remove the four screws at the top rear edge of the upper device, as indicated by the arrows in Figure 3-6.

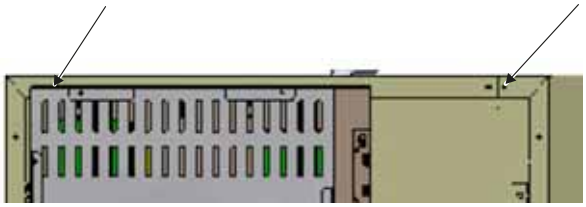


Figure 3-6. Removing the screws for the wall brackets

8. Bend both ends of the wall brackets (4/Figure 3-7) by an angle of approx. 90 degrees to obtain two rectangular tabs.
9. Use the four screws to secure the wall bracket to the back of the device, with the tab facing downward on the device side.
10. Make sure that the stacking feet of the upper device are correctly aligned on the stacking adapter.
11. Secure the wall brackets to a load-bearing structural part of the building using suitable mounting hardware, such as wood screws and wall plugs.

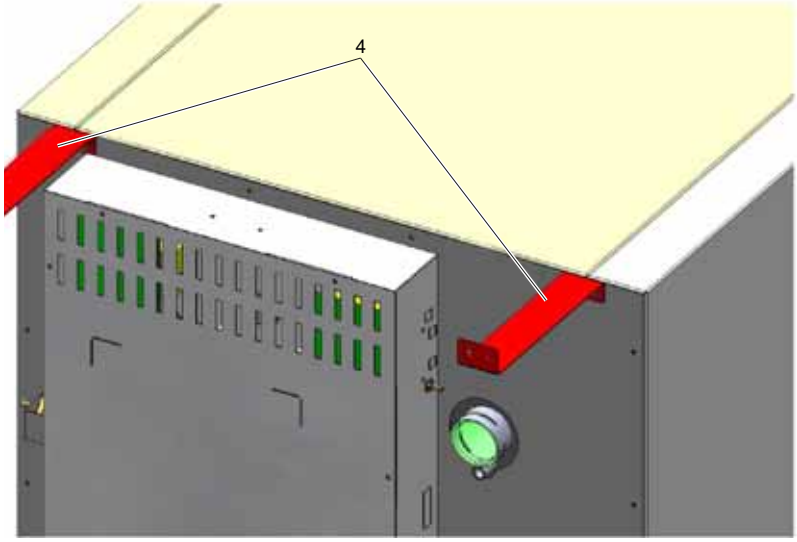


Figure 3-7. Mounting the Wall Brackets

CAUTION Risk of tipping and dropping of stacked devices!

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

CAUTION Transporting stacked devices!

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

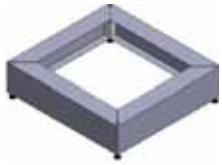
Note Fastening on mobile racks:
If the devices are installed onto mobile racks, make sure that the rollers are secured with a locking brake during the operation of the incubators and that the rollers are oriented toward the front for increased stability.

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

Stacking variants

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

Details see assembly instruction of stacking adapter kit.

Material Number	Support stand Options	Description
50149102		Support frame for double chamber, 200 mm high (without castors) for HERAcell VIOS 250i AxD and Steri-Cycle i250
50149125		Support frame for single chamber, 780 mm high (without castors) for HERAcell VIOS 250i AxD and Steri-Cycle i250

Start-up

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Adapting the Unit to the Ambient Atmosphere

CAUTION Adapting the unit to the ambient atmosphere!

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

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

Preparing the Workspace

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

- Support rail
- Shelf support
- Prefilter
- Air duct
- Airbox
- Shelves
- Workspace surfaces

Note Decontamination:
For details about the cleaning and disinfection of the device see chapter “Cleaning and Disinfection“ on page 6-1.

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

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

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

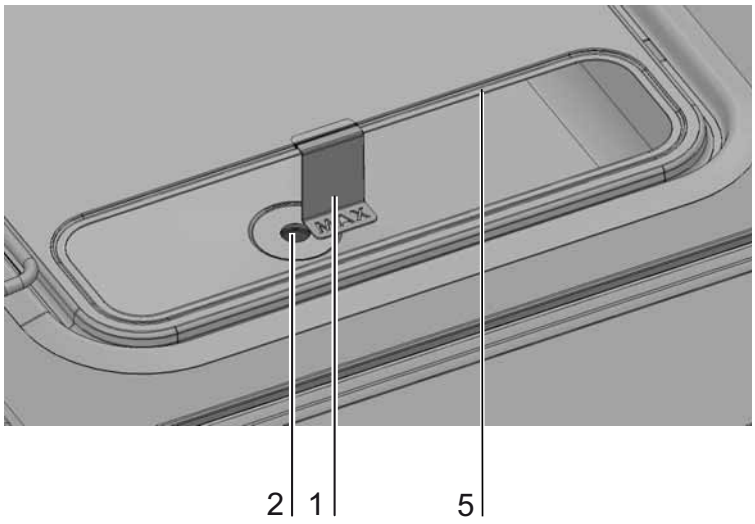

Figure 4-1. “MAX” Fill Level Indicator

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

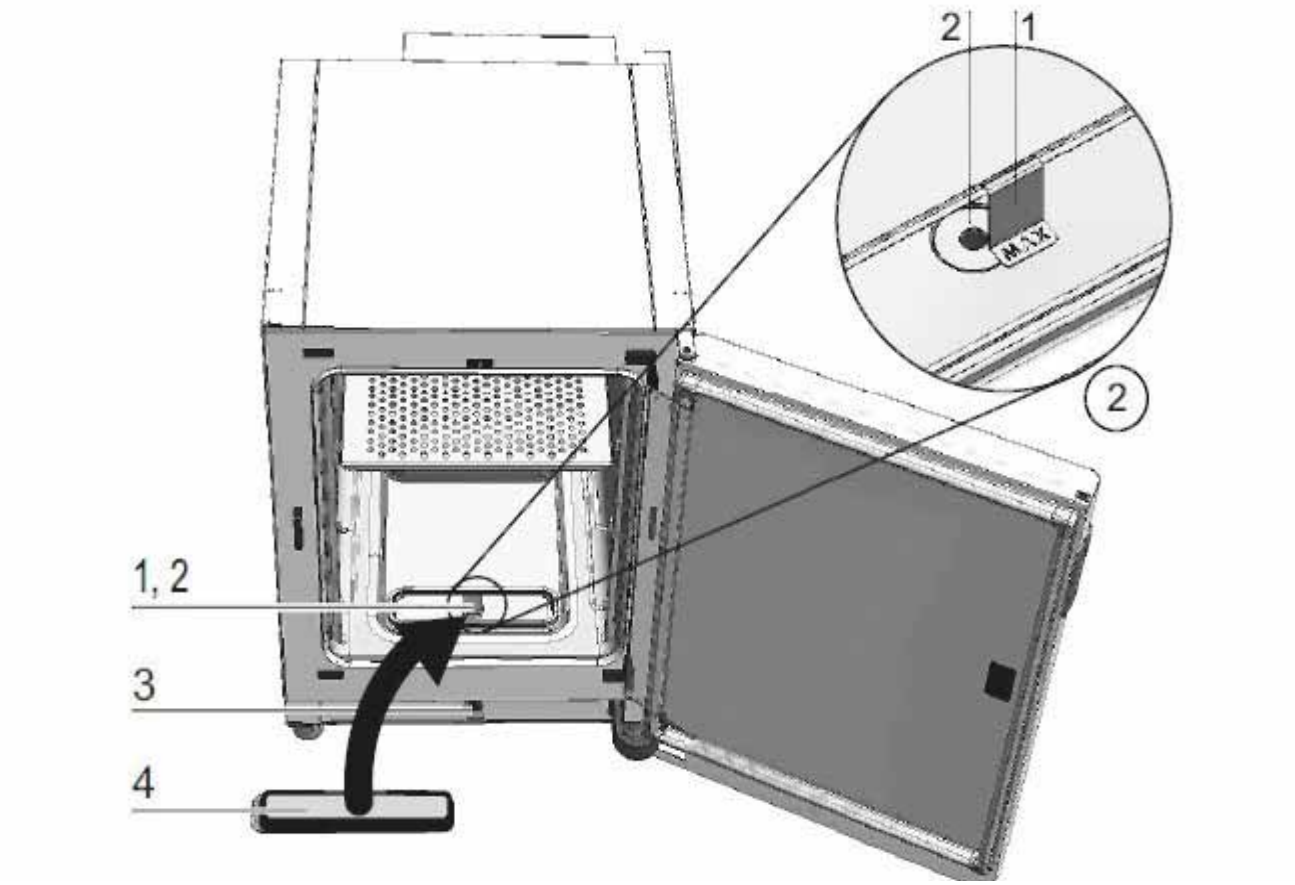

Figure 4-2. “MAX” Fill Level Indicator and Pre-Filter

Install the Air Duct

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

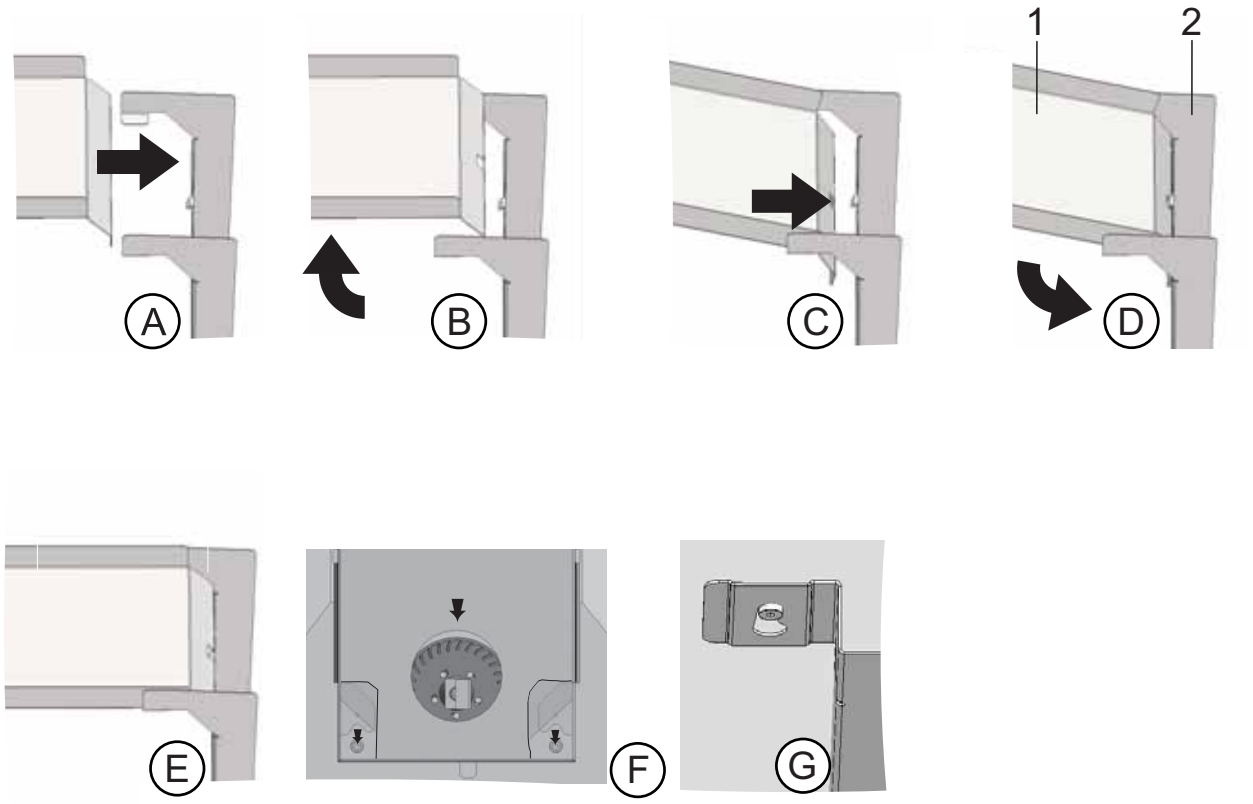

Figure 4-3. Assembling the Air Duct

Installing the HEPA-Filter and the Water Reservoir Cover Panel

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

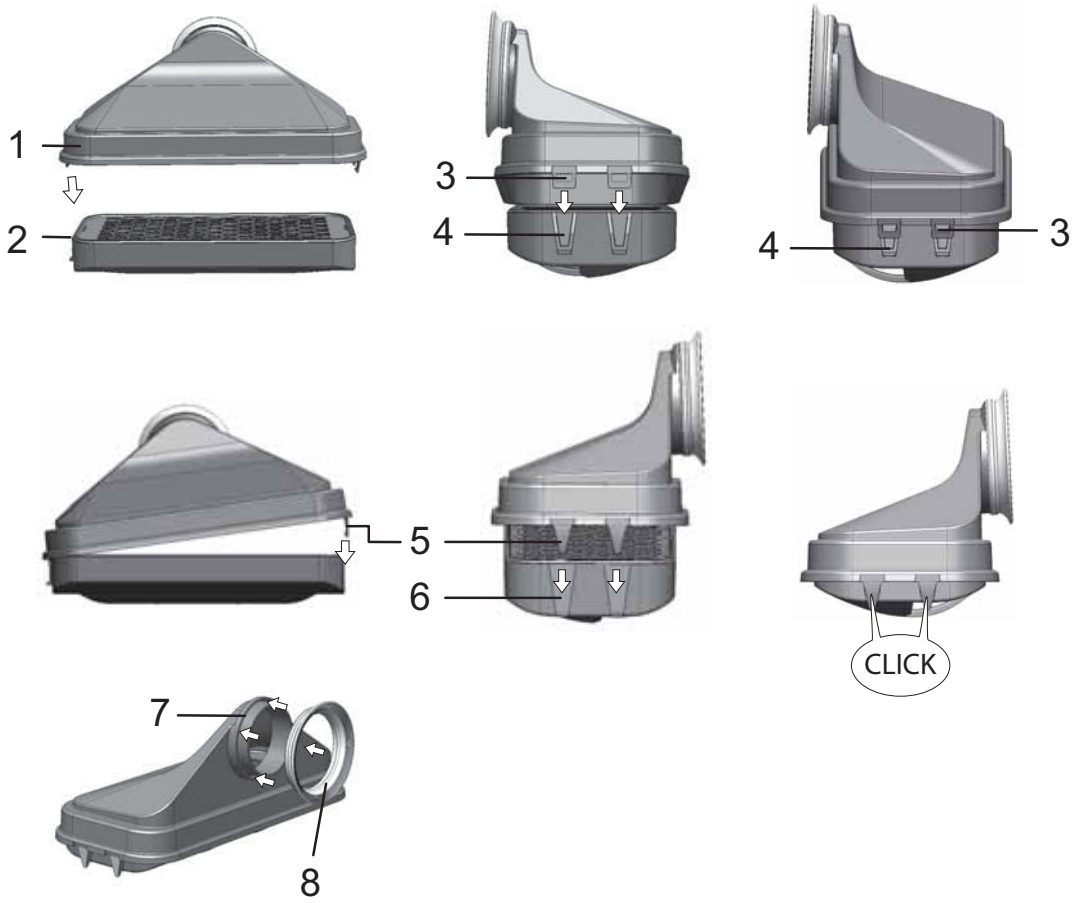

Figure 4-4. Assembling the HEPA-Filter and the Airbox

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

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

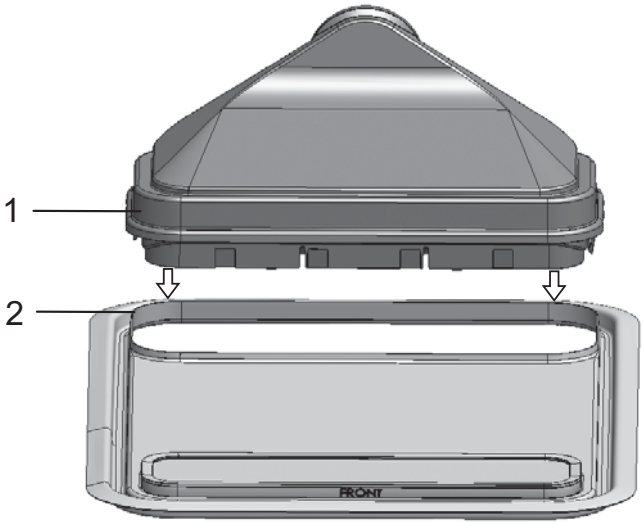

Figure 4-5. Place the Airbox onto the Water Reservoir Cover Panel

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 4-6).

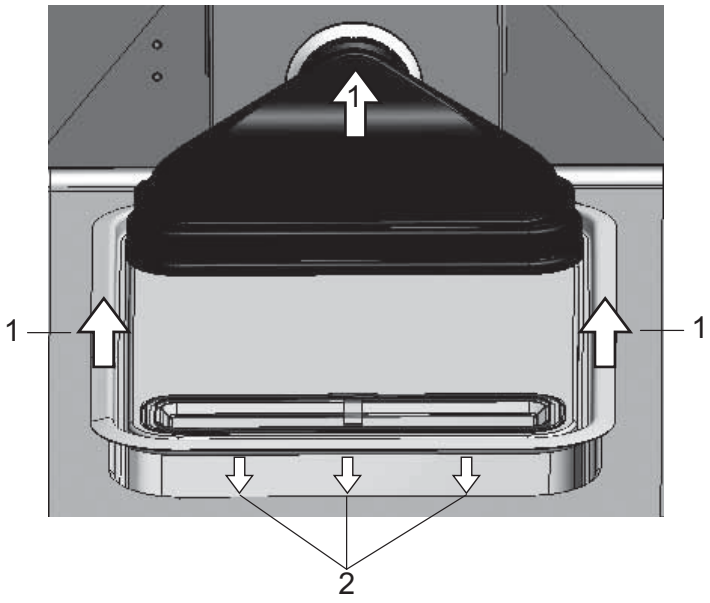

Figure 4-6. Installing the Airbox

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 4-6). The airbox tubing slides into the fan outlet.

Installing the Shelf System

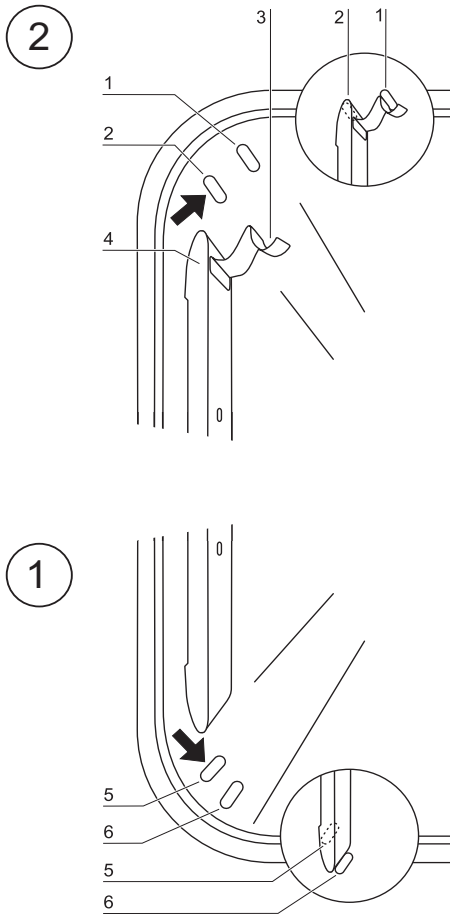

Figure 4-7. Support Rail Installation/Removal

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

Installation/Removal of the Support Rail

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

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

Shelf Support Installation

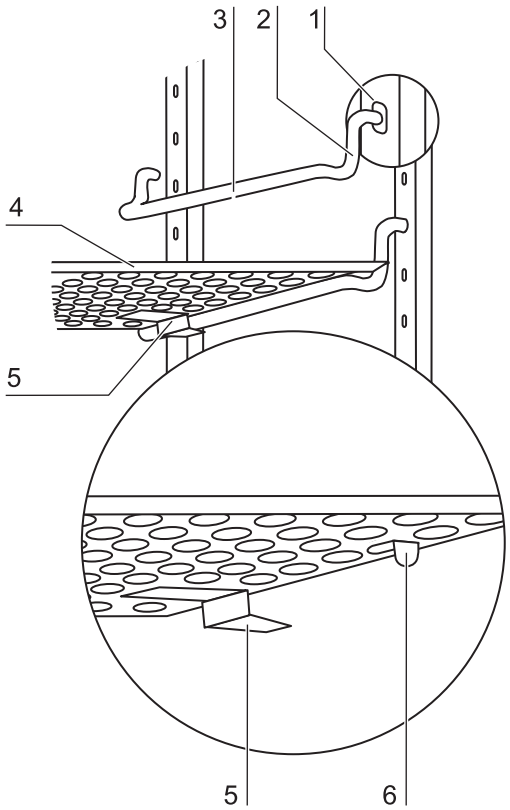

Figure 4-8. Shelf Support Installation

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

Installing the Shelves:

1. Slide the shelves tilt with the protection device (5/Figure 4-8) 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 4-8) can be routed over the shelf supports.
3. Make sure that the shelf support is positioned in the two tilt protections in a way that allows it to move freely.

Leveling the Device

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

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

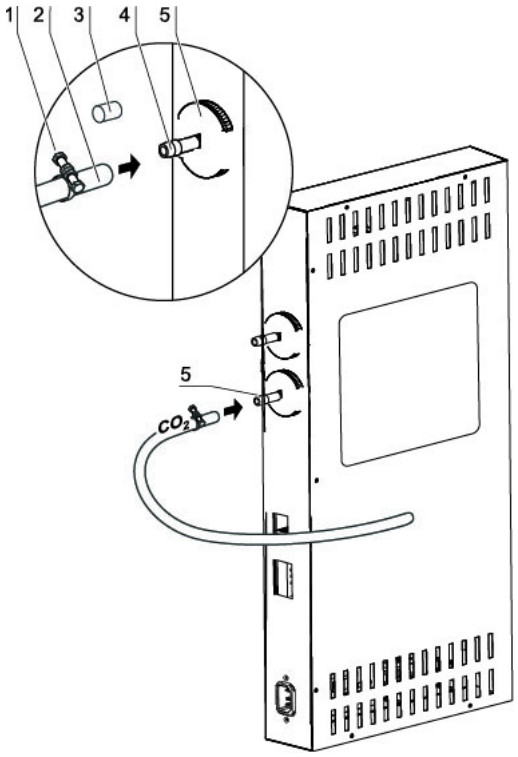

Figure 4-9. Installing Gas Pressure Hoses

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 4-9) from the sterile filter.
3. Slide the hose clamp (1/Figure 4-9) onto the gas pressure hose (2/Figure 4-9) and connect hose to the sleeve (4/Figure 4-9) of the sterile filter (5/Figure 4-9).
4. Secure the gas pressure hose to the sleeve of the sterile filter using the hose clamp.

CAUTION Pressure compensation opening

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

Gas Connection

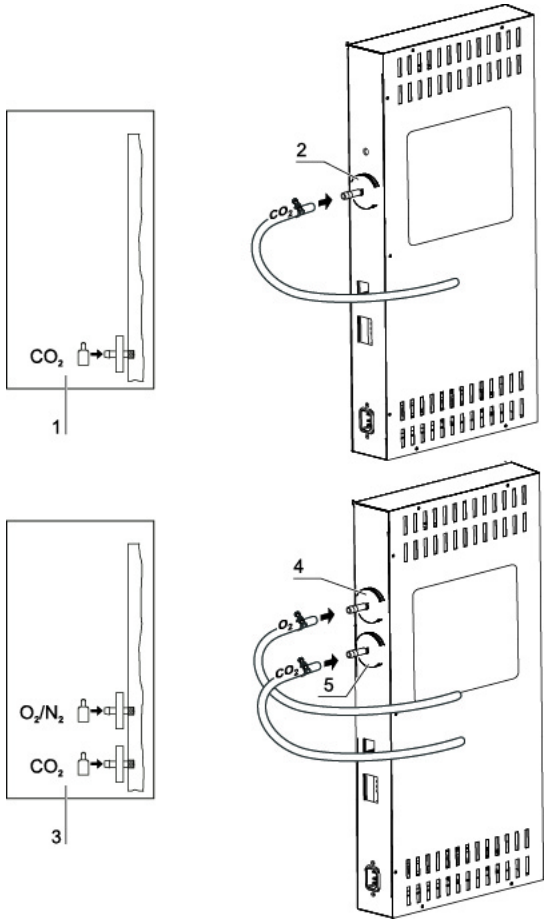

Figure 4-10. Gas Connection

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

CO_2 Connection:

- For a device with CO_2 connection, connect the gas supply to the gas inlet filter (2/Figure 4-10) in accordance with the connection diagram (1/Figure 4-10).

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

On units with a combined CO_2 /O_2 /N_2 connection, the gas supply tubes must be routed according to the following connection diagram (3/Figure 4-10):

- Connect the O_2/N_2 supply line to the upper gas inlet filter (4/Figure 4-10),

- Connect the CO_2 supply line to the lower gas inlet filter (5/Figure 4-10).

Note Manual gas monitoring:

The filling level of the gas bottles must be checked every day.

Power Supply Connection

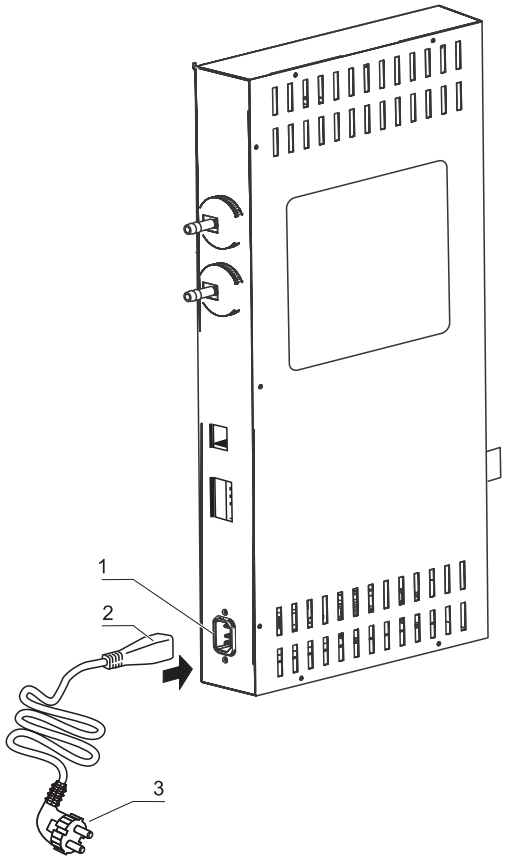

Figure 4-11. Power Supply Connection

WARNING Electric shock!

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

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

Connection to the Power Supply System:

1. Before connecting the device to the power supply, check to see if the voltage of the power outlet corresponds with the specifications on the nameplate to the left of the power switch. If the ratings given for voltage (V) and current (A) are not correct, the device must not be connected to the power supply.

2. Connect the IEC connector to the socket of the control box of the device.
3. Connect the grounding plug of the power supply cable to a correctly grounded and fused socket.
4. Make sure the power supply cable is not subjected to tensile or compressive force.
5. Mains connection: The mains socket must be easily identifiable by the user and freely accessible at all times. The power cord plug is the all-pole disconnecting device from the mains supply.

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

Electrical Connection of the Automatic Door Opener[1]

WARNING

The input for „auto-door“ (24 VDC / max. 2.2 A) at S-Box has minimum to fulfill the requirements in compliance to Limited-energy circuit (UL 61010-1, chapter 9.4), or LPDS (IEC 606950-1), or NEC Class2.

- Connect the device to the robotic system according to the wiring table „robot“ below (see fig. 4-12, 2nd Chapter „Wiring Table „Robot“).
- Connect the red 24 V-cable (Fig. 4-12, 3) to the 24 V power supply. Connect the blue cable to GND (0V).
- Connect the external door opener (Fig. 4-12, 1).

[1] Only devices with external 24 V supply.

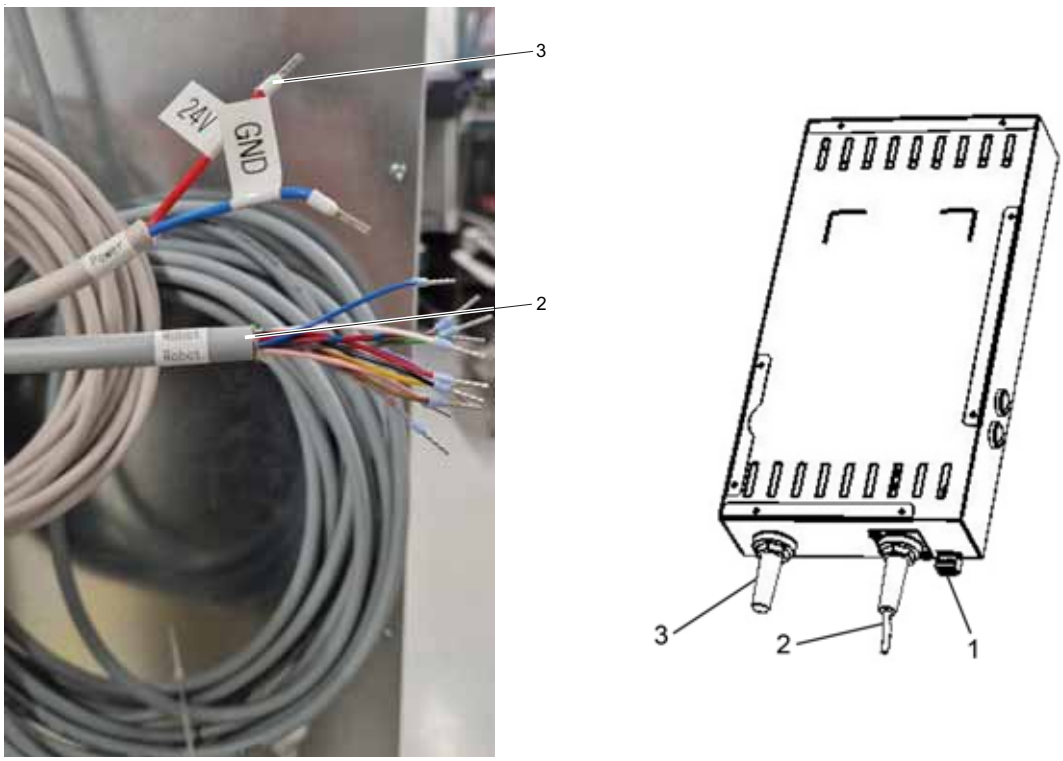

Figure 4-12. Connection of the Automatic Door Opener

Wiring Tables

Wiring table „Robot“

Note If reached, the output is 0 V, otherwise it‘s 24 V (e.g.: if the door is open, the doors open output is 0 V and the doors close output is 24 V. Vice versa, if the door is closed).

Number PIN	Color	Usage	Type
1	Green	Door Open (Reed Sensor 1)	Output (24 V)
2	Yellow	Door Open (Reed Sensor 1/ GND)	
3	Violet	Door Close (Reed Sensor 2)	Output (24 V)
4	Brown	Door Close (Reed Sensor 2/ GND)	
5	Gray	Lock System Open (Switch 1)	Output (24 V)
6	Blue	Lock System Open (Switch 1/ GND)	
7	Pink	Lock System Close (Switch 2)	Output (24 V)
8	Red	Lock System Close (Switch 2/ GND)	
9	Black	GND	

Number PIN	Color	Usage	Type
10	White	Robot Open	Input (24 V)
11	Gray-Pink	Robot Close	Input (24 V)
12	Red-Blue	Robot Init	Input (24 V)

Wiring Table Connector 1

Number PIN	Usage
1	Open / Close (Key 1 / GND)
2	Open / Close (Key 1)
3	Init (Key 2 / GND)
4	Init (Key 2)

Connecting the USB Interface

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

The USB interface complies with Standard USB 1.1 and is compatible with Standard USB 2.0 and 3.0 (full speed). Data communication between the PC and incubator across the USB interface requires that suitable driver software be installed on the PC, unless such software is provided by the currently installed Windows-version. The installation of the driver software is described in “Data Communication“ on page 10-1.

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 5-32.

Connecting the Alarm Contact

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

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

Alarm relay:

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

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

Note Switching structure:
The alarm relay switches for all failures reported by the control loops (see “Error Messages“ on page 5-52).

Connection Example

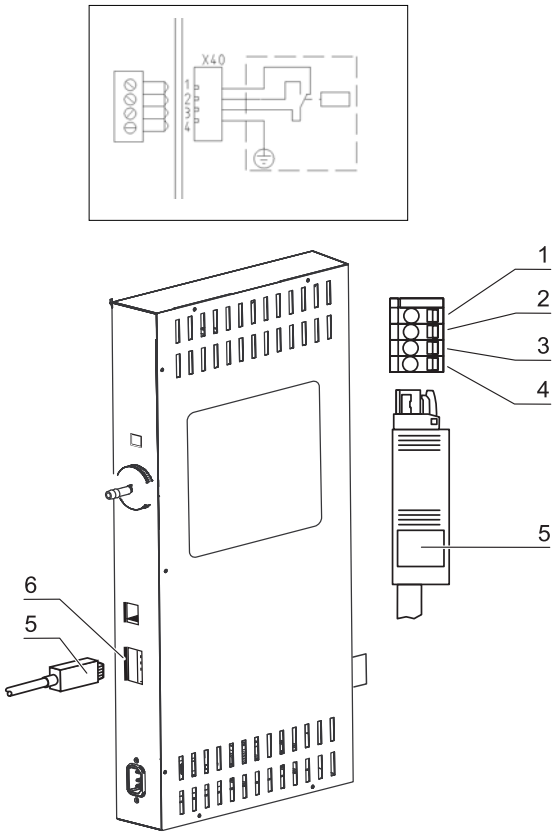

Figure 4-13. Connection Example Alarm Contact

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

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

Operation

Table of Contents

Preparing the Device

CAUTION

Block access to the device when it is in automatic mode.

CAUTION

In automatic mode, observe the safety and assembly instructions of the robots.

CAUTION

In the event of a door opening error, disconnect the power to the unit and correct the error before restarting the unit!

CAUTION

In non-automatic mode, disconnect the control of the CO_2 incubator by the robotic cluster!

CAUTION

Make sure that the belt cover for the drive belt of the door has been properly mounted before operation and is not defective.

CAUTION

The operator of the unit needs to take care about safety, especially during automatic opening and closing of the door.

CAUTION

During opening and closing of the door, no persons or obstacles may be within a radius of 1 m around the door hinges.

CAUTION

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

CAUTION

There is a possibility that an unsuitable robot may be a source of danger to people. We recommend the use of a collaborative robot.

CAUTION

Do not remove the protective cover located at the door hinge.

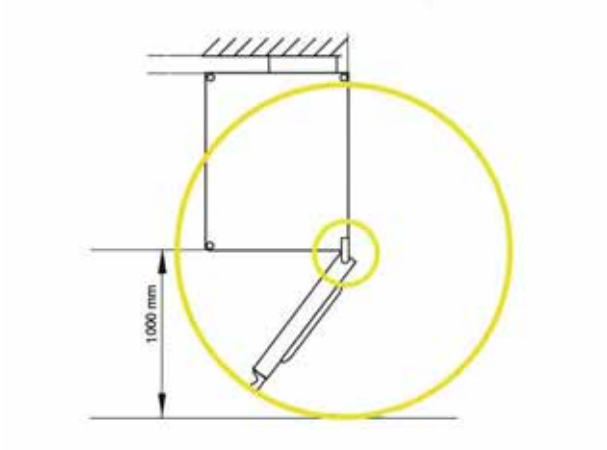

Figure 5-1. Distance around the device

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 shelf system components must be installed safely.
- The airbox with the HEPA-filter and the air duct must be installed according to the instructions.

Decontaminating of the Device Workspace

- Run the steri-run sterilization routine (see “Progress of a Steri-Run Sterilization Routine:“ on page 6-10) or decontaminate the workspace according to the hygiene regulations set forth by the operator.

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

Water supply: see “Relative Humidity“ on page 2-7.

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

Fill volume for *HERACELL VIOS 250i AxD*: 3 l

Emergency Unlock

WARNING

After an emergency release, the surfaces of the device may be hot. Let it cool down before touching it and use protective gloves if necessary.

CAUTION

Only operate the emergency unlock in non-automatic mode. Disconnect the control of the CO_2 incubator by the robotic cluster before operating to ensure safe operation.

CAUTION

Always pull the key after locking the device.

CAUTION

Handle the key carefully and keep it safe. Make sure that unauthorized persons do not gain access to the key and thus to the device.

Figure 5-2. Key

- Insert the key into the keyhole.

- Turn the key 90 degrees counterclockwise to open the door.
- The door is released and can be moved slowly in open position.
- Open the door slowly.
- Close the door in opposite way. (Press the door towards the unit body for easier locking the door.)

Starting Operation

1. Remove pre-filter (2/Figure 5-3).
2. Remove bottom insert if there is not enough space for the container used for filling.
3. Fill reservoir with sufficiently purified water (beneath cover item 1 in Figure 5-3) of the workspace.

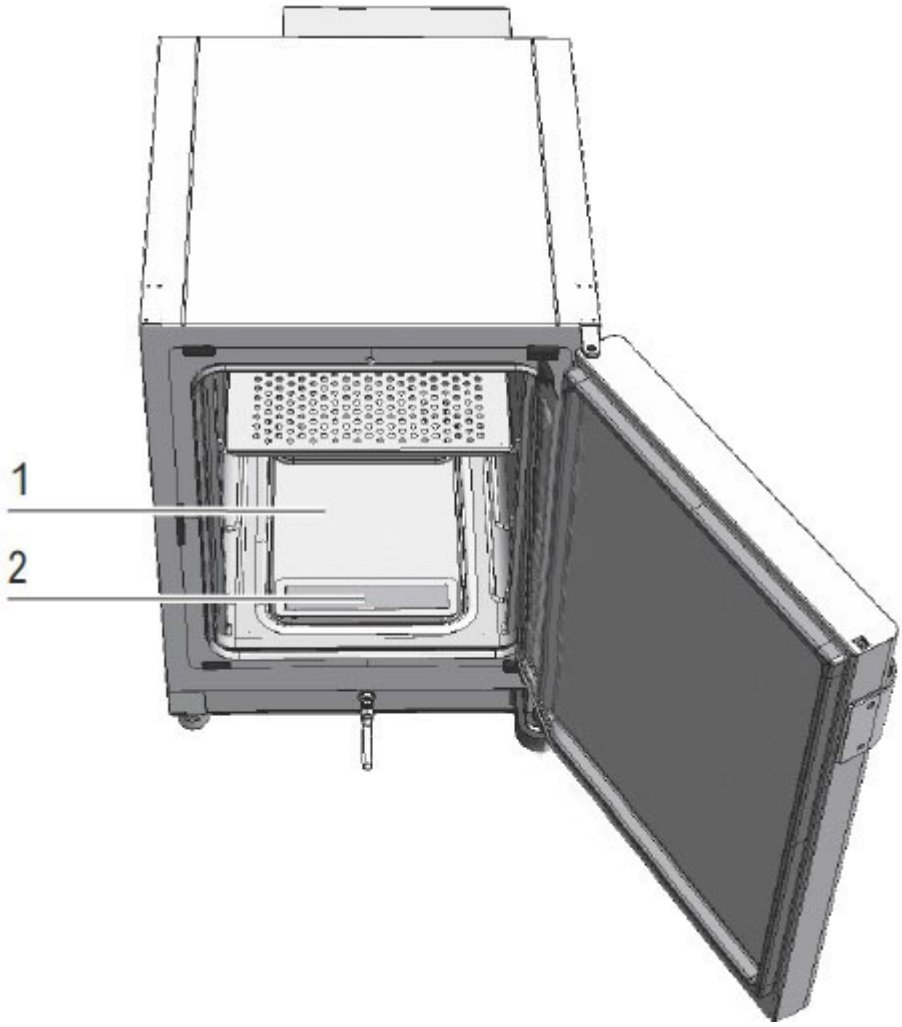

Figure 5-3. Water Reservoir[1]

[1] Figure similar.

Water Filling

Filling at the Front

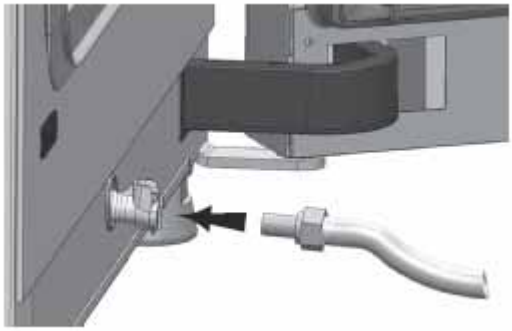

Figure 5-4. Fill and Drain Valve Incubator[2]

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

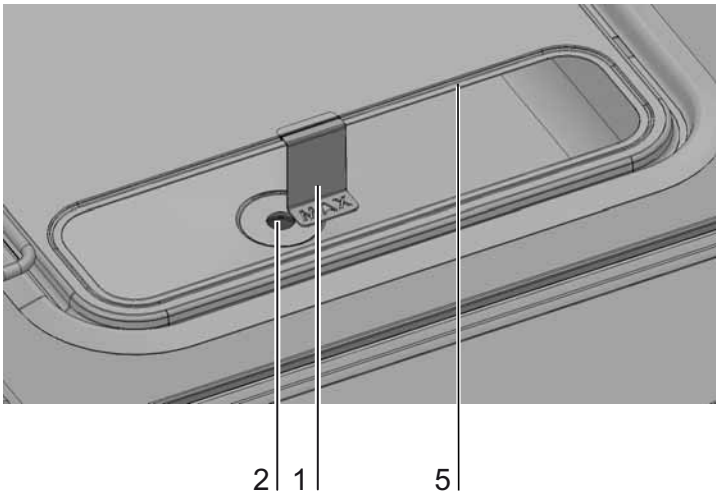

Figure 5-5. “MAX” Fill Level Indicator

6. Wipe off excess water from the cover of the water reservoir.
7. Reinstall pre-filter (2/Figure 5-3).
8. Reinstall the bottom shelf or close flap over cut-out for filling.
9. Make sure that the valves of the CO_2 /O_2 /N_2 supply system are open.
10. Turn on the device using the power switch.
11. Adjust set values for temperature and CO_2 /O_2 concentration on the iCan™ touchscreen.

[2] Figure similar.

Filling at the Backside[3]

CAUTION

Check the water level in the water level indicator (fig. 5-6, 2) while filling the water tank. Do not fill above the „Max. Water Level“-Line.

Note Please hold the funnel with one hand during filling.

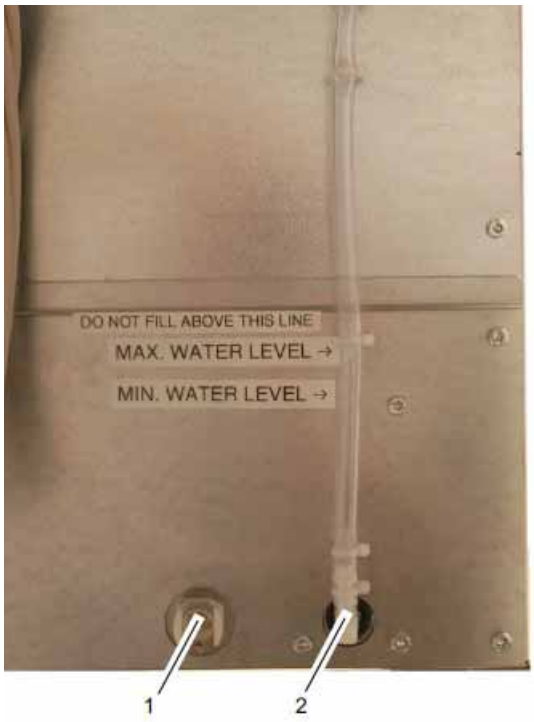

Figure 5-6. Filling Water at the Backside

Through the water valve at the incubator, water can be filled with a re-filling funnel (water filling aid) both at the front and from the back site.

[3] Optional. Depending on the variant.

Figure 5-7. Water Filling Aid

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.

- Install the water filling aid (fig. 5-8) to the water filler neck (fig. 5-7, 1) at the rear of the unit, 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.

Starting the Device

1. Start the device with the auto-start routine (see “Activating the Auto-Start Routine“ on page 5-23).
2. The auto-start progress indicator appears on the display, and the automatic start routine is run.
3. The temperature control adjusts the temperature to the selected set value, humidity rises.
4. When temperature and relative humidity are constant, the automatic adjustment of the CO_2-/O_2 measuring system is performed.
5. The CO_2-/O_2 control supplies the set amount of CO_2-/O_2.
6. If the auto-start routine has been completed, the progress indicator is hidden, and the main menu is displayed. The device is operational.

Open and Close the Device Manually

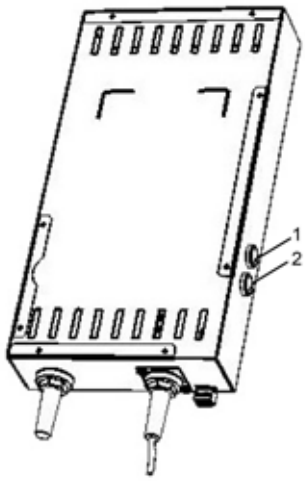

Figure 5-8. Buttons at the Rear

- Press key 1 (Fig. 5-8, 1) on unit rear to open the device manually.
- Press key 1 on unit rear again to close the device manually.
- At startup or if the door was moved by hand, press key 2 (Fig. 5-8, 2) to initialize the door. The door will close. Once the door is closed and locked key 1 can be used to either open or close the door, depending on its current position.

Operating of the Shelving System

CAUTION

Observe the permitted weight load.

Loading the Device

- Load the workspace with cultures.

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

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

Handling and Control

Power Switch

Figure 5-9. 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 5-16).

- Powering down: Press the power switch; the switch illumination goes off.

Operating Panel and Operating Structure

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

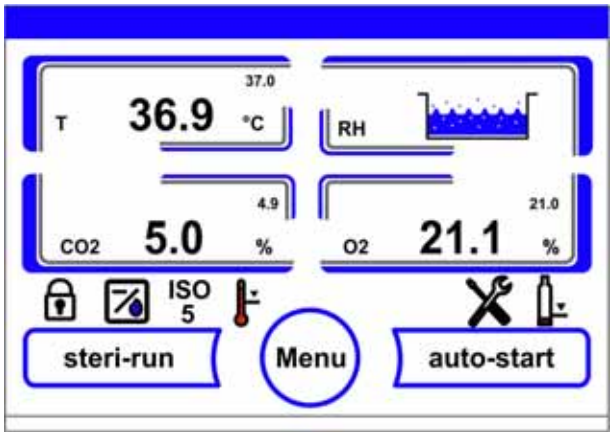

Figure 5-10. Main Screen: Touch-Sensitive Screen Areas

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

- Temperature display T,
- CO_2 display CO_2,
- Display field water level RH,
- O_2 display (optional),
- Icon bar with symbolic representations of operating states, allowing direct access to installed options (see also “Icon Description“ on page 5-48),
- **steri-run** key,
- Menu key,
- **auto-start** key.

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

Versions without O_2/N_2 Control

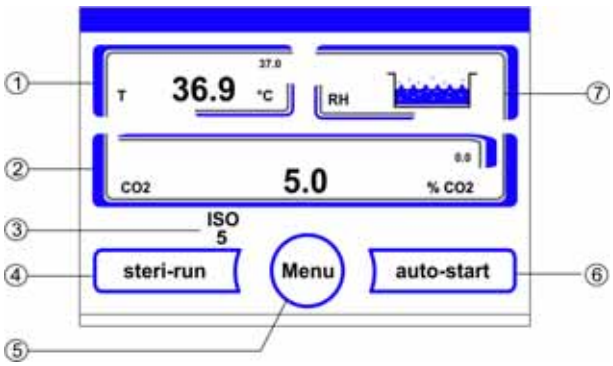

Figure 5-11. iCan™ Touchscreen without O_2/N_2 Gas Supply

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

Position	Description
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_2 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 5-48)
4	Key for starting the steri-run decontamination routine
5	Key for opening the menu navigation
6	Key for starting the auto-start routine
7	Display field water level **RH**

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

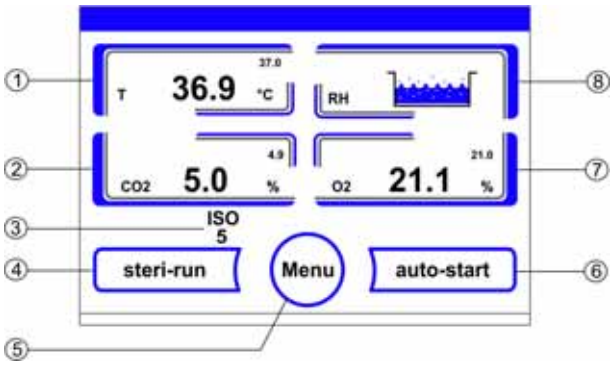

Figure 5-12. iCan™ Touchscreen with Combined Gas Connection

Function keys and actual value readouts on the operating panel for versions with a combined CO_2/O2/N2 gas supply source:

Position	Description
1	Workspace temperature display field with actual value (large numeric readout at center), set value (small numeric readout top right) and unit (bottom right)
2	CO_2 concentration display field with actual value (large numeric readout at center), set value (small numeric readout top right) and unit (bottom right)
3	HEPA-filter activity display (icons for further options see “Icon Description“ on page 5-48)
4	Key for starting the steri-run decontamination routine
5	Key for opening the menu navigation
6	Key for starting the auto-start routine
7	O_2 concentration display field with actual value (large numeric readout at center), set value (small numeric readout top right) and physical unit (bottom right)
8	Display field water level **RH**

Structure of the Operating Levels

Operation is divided into three levels:

A: Direct access to the control loop settings: Temperature, CO_2, O_2-setpoint,

B: Starting the Steri-Run or auto-start routine of the unit,

C: Navigation through the submenus for device configuration.

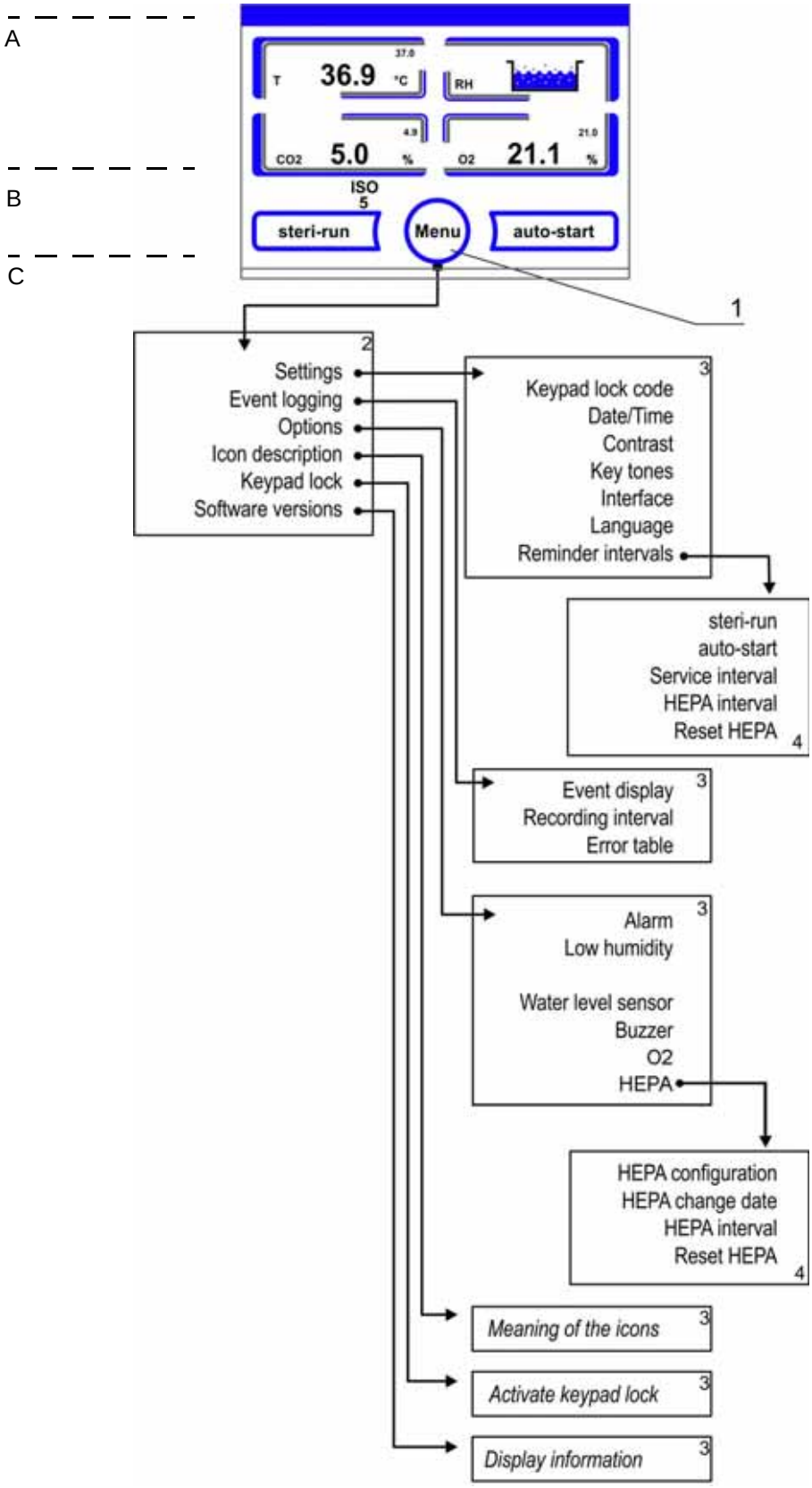

Figure 5-13. Menu Structure Overview

Factory Presettings of the iCan™ Touchscreen Controls

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

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

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

Heat-up Phase of the Control Loop Sensors

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

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

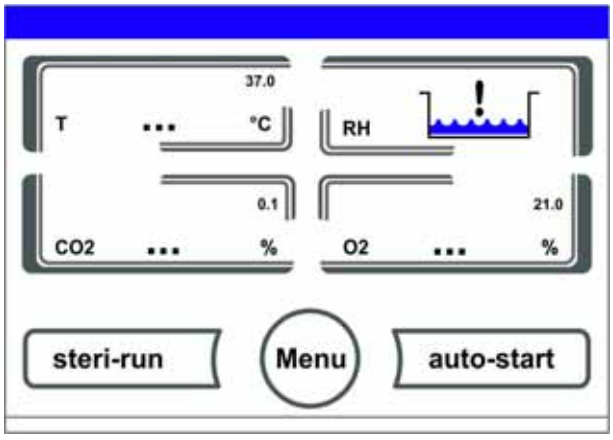

Figure 5-14. Heat-up Phase Display

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

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

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

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

Behavior of Keys during Adjustments

Pressing a key can increase or reduce a value gradually:

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

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

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

Setting the Temperature Set Value

- Press the **Temperature** key.

  The Temperature menu (Figure 5-15) is displayed.

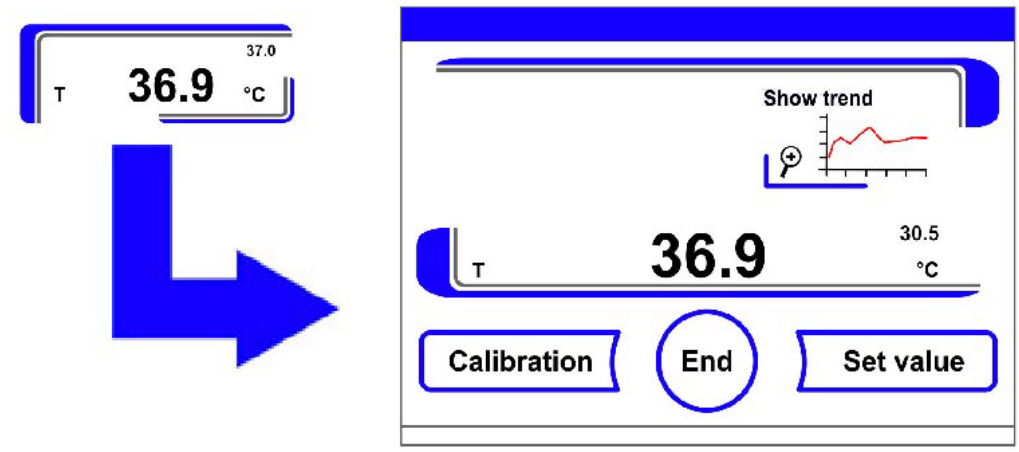

Figure 5-15. Temperature Display Field and Temperature Selection Menu

To exit the Temperature menu:

- Press the **End** key [3].

To set the temperature set value:

- Press the **Set value** key.

To increase the set value:

- Press the + key.

To reduce the set value:

- Press the - key.

To accept and save the set value:

- Press the **Enter** key.

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

Setting the CO_2 Set Value

- Press the CO_2 display key.

  The CO_2 menu is displayed.

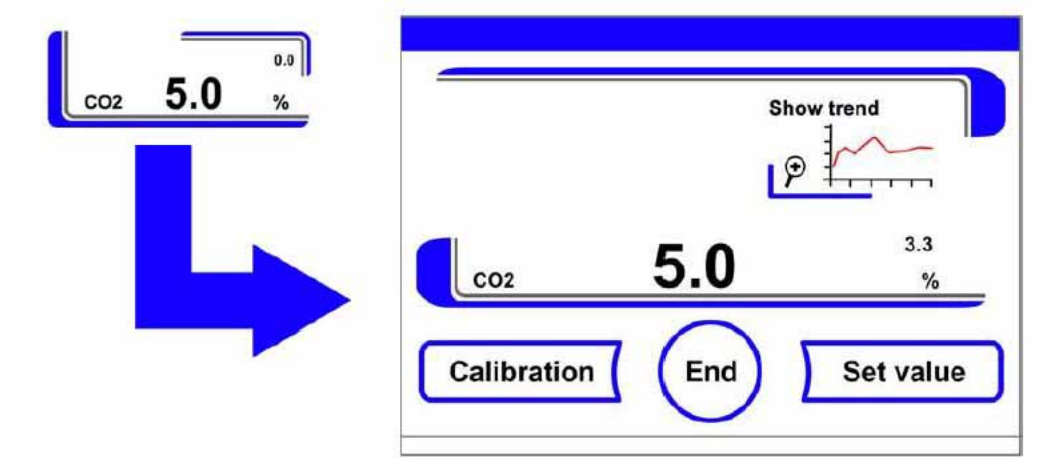

Figure 5-16. CO_2 Display and CO_2 Menu

To exit the CO_2 menu:

- Press the **End** key [3].

To set the CO_2 set value:

- Press the **Set value** key.

To increase the set value:

- Press the + key.

To reduce the set value:

- Press the - key.

To accept and save the set value:

- Press the **Enter** key.

  The system returns to the main menu. The CO_2 display shows the actual value currently measured in the workspace.

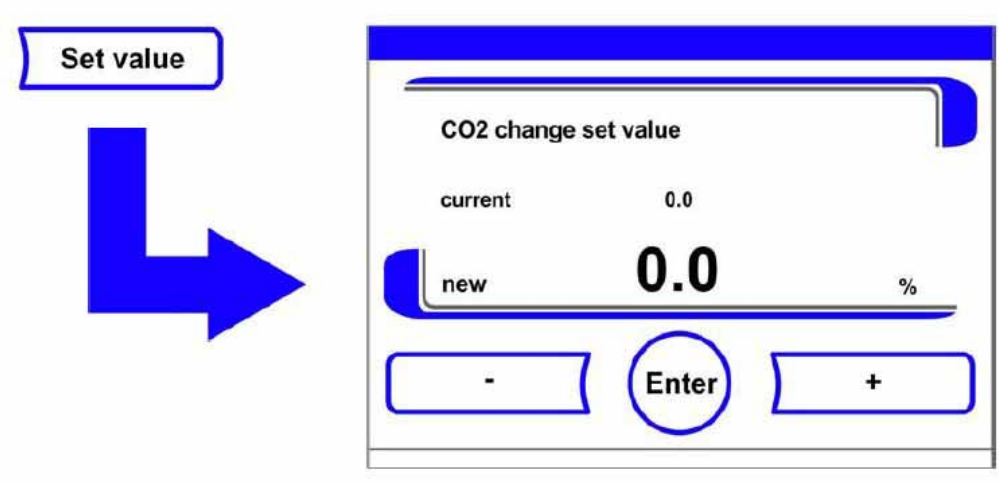

Figure 5-17. Setting the CO_2 Set Value

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

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

Setting the O_2 Set Value

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

- Press the O_2 display key.

  The O_2 menu is displayed.

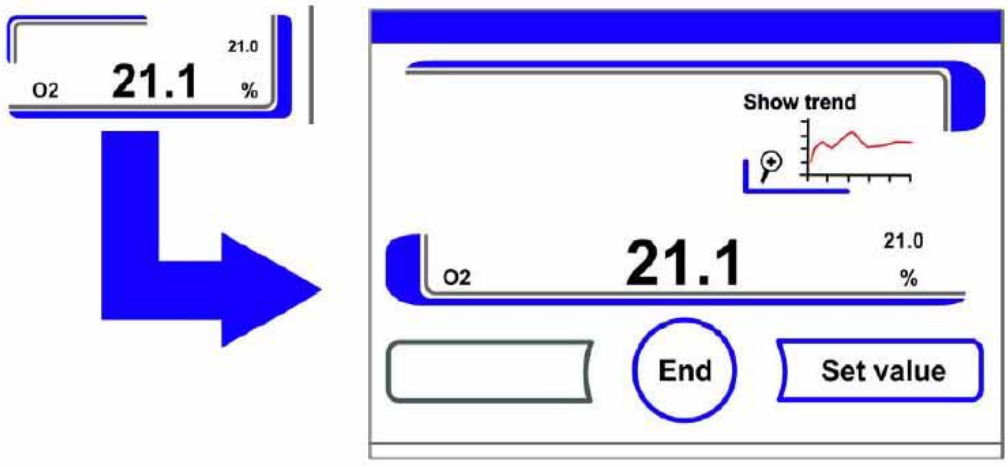

Figure 5-18. O_2 Display and O_2 Menu

To exit the O_2 menu:

- Press the **End** key.

To set the O_2 set value:

- Press the **Set value** key.

To increase the set value:

- Press the + key.

To reduce the set value:

- Press the - key.

To accept and save the set value:

- Press the **Enter** key.

  The system returns to the main menu. The O_2 display shows the actual value currently measured in the workspace.

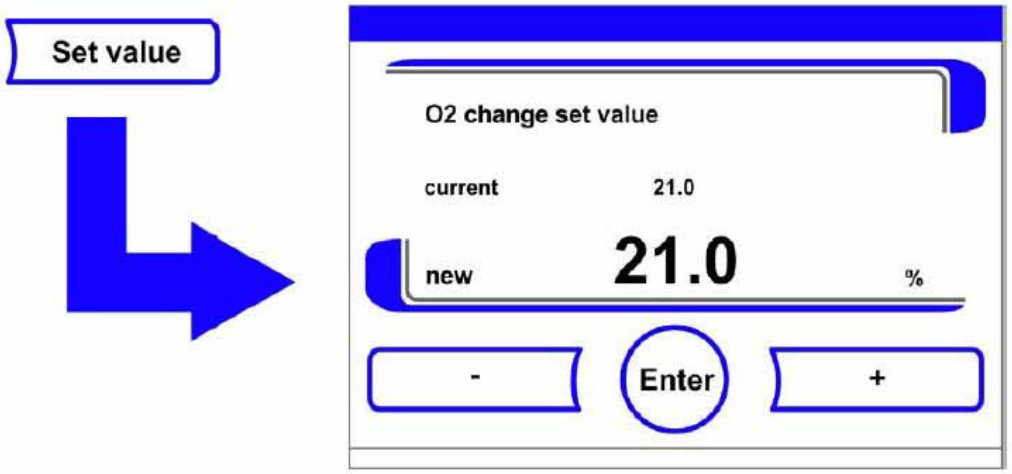

Figure 5-19. Setting the O_2 Set Value

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

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

Usage of the process gases:

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

Note

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

Auto-Start Function

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

Notes on using the auto-start routine:

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

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

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

Duration of the auto-start routine:

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

Start conditions for the auto-start routine:

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

Inhibition of the auto-start routine:

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

Temperature control loop:

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

Gas supply *CO_2 control loop:*

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

Auto-start routine aborted due to error:

- The auto-start routine is aborted if:
- an error is detected in the temperature control loop,
- an error is sensed in the CO_2 control circuit,
- the water filling level is insufficient,
- the CO_2 value to be set is out of tolerance.

Dry execution of auto-start routine:

If the routine is to be run dry (without water in the water reservoir of the workspace), the water level sensor must be disabled prior to its start (chapter “Options“ on page 5-40).

Activating the Auto-Start Routine

Preparations for the start:

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

Launching the auto-start routine:

1. Press the auto-start key.

   The auto-start instruction menu is displayed.

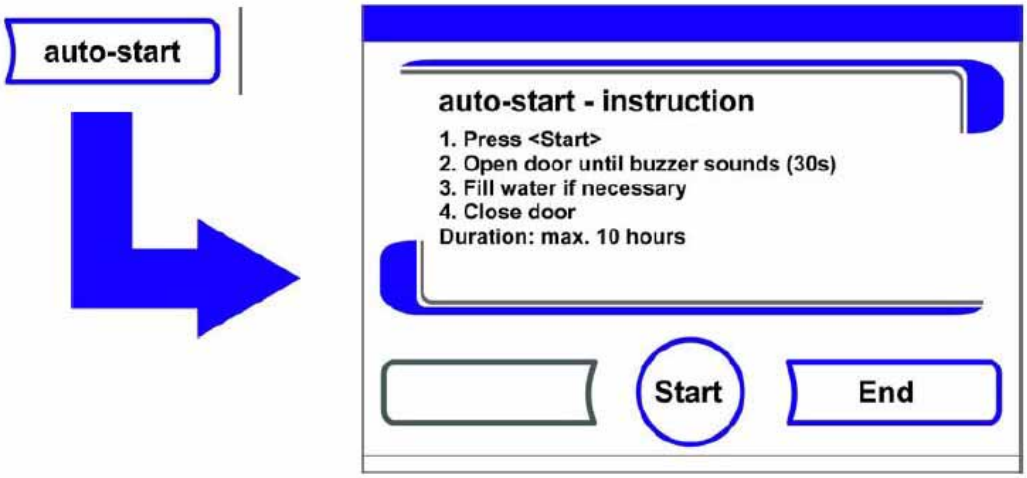

Figure 5-20. Activating the Auto-Start Routine

To exit from the auto-start instruction menu and stop auto-start:

1. Press the **End** key [3].
2. Refill water, if necessary.
3. Activate the auto-start routine:

- Press the **Start** key.

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

   A status display window showing data on the process is displayed.

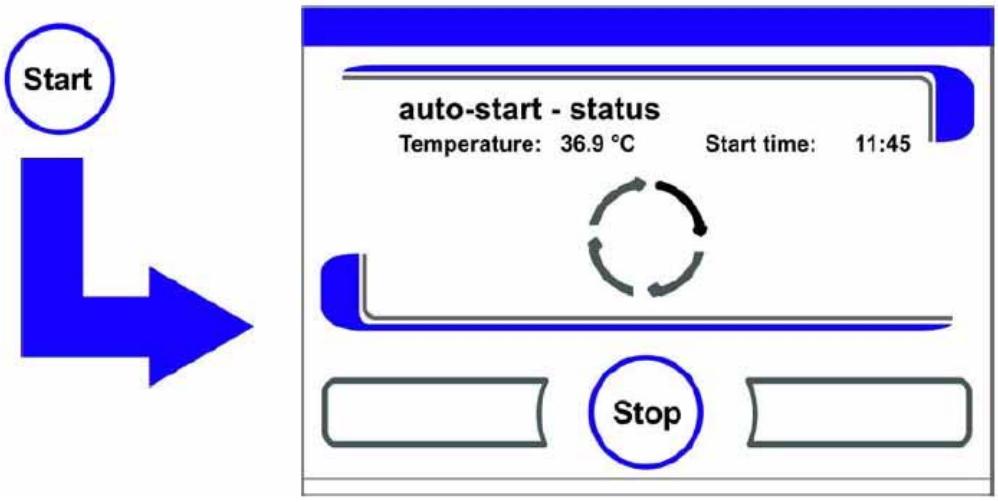

Figure 5-21. Auto-Start-Status Display Window

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 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.

To resume the auto-start routine:

- Press the **Back** key.

  The system returns to the status display, and the auto-start routine is resumed.

To cancel the auto-start routine:

- Press the **End** key [3].

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

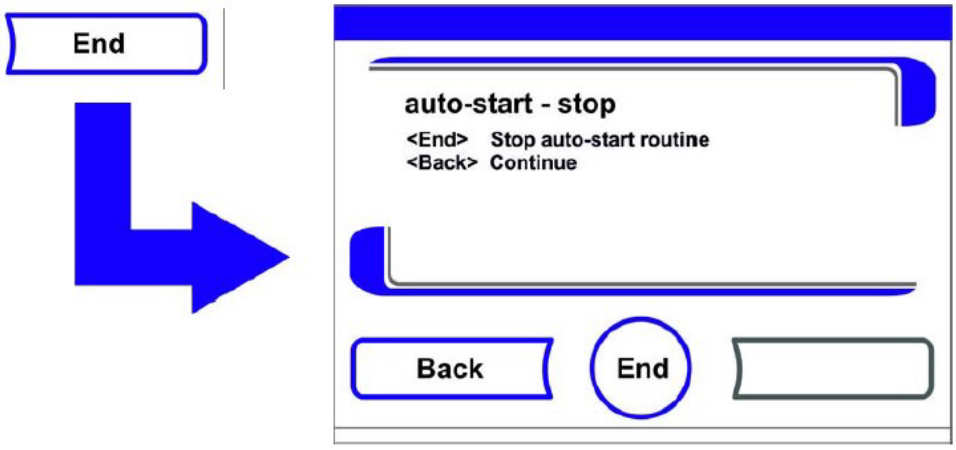

Figure 5-22. Interrupting the Auto-Start Routine

To accept the failure message:

- Press any position on the display.

  The **Error** dialog box with the description of the error is displayed.

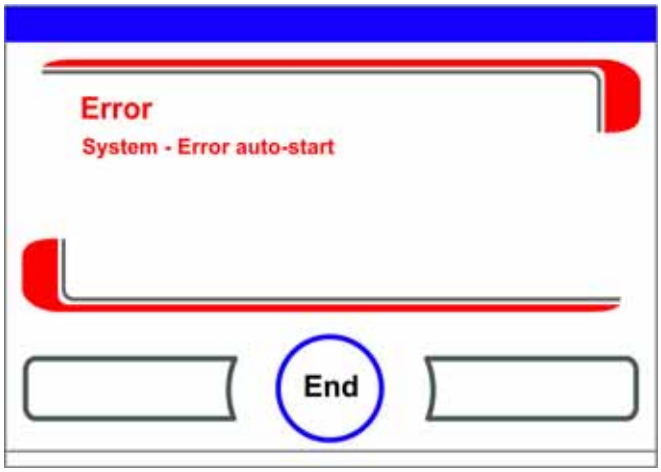

Figure 5-23. Error Message Subsequent to Aborted Auto-Start

To accept the failure message:

- Press the **End** key [3].

  The system returns to the main menu.

Launching Steri-Run

The steri-run sterilization routine is used to decontaminate 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 6).

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 5-24) is invoked by pressing the Menu key on the main screen.

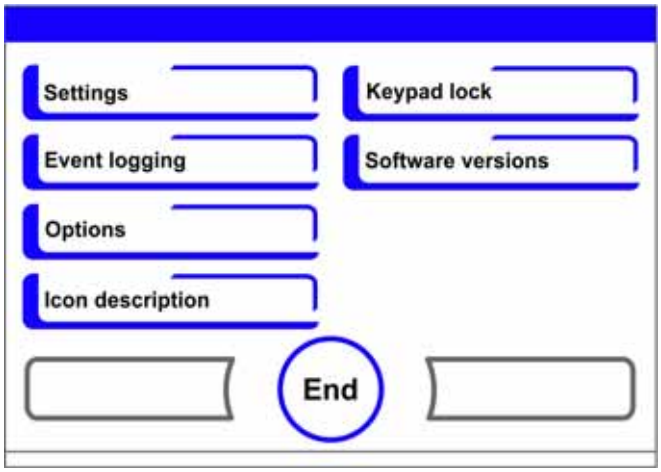

Figure 5-24. User Configuration Menu

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 5-25) 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.

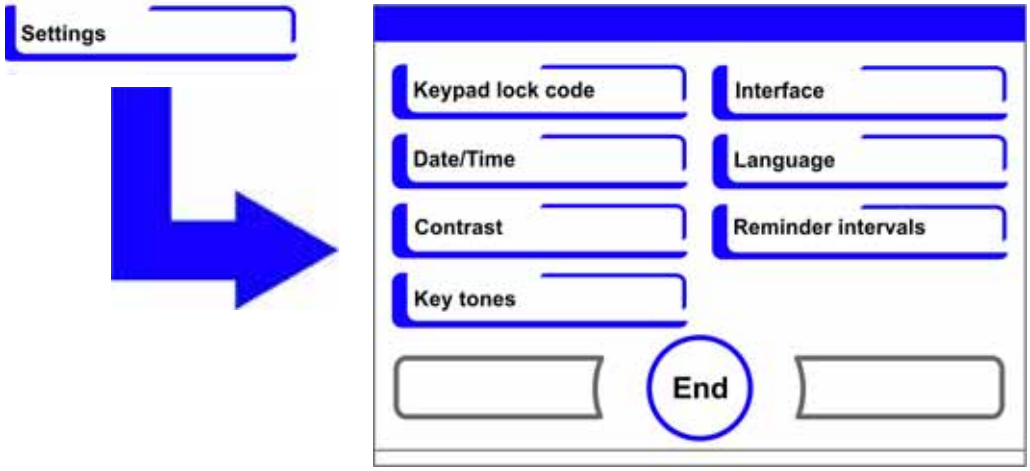

Figure 5-25. Settings/Setup Menu

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 5-49).

Changing the keypad lock code:

1. Press the **Menu** key.
2. Select the menu command Keypad lock code.

   The input dialog shown in Figure 5-26 is displayed.

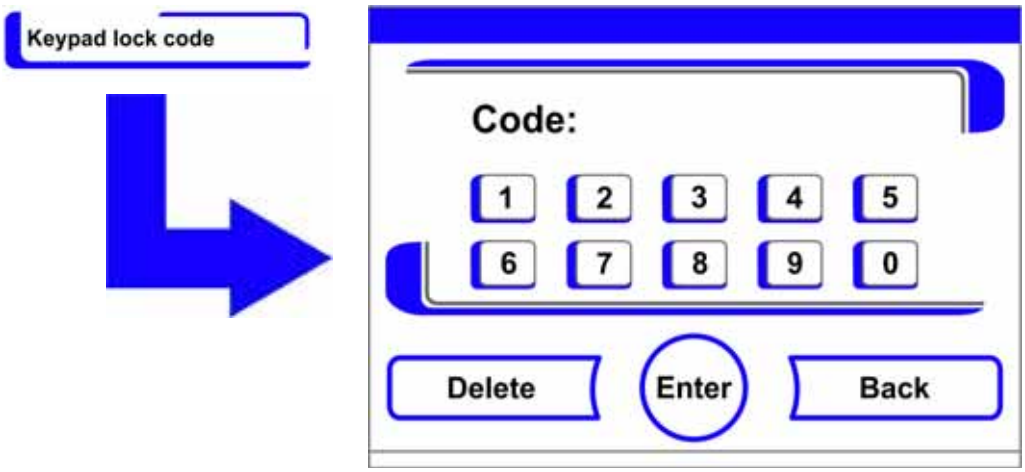

Figure 5-26. Changing the Keypad Lock Code

To enter the default **0000**:

- Press the corresponding numeric keys.

The number combination is displayed as encrypted text in the input box.

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.

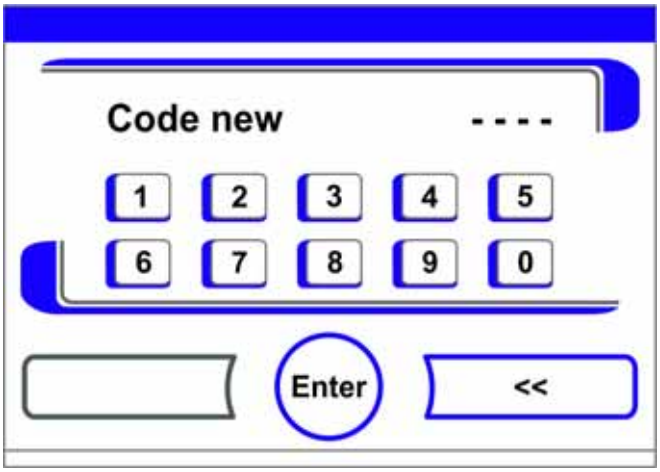

Figure 5-27. Changing the Keypad Lock Code

Entering the new 4-digit code:

- Press the corresponding numeric keys.

  The number combination is displayed in the input box.

To set the cursor to the left to overwrite a value:

- Press the **Backspace** (<<) key.

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 5-10 on Page 12) 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 5-28 is displayed.

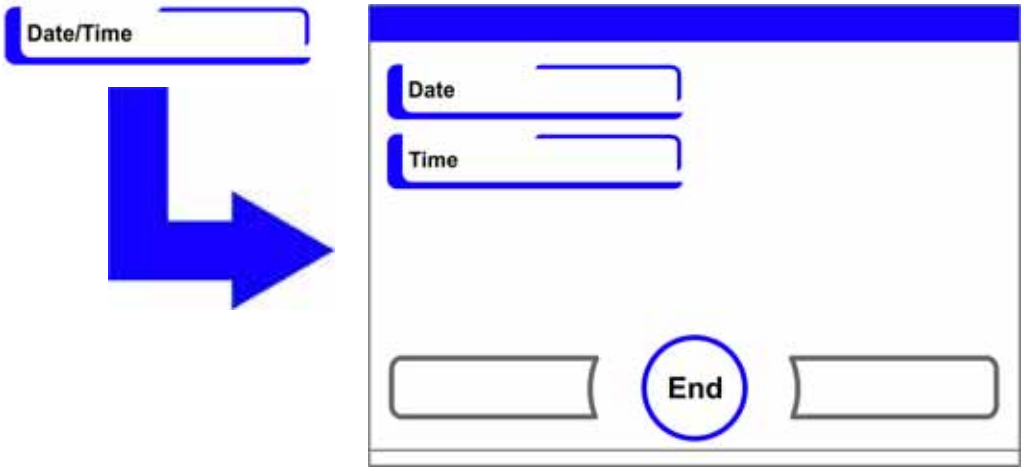

Figure 5-28. Date/Time Menu

3. For changing the date, choose the **Date** option.

   The input dialog shown in Figure 5-29 is displayed.

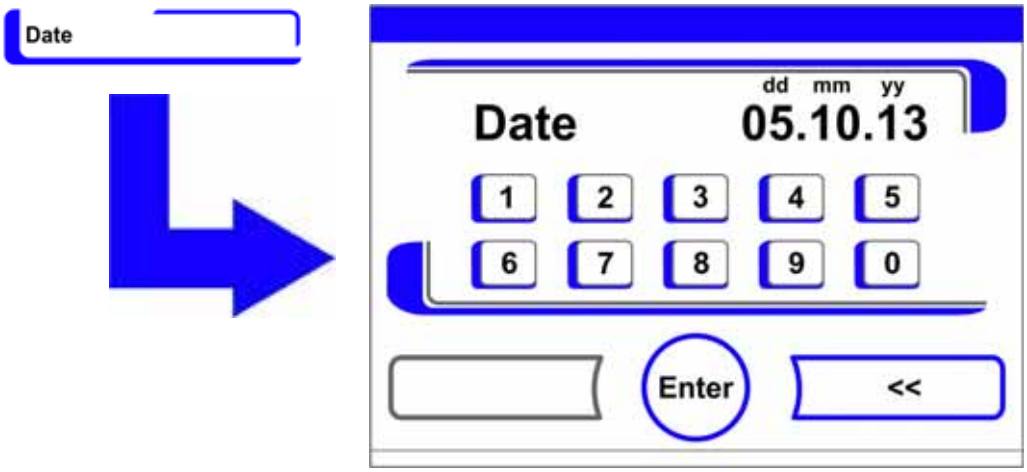

Figure 5-29. Setting the Date

To enter the date:

- Press the numeric keys.

  The input numbers are displayed in the input box.

To set the cursor to the left to overwrite a value:

- Press the **Backspace** (<<) key.

To accept and save the input value:

- Press the **Enter** key.

  The system returns to the **Date/Time menu**.

- For changing the time, choose the **Time** option.

The input dialog shown in Figure 5-30 is displayed.

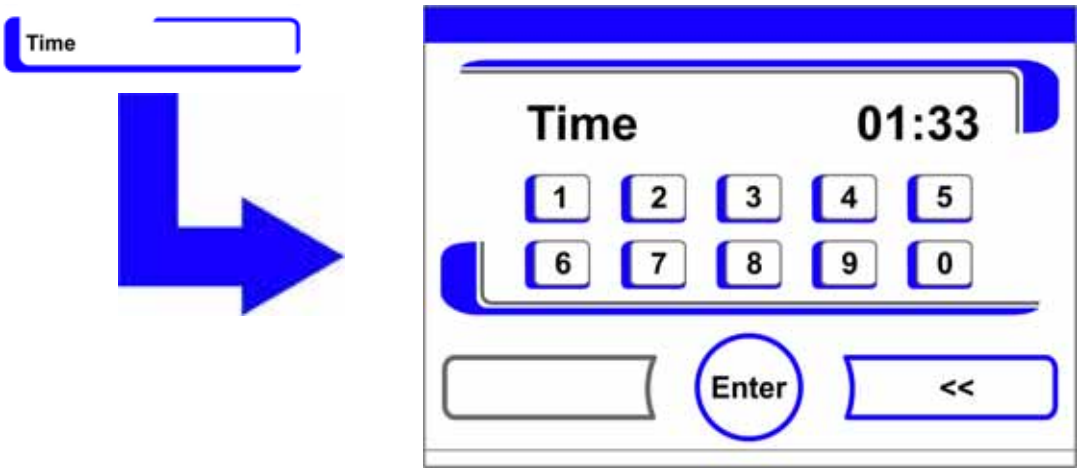

Figure 5-30. Setting the Time

To enter the time:

- Press the numeric keys.

  The input numbers are displayed in the input box.

To set the cursor to the left to overwrite a value:

- Press the **Backspace** (<<) key.

To accept and save the input value:

- Press the **Enter** key.

  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 5-31 is displayed.

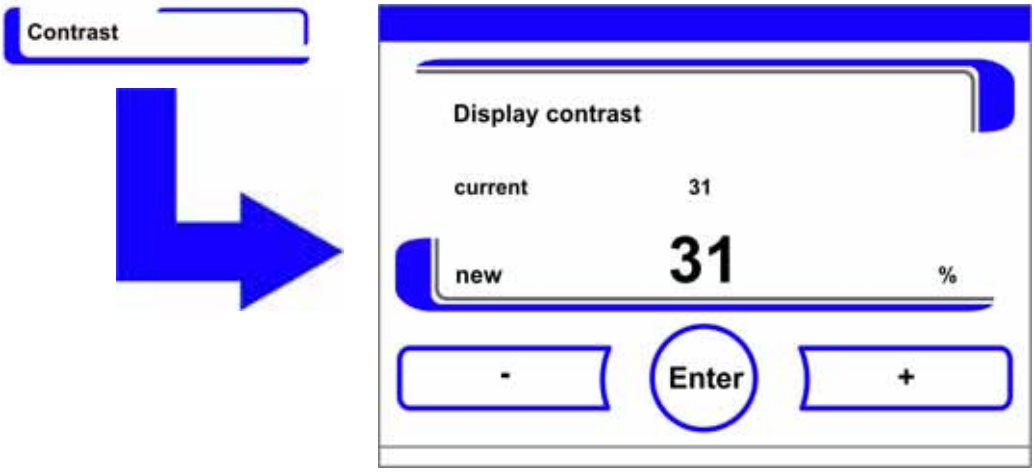

Figure 5-31. Adjusting Display Brightness

To increase the value:

- Press the + key.

To reduce the value:

- Press the - key.

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

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 5-32 is displayed.

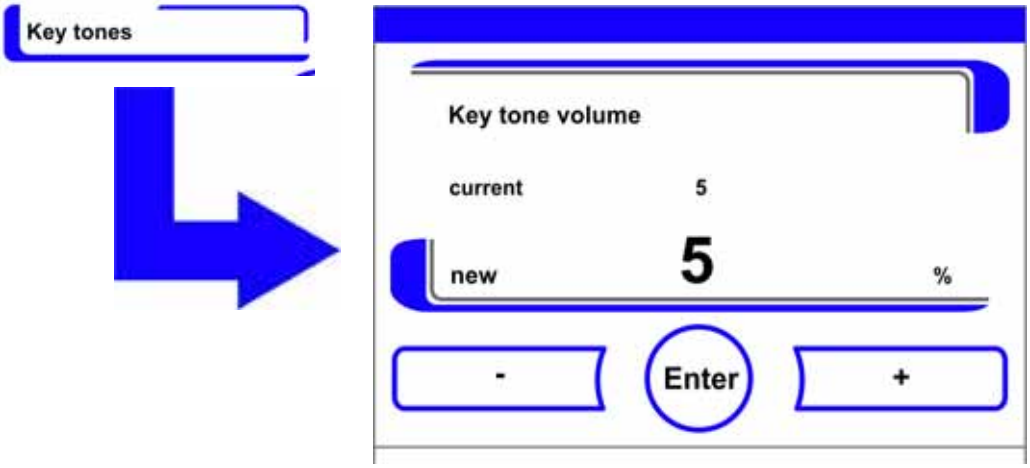

Figure 5-32. Adjusting Key Tone Volume

To increase the value:

- Press the + key.

To reduce the value:

- Press the - key.

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

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 5-33 is displayed.

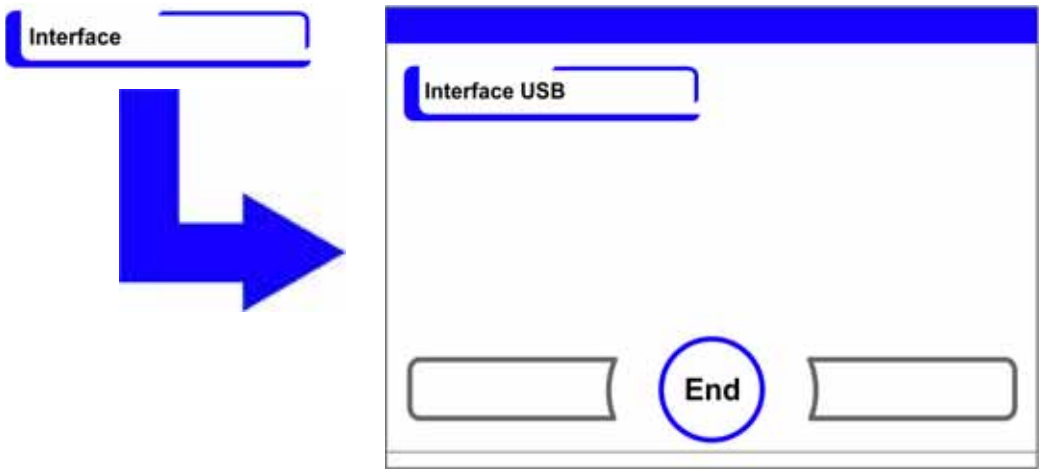

Figure 5-33. Interface USB Menu

3. Select the option **Interface USB** (Figure 5-33).

   The input dialog shown in Figure 5-34 is displayed.

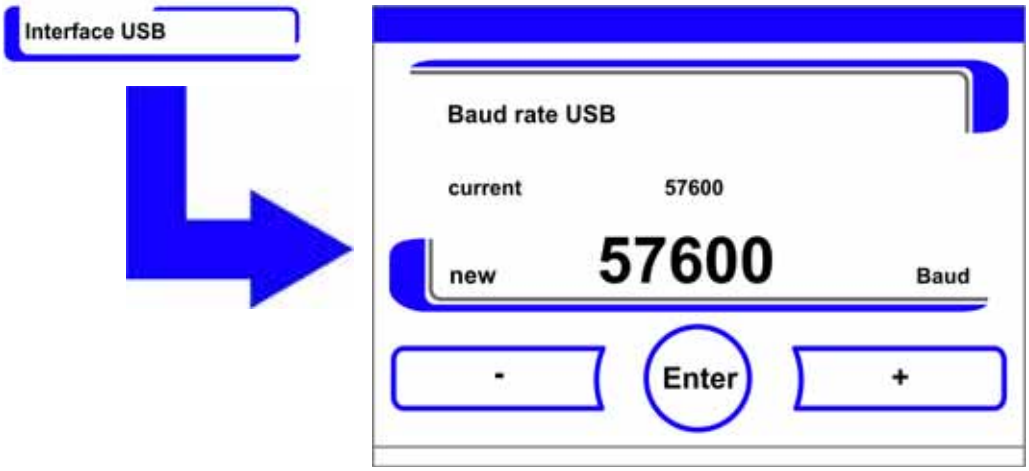

Figure 5-34. USB Interface Baud Rate Setting

4. Press the + or key to set the Baud rate of the USB interface (Figure 5-34).

- To increase the baud rate: Press the + key.
- To reduce the baud rate: Press the - key.

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

To accept and save the change:

- Press the **Enter** key.

The display returns to **Interface USB** selection menu.

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 5-35 is displayed.

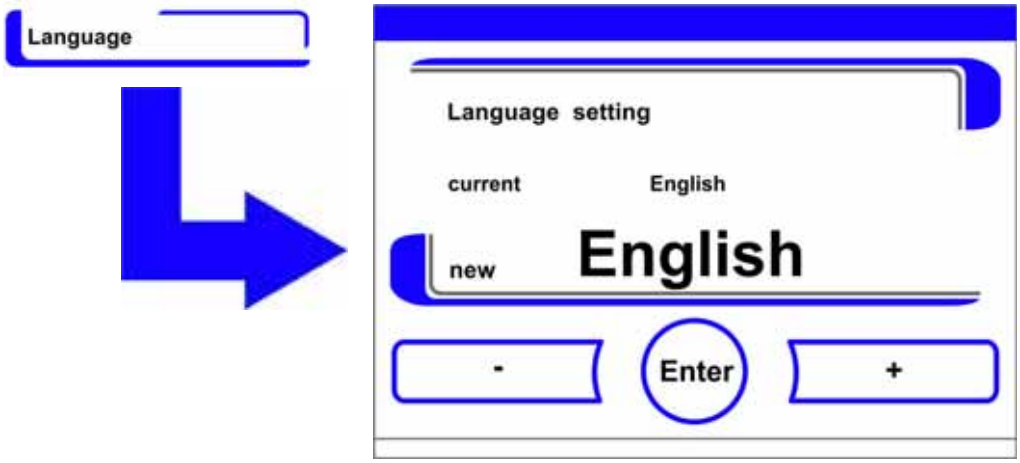

Figure 5-35. Language Setting

To browse upward in the selection:

- Press the + key.

To browse downward in the selection:

- Press the - key.

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

3. To accept and save the selection:

- Press the **Enter** key.

The system returns to the **Settings/Setup** menu.

Reminder Interval Setting

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

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

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

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

Factory Settings

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

Reminder Interval Setting

1. Press the **Menu** key.
2. Select the Reminder intervals menu option.

   The selection dialog shown in Figure 5-36 is displayed.

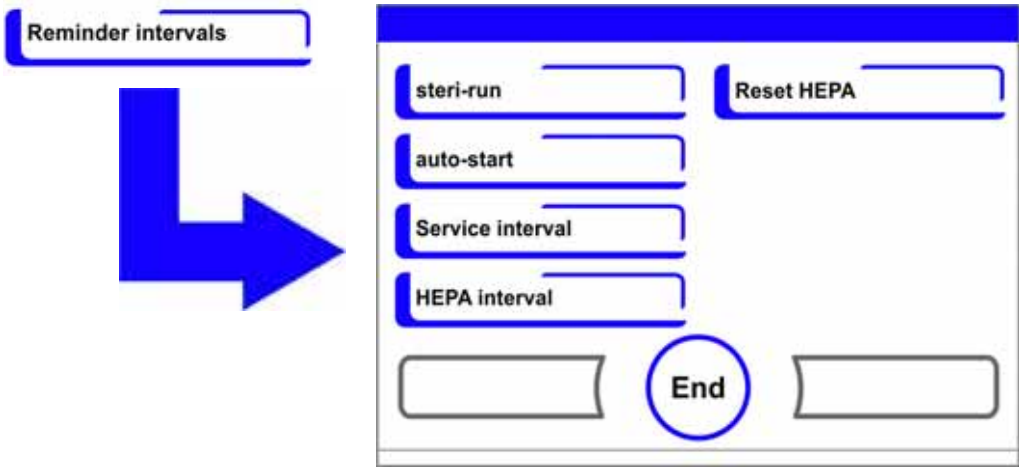

Figure 5-36. Choose the Desired Reminder Interval Function.

3. Select the appropriate menu option, for example **Steri-run**.

The input dialog shown in Figure 5-36 is displayed.

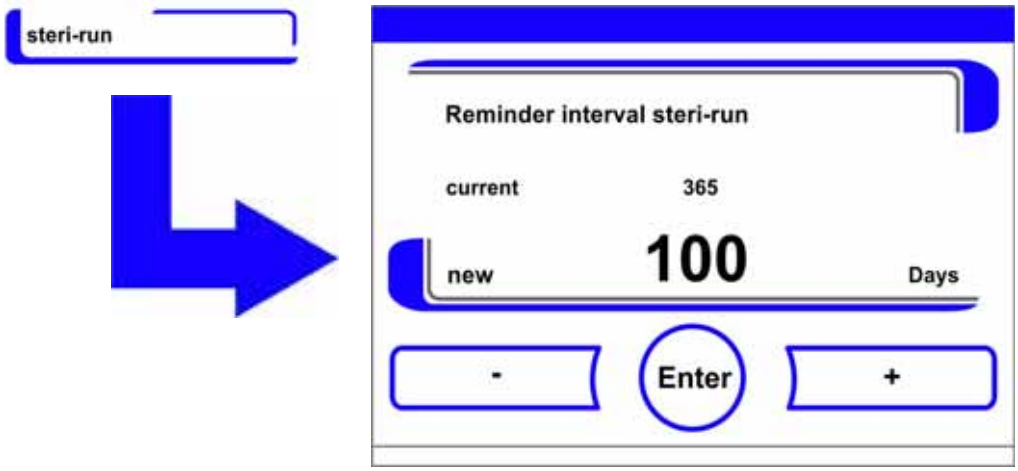

Figure 5-37. Setting the Reminder Interval for Steri-Run

To increase the number of days:

Press the + key.

To reduce the number of days:

- Press the - key.

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

To deactivate the reminder interval:

- Set the value to **Off**.
- Press the - key.

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 5-38) allows for accessing dialog screens for logging and displaying events that occur during ongoing operation of the unit:

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

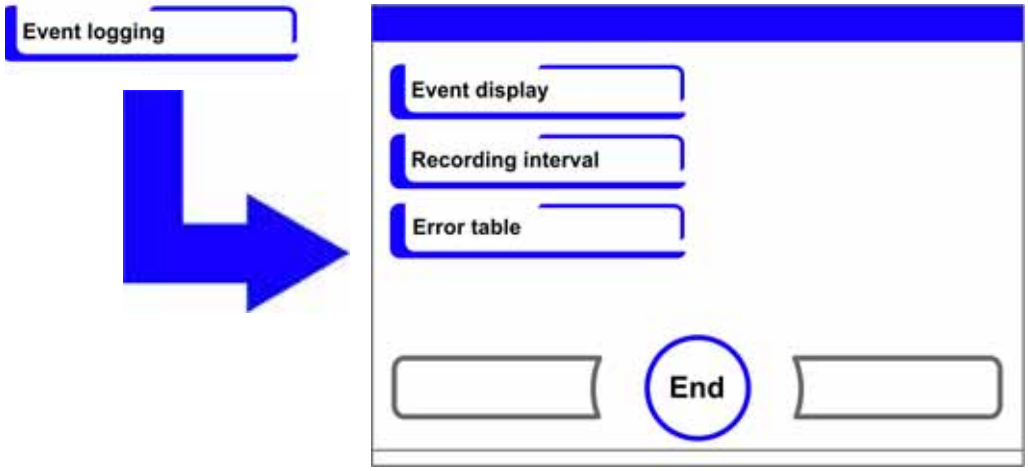

Figure 5-38. Event Logging Menu

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 5-38 is displayed.
3. Select the menu command Event display.

   The list shown in Figure 5-39 appears on the display.

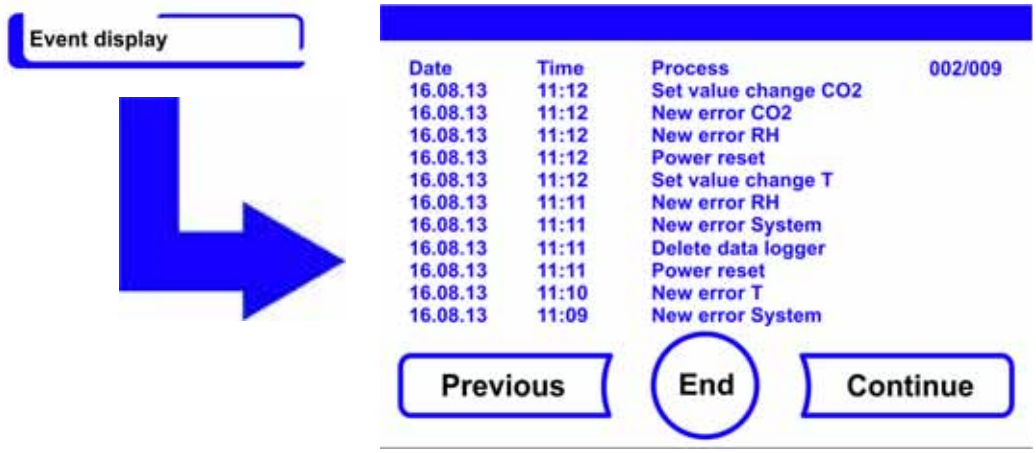

Figure 5-39. Event Display

To browse forward in the list:

- Press the **Continue** key.

To browse backward in the list:

- Press the **Previous** key.

Exit the display:

- Press the **End** key [3].

  The system returns to the Event logging menu.

Changing the Logging Cycle Time:

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

Invoking the Event Log

1. Press the **Menu** key.
2. Select the menu command Event logging.

   The selection dialog shown in Figure 5-38 is displayed.
3. Select the menu command Recording interval.

   The input dialog shown in Figure 5-40 is displayed.

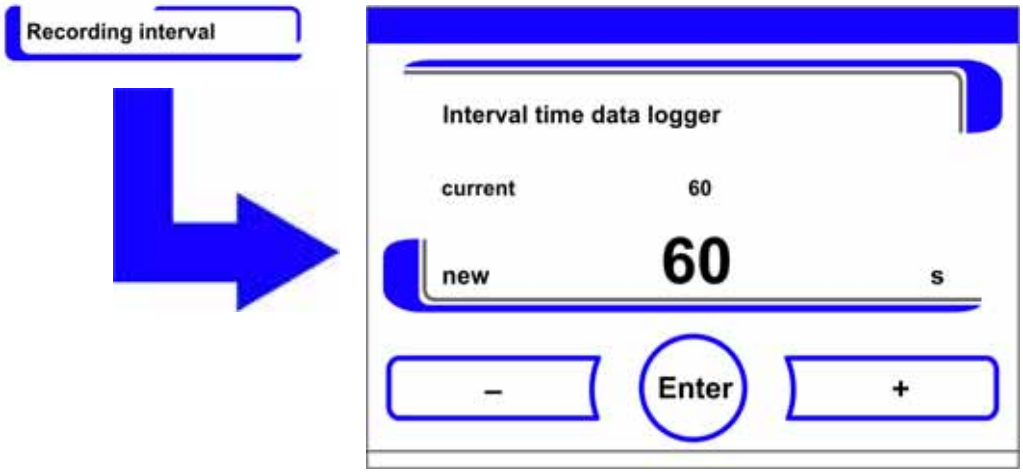

Figure 5-40. Logging Cycle Setting

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

The setting controls the logging cycle in sections of seconds during which the control loop measured values are logged during the operation of the device and displayed by the trend display (“Trend Display Scaling“ on page 5-50).

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

To increase the value:

- Press the + key.

To reduce the value:

- Press the - key.

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

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 5-38 is displayed.

3. Select the menu command Event display.

   The list shown in Figure 5-41 appears on the display.

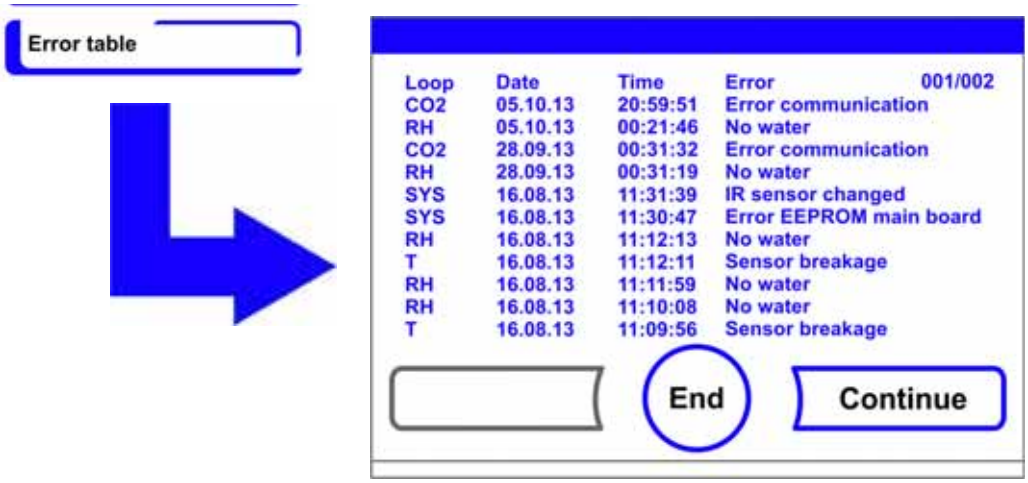

Figure 5-41. Displaying the Error Table

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

To browse forward in the error table:

- Press the **Continue** key.

To browse backward in the list:

- Press the **Previous** key.

Exit the display:

- Press the **End** key [3].

  The system returns to the **Event logging** menu.

Options

The **Options** selection menu (Figure 5-42) allows for accessing all selection dialogs for the functional options of the unit:

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

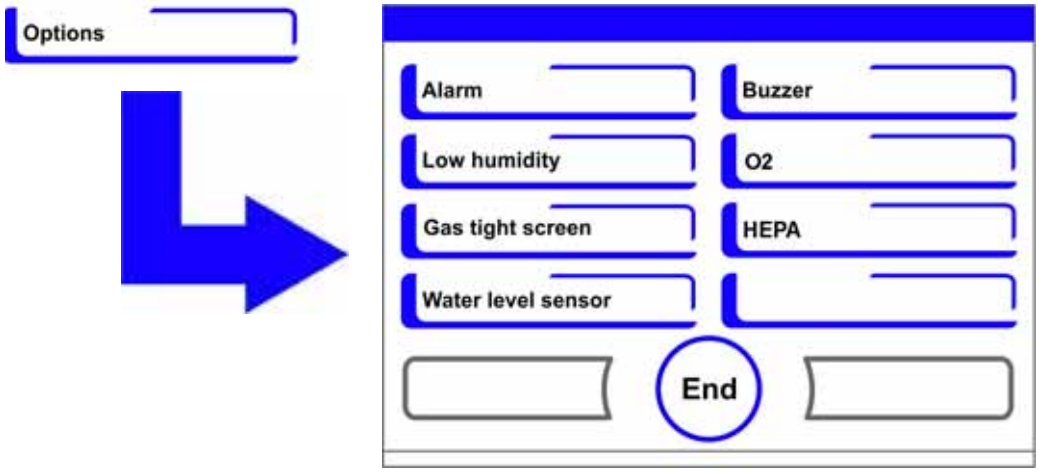

Figure 5-42. Options Menu

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 4-14.

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

   The selection dialog shown in Figure 5-42 is displayed.
3. Select the menu command Alarm.

   The selection dialog shown in Figure 5-43 is displayed.

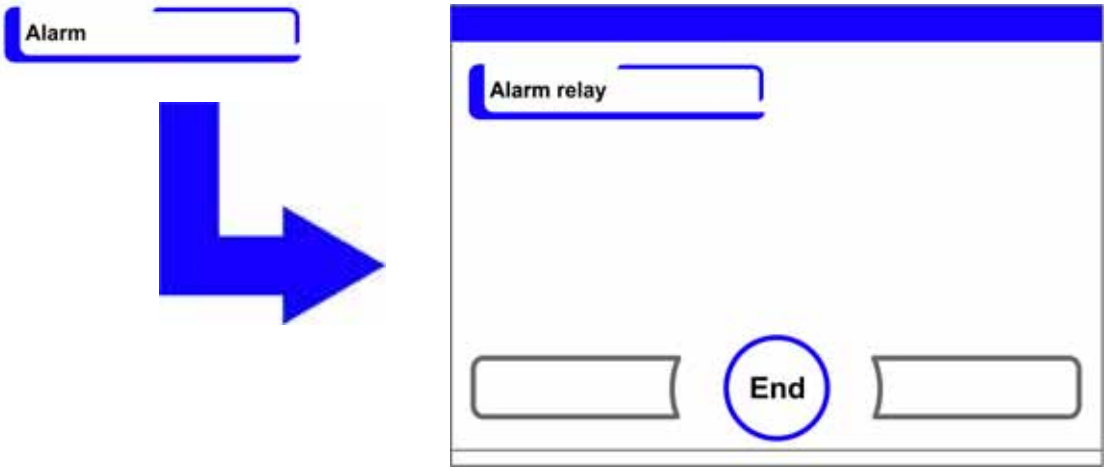

Figure 5-43. Alarm Menu

4. Select the menu command **Alarm relay**.

   The input dialog shown in Figure 5-44 is displayed.

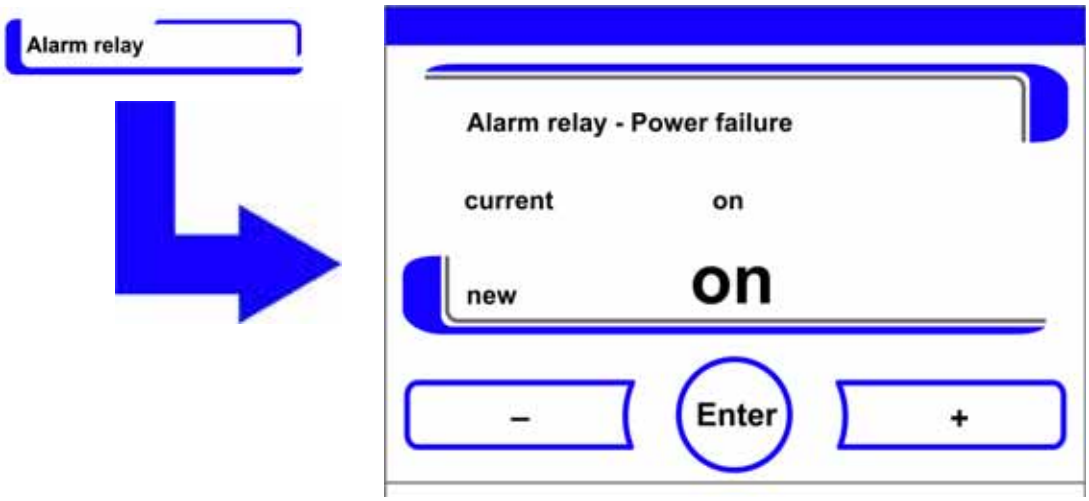

Figure 5-44. Alarm Relay Setting

To toggle between two states:

- Press the + key.
  or
- Press the - key.

To accept and save the change:

- Press the **Enter** key.

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

Low Humidity Setting

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

Reducing Humidity in the Workspace

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

   The selection dialog shown in Figure 5-42 is displayed.
3. Select the menu command Low humidity.

   The input dialog shown in Figure 5-45 is displayed.

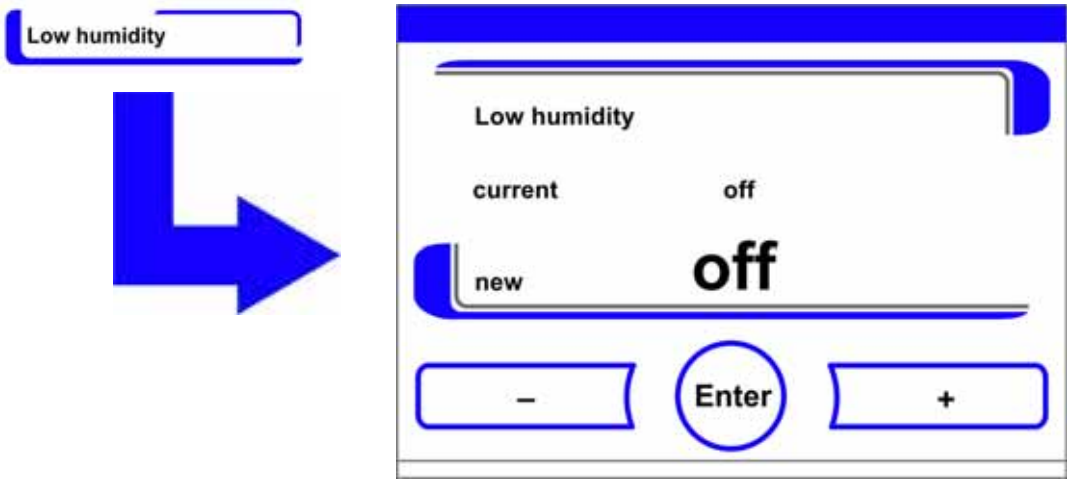

Figure 5-45. Low Humidity Setting

To toggle between two states:

- Press the + key.
  or
- Press the - key.

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.

Activating/De-activating the Water Level Sensor

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

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

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

   The selection dialog shown in Figure 5-42 is displayed.
3. Select the menu command Water level sensor.

   The input dialog shown in Figure 5-46 is displayed.

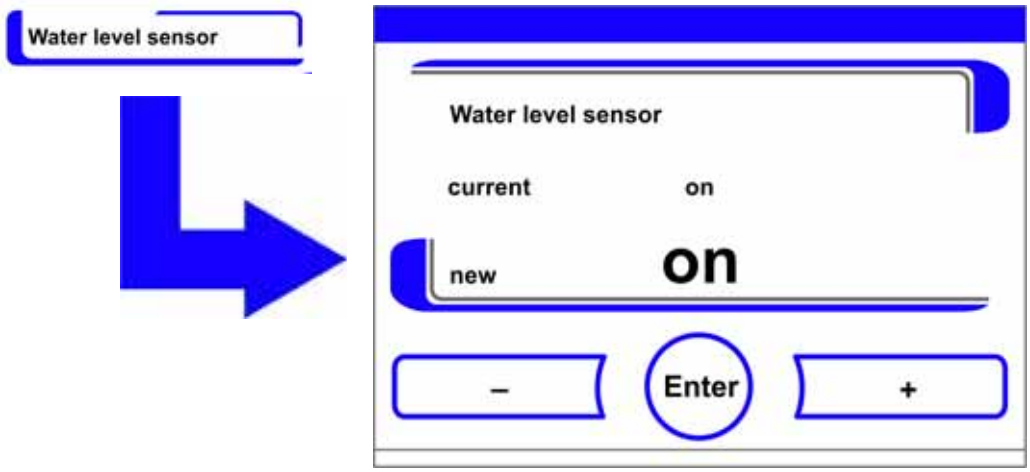

Figure 5-46. Setting the Water Level Sensor

To toggle between two states:

- Press the + key.
  or
- Press the - key.

To accept and save the change:

- Press the **Enter** key.

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

Switching the Audible Alarm on/off:

If the device-integral monitoring system detects an error:

- an audible alarm sounds in addition to
- the visual error message and the switching of the alarm relay.

The audible alarm can be permanently disabled.

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

   The selection dialog shown in Figure 5-42 is displayed.
3. Select the menu command Buzzer.

   The input dialog shown in Figure 5-47 is displayed.

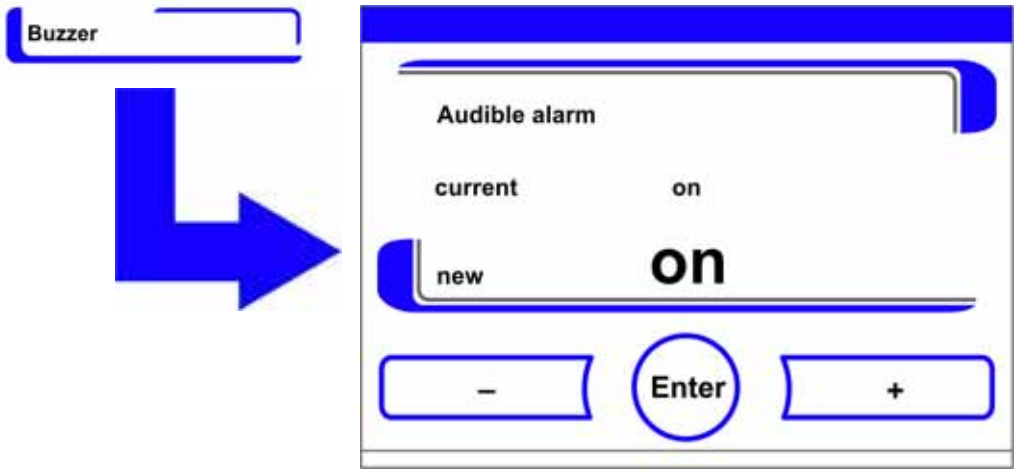

Figure 5-47. Alarm Relay Setting

To toggle between two states:

- Press the + key.
  or
- Press the - key.

To accept and save the change:

- Press the **Enter** key.

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

Switching the O_2 Control on and off

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

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

   The selection dialog shown in Figure 5-42 is displayed.
3. Select the menu command O_2.

   The input dialog shown in Figure 5-48 is displayed.

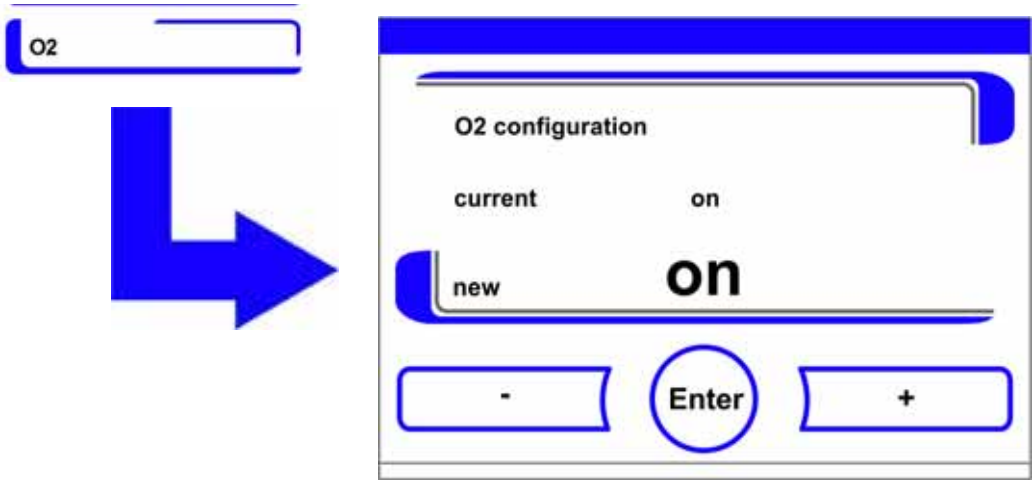

Figure 5-48. Switching the O_2 Control on and off

To toggle between two states of the O_2 control:

- Press the + key.
  or
- Press the - key.

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

To accept and save the setting:

- Press the **Enter** key.

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

Note Display of O_2 value:
When O_2 control is de-activated, the actual value readout shows three dashes (- - -) in the O_2 display field.
This procedure provides protection for the O_2 sensor. If the set value is set to 21%, the O_2 control loop is not monitored.

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

Airing the Workspace

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

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 5-42 is displayed.

3. Select the menu command HEPA.

   The selection dialog shown in Figure 5-49 is displayed.

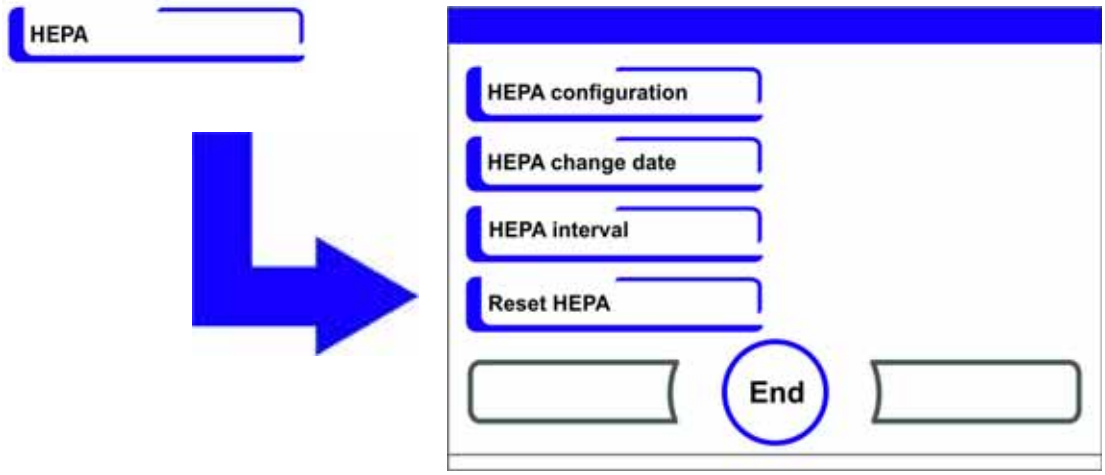

Figure 5-49. HEPA Configuration

4. Select the menu command HEPA configuration.

   The input dialog shown in Figure 5-50 is displayed.

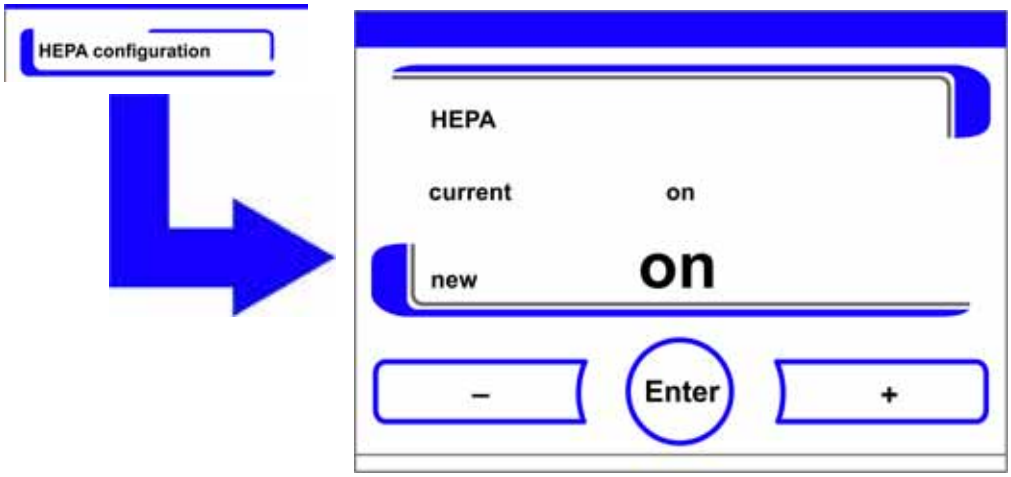

Figure 5-50. Activating / De-Activating the HEPA-Filter

To toggle between two states:

- Press the + key.
  or
- Press the - key.

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 5-10 on Page 12).

Icon Description

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

Invoking the Icon Description

1. Press the **Menu** key.
2. Select the menu command Icon description.

   The information dialog shown in Figure 5-51 is displayed.

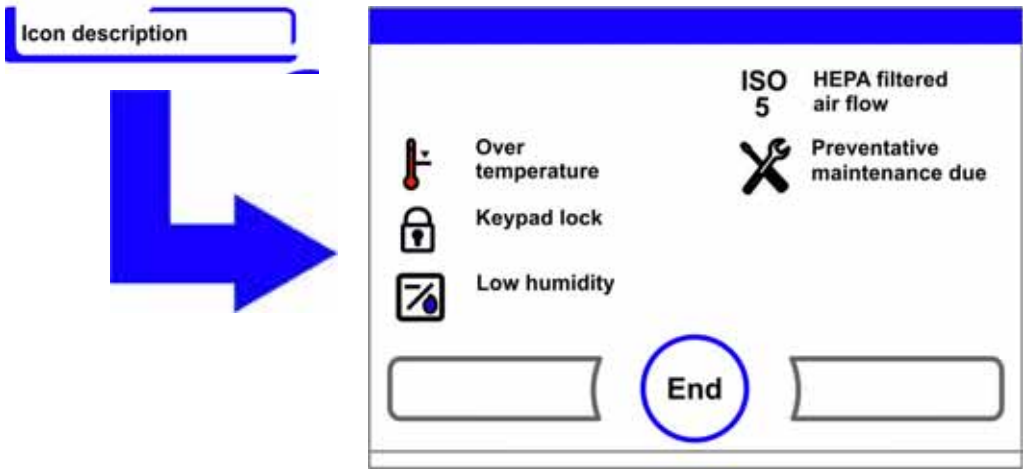

Figure 5-51. Icon Description

Exit the display:

- Press the **End** key [3].

  The system returns to the **User configuration** menu.

Function of the Individual Icons

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 5-49).

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 5-42).

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 5-46 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.

To delete complete incorrect input:

- Press the **Delete** key.

To break off the input:

- Press the **Back** key.

  The system returns to the **User configuration** menu.

2. Confirm your input:

- Press the **End** key [3].

  The system returns to the **User configuration** menu.

Note Changing an existing code:
The currently valid code can be redefined in the Keypad Lock Code dialog box of the Settings/Setup menu (“Changing the Keypad Lock Code“ on page 5-27).

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.

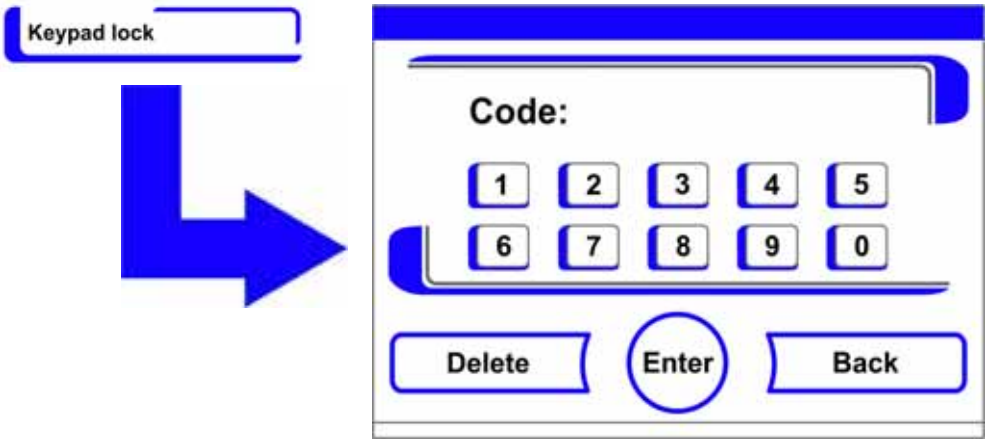

Figure 5-52. Enabling/Disabling the Keypad Lock

Software Versions

This menu shows the unit software versions in the display.

Exit the display:

- Press the **End** key [3].

  The system returns to the **User configuration** menu.

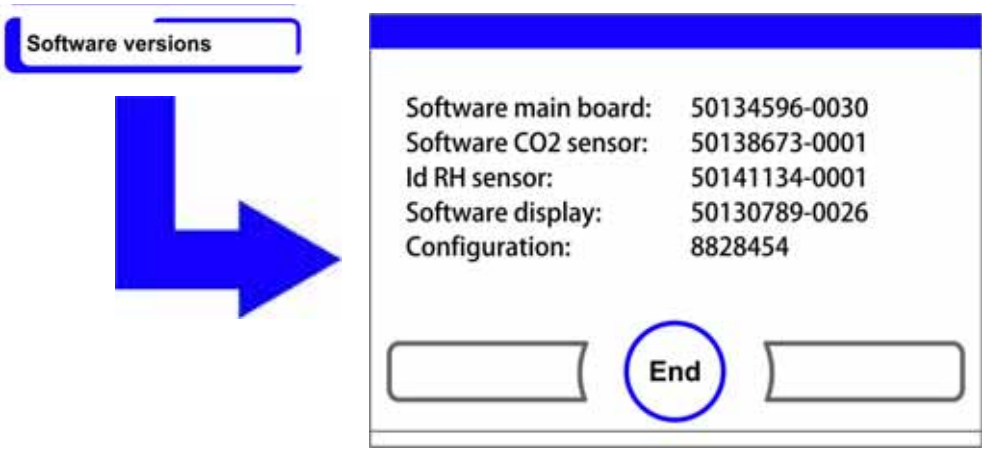

Figure 5-53. Software Versions

Trend Display Scaling

The trend display of the three control loops:

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

can be scaled to two different versions.

Full screen display

- Press the **CO_2 display field** in the main menu.

  The CO_2-menu (Figure 5-16) menu is displayed.

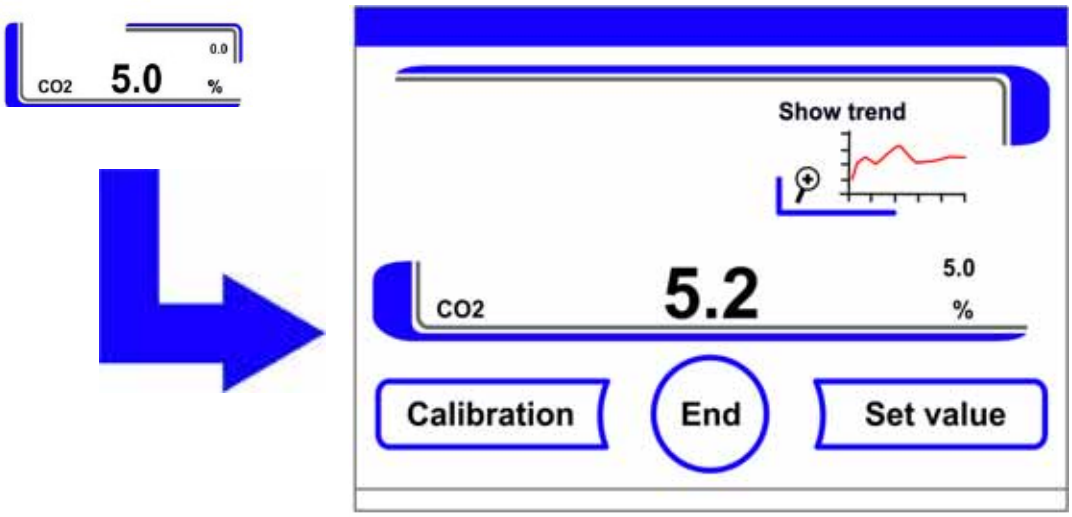

Figure 5-54. Invoking the CO_2 Concentration Graph Display

3. Press the **Show trend** icon.

   The progress indicator appears.

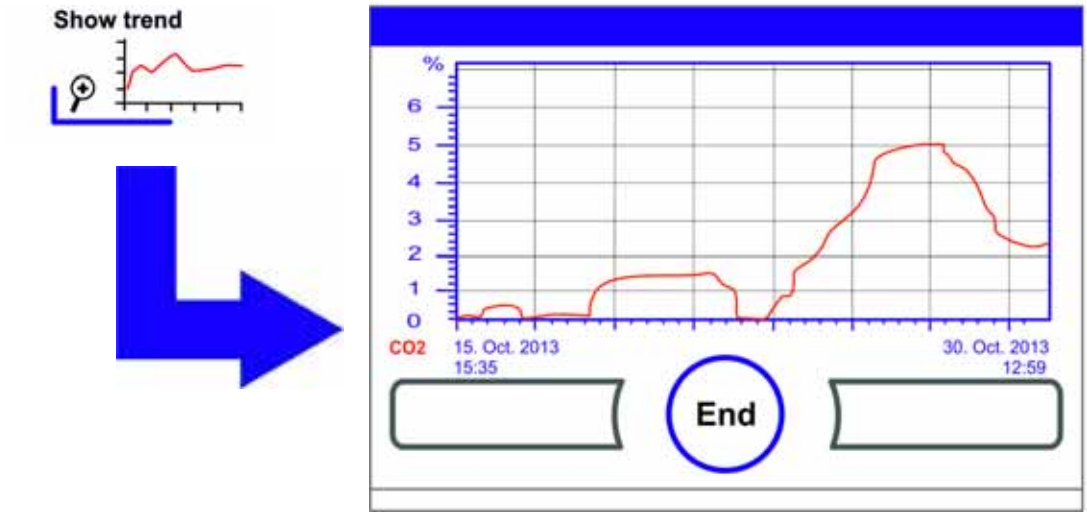

Figure 5-55. Invoking the CO_2 Concentration Graph Display

To display an enlarged section:

- Open a rectangular section in the desired area of the diagram using a finger or a pen. The size of the rectangle is determined by dragging a diagonal from the start (press onto screen at left of upper diagram frame) to the end (release at right of lower diagram frame.
- Press any position within the marked rectangle area. The section is now enlarged.

- This may be repeated as often as necessary, until the section of the graph is shown at the desired magnification or until the maximum magnification (max. 30 data logger elements, equivalent to 30 minutes of logging operation at a storage rate of 60 seconds) is attained.
- During zoom mode the trend display can be scrolled forward and back.

To return to the total trend:

- Open rectangle over a small diagram section and press any position outside the marked area.

To exit the trend display:

- Press the **End** key [3].

  The system returns to the main menu.

Note Logging cycle:
The time interval of the data logging cycle can be redefined in the **Recording interval** dialog box ("Changing the Logging Cycle Time:" on page 5-38).

Error Messages

Note The potential errors of the door opening are not shown on the display as there is no connection to the control system of the incubator itself.

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

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

Response to an Error Message Event

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

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.

To exit the error display:

- Press the **End** key [3].

  The error message disappears.

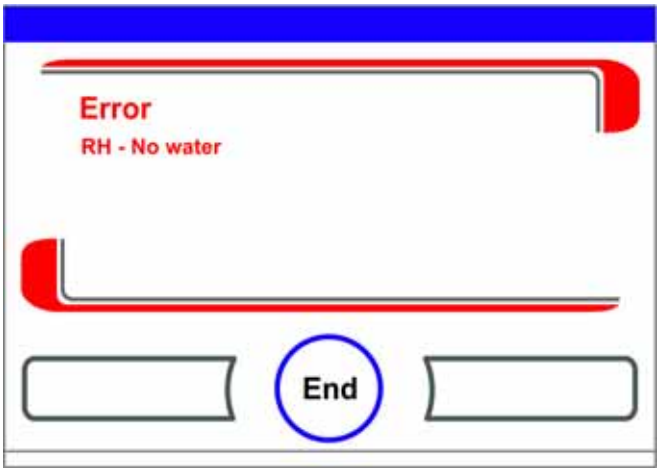

Figure 5-56. Event Error Messages

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.

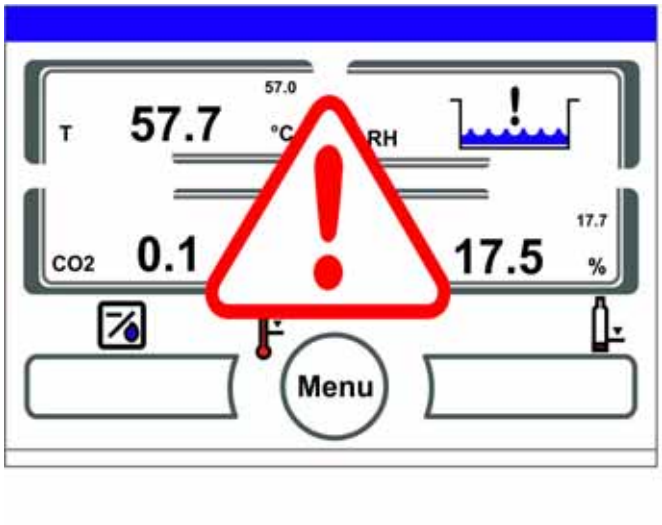

Figure 5-57. Failure Message Overtemperature

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.

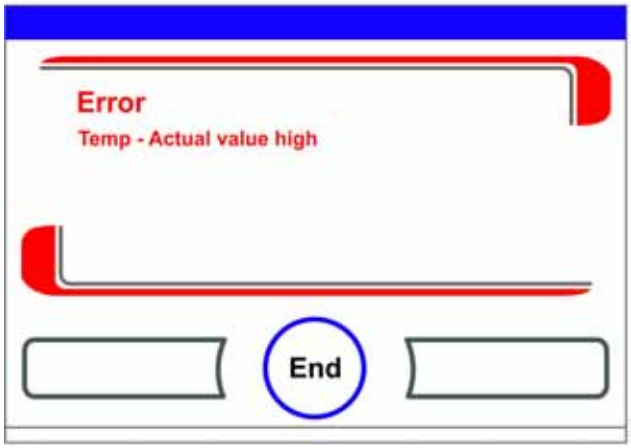

Figure 5-58. Failure Message Overtemperature

To exit the error display:

- Press the **End** key [3].

  The error message disappears. The temperature display field is displayed with a red bounding box.

Resetting the error message:

1. Turn the device off.
2. Open the door and allow the workspace to cool down.
3. 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 5-55).

The following measures must be taken to ensure safe operation:

1. Drain the water and wipe the interior dry.
2. Let the device warm up without water for 1 hour to 55 °C.
3. Then let the device cool down with the doors opened.
4. After this, start the device at incubation temperature according to Chapter “Start-up“ on page 4-1.

Alternatively, or when the above mentioned measures were not effective, start a disinfection run at 180 °C. Refer to Chapter “Steri-Run Sterilization Routine“ on page 6-9.

Troubleshooting

The disinfection routine can be interrupted after approx. 1 hour. The sensors should then have dried.The error tables indicate source of error, cause of error, and possible corrections.
For any communication with the Technical Service of Thermo Fisher Scientific, please have the device data ready.

.

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

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

Control loop	Failure message	Cause	Remedy	Alarm relay	Audible alarm	Log
0...20% CO_2	Sensor breakage	Measured value exceeds accepted limit	Run auto-start. When the error occurs again, troubleshoot the unit on the basis of Section “Measures After Power Outage“ on page 5-54. When the error persists, request service.	X	X	X
	Actual value above	Actual value > Set value + 1% *4)	automatic	X	X	X
	Actual value below	Actual value < Set value - 1% *3) *4)	automatic	X	X	X
	RH Error communication	RH sensor not communicating with the main board	automatic	X	X	X
	Calibration values too high/low	Max. adjust value for CO_2 exceeded / not attained	Acknowledge the alarm			X
	Error communication	Sensor not communicating with the main board	automatic	X	X	X
	Error: Gas cylinder changeover switch	Gas cylinder changeover switch not communicating with the main board	automatic	X	X	X
	No gas	Both CO_2 cylinders are empty	Swap at least one CO_2 cylinder.	X	X	X
	RH sensor breakage	Measured value exceeds accepted limit	Request service. See also Chapter “Measures After Power Outage“ on page 5-54.	X	X	X

Control loop	Failure message	Cause	Remedy	Alarm relay	Audible alarm	Log
0...100% O_2	Sensor breakage	Measured value exceeds accepted limit	Request service	X	X	X
	Actual value above	Actual value > Set value + 1% *4)	Check the gas supply source. Reduce primary pressure to 1 bar (14.5 psi) max.	X	X	X
	Actual value below	Actual value < Set value - 1% *4)	Check the gas supply source. Replace gas cylinder. Increase primary pressure to 1 bar (14.5 psi) max. Check feeding line.	X	X	X
	Error communication	Sensor not communicating with the main board	Request service	X	X	X
rH	No water	Not enough water in water reservoir.	Refill water or, if dry operation is desired, de-activate the water level sensor. In case the failure message occurs again after filling, troubleshoot the device according to Section “Measures After Power Outage“ on page 5-54. If the error persists, request service.	X	X	X

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

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

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

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

Shutting the Device Down

WARNING Contamination hazard!

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

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

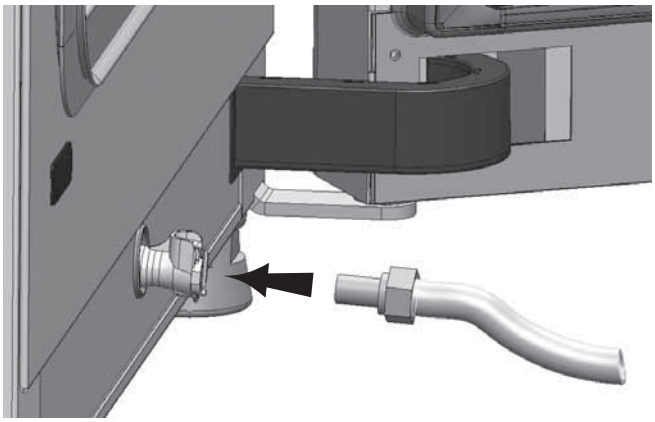

Figure 5-59. Fill and Drain Valve of Water Reservoir[4]

5. Allow the water reservoir to drain completely into the collecting vessel.
6. Remove drain hose valve again.
7. Start the Steri-Run decontamination routine (“Launching Steri-Run“ on page 5-25).
8. Turn the device off using the power switch when the steri-run decontamination routine has been completed.
9. Unplug the power connector and protect it against accidental reconnection.
10. Close shut-off valves of the CO_2 /O_2 /N_2 supply system.
11. Disconnect the gas pressure hoses from the sleeve at the rear of the device.
12. Disconnect the connection to the robot unit.
13. Until the device is shut down, the workspace must be continuously ventilated. Leave the door open and secure them in this state.

[4] Figure similar. Optional and depending of the variant, your device has the water connection at the back.

Cleaning and Disinfection

Table of Contents

Cleaning

CAUTION Incompatible cleaners!

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

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

Cleaning Exterior Surfaces

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

Cleaning Display

CAUTION Moisture-sensitive display!

Do not spray or wipe the display with cleaner.

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

Decontamination Procedures

The operator must prepare hygiene regulations for the decontamination of the device in accordance with the application of the device.
The following disinfection procedures are compatible with the device:

Wipe/spray Disinfection

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

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

Preparing for Disinfection or Steri-Run

WARNING If the unit is connected to a robotic system, switch off the external 24 V power supply of the door drive to avoid any unintentional movement. The switch is located on the side of the second interface box

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

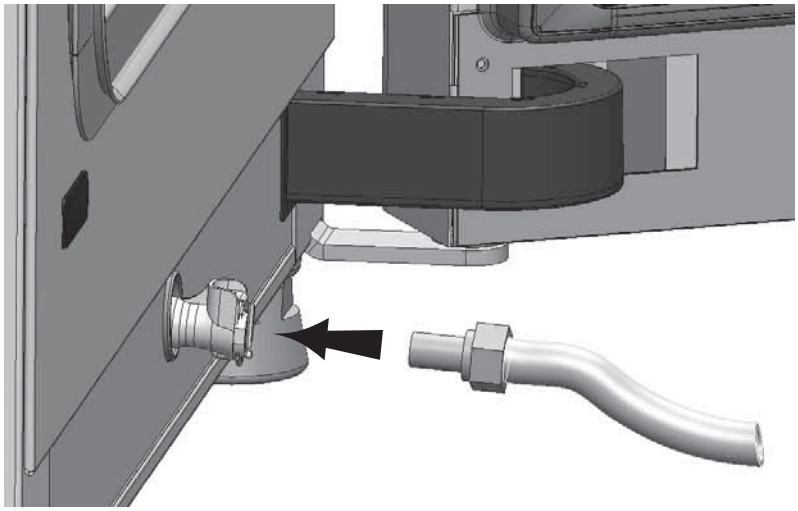

Figure 6-1. Fill and Drain Valve of Water Reservoir[1]

5. Allow the water reservoir to drain completely into the collecting vessel.

[1] Figure similar. Optional and depending of the variant, your device has the water connection at the back.

6. Wipe up residual water with a cloth.
7. Pull airbox (1/Figure 6-2) out of its seat on the water reservoir cover panel and remove it.
8. Take HEPA-filter (2/Figure 6-2) out of airbox (1/Figure 6-2) and reinstall the airbox.
9. If previously switched off, switch the 24 V external supply back on.

Wipe/Spray Disinfection

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

- Predisinfection
- Cleaning
- Final disinfection

CAUTION

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

CAUTION

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

WARNING Electric shock!

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

- Turn the device off using the power switch.
- Unplug the power connector and protect it against accidental reconnection.
- Disconnect from the external 24 V power supply (optional) using the switch on the second interface box during the procedure.
- Make sure the device is de-energized.

CAUTION Health hazard!

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

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

Predisinfection

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

CAUTION Moisture-sensitive components!

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

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

Removing Accessories and Shelf System

1. Remove the shelves, then remove the entire shelf system from the workspace. The installation and removal of the shelving system are described in the section "Installing the Shelf System" on page 4-7.
2. Remove the airbox and the HEPA-filter. The installation and removal of the airbox and the HEPA-filter are described in section "Replacing the HEPA-Filter" on page 7-8
.

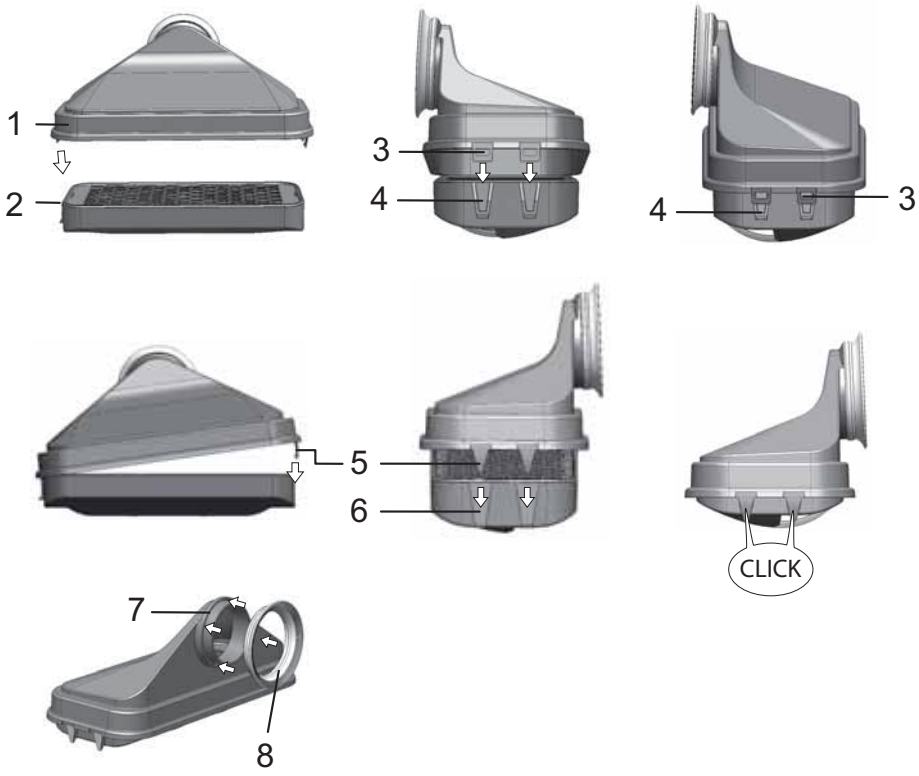

Figure 6-2. HEPA-Filter and Airbox

3. Pull top part the air duct (1/Figure 6-3) 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 6-3) and remove it from the workspace.

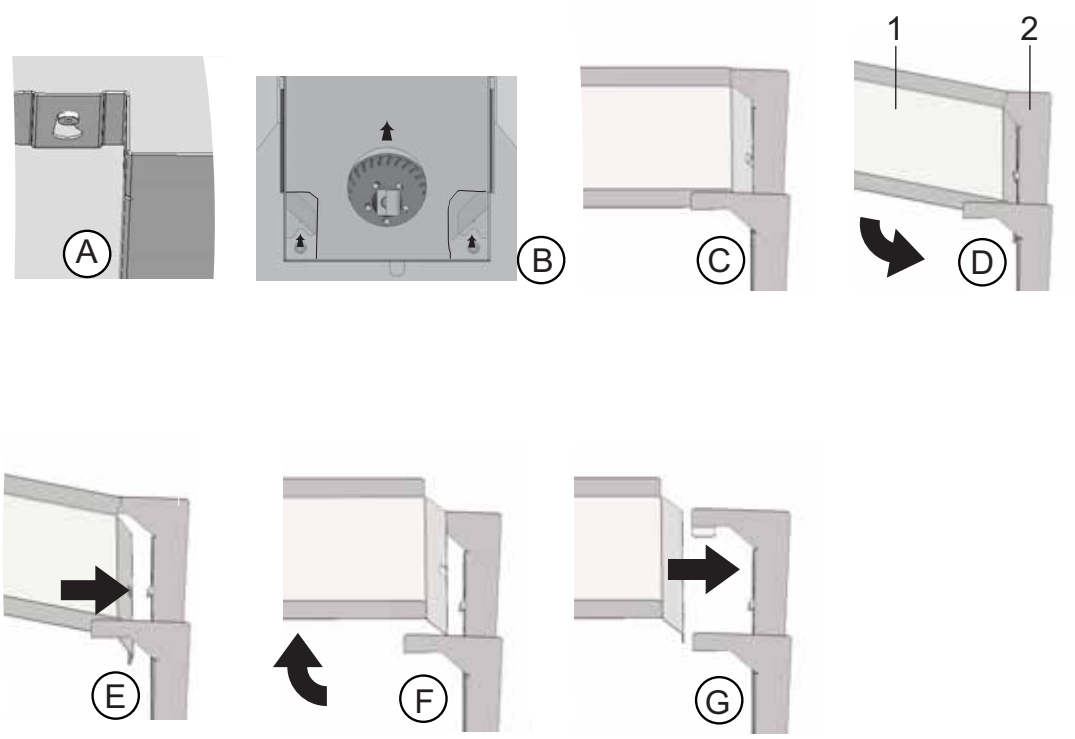

Figure 6-3. Air Duct

5. Unhinge the rear part of the air duct (2/Figure 6-3) from the rear wall and remove it.

Remove pre-filter (9/Figure 2-1). The pre-filter is autoclavable.

6. Remove the cover panel from the water reservoir.

Cleaning the Workspace and Accessories

1. Thoroughly remove dirt residues and deposits using a solution of tepid water and dishwashing agent.
2. Wipe the surfaces clean using a clean cloth and plenty of clear water.
3. Remove the cleaning liquid from the water reservoir and wipe all surfaces of the workspace thoroughly dry.
4. Wipe accessories thoroughly dry.

Final Disinfection

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

Steri-Run Sterilization Routine

CAUTION

Disconnect the control of the CO_2 incubator by the robotic clusters as well as the optional door opener before the steri-run-decontamination!

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

The entire program cycle of the sterilization routine takes less than 12 hours to accomplish. During this routine, a hot and humid atmosphere at 180 °C with highly sterilizing 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 106 (6-log reduction) to the ISO 11138 standard. On request, Thermo Scientific will supply information on the pertinent tests.

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,
- Door open (Door open condition causes „Door open“ error message)
- Actual value high (excessive deviation from set value),
- Actual value low (excessive deviation from set value),
- Actual value not plausible,
- Error communication.
- Water has been detected.

Overtemperature protection:

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

Progress of a Steri-Run Sterilization Routine:

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

CAUTION Hot surfaces!

The interior panel of the 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!

CAUTION Damage to the samples!

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

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

Operating Phases of Steri-Run Decontamination:

The remaining run time of the steri-run 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 orientation.
The routine is divided into three phases:

- Heating phase,
- sterilization phase,
- cool-down.

Heating phase: approx. 2 h.
The workspace is heated up to 180 °C.

Sterilization phase: approx. 1.5 h.
After the sterilization temperature has been created, 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.

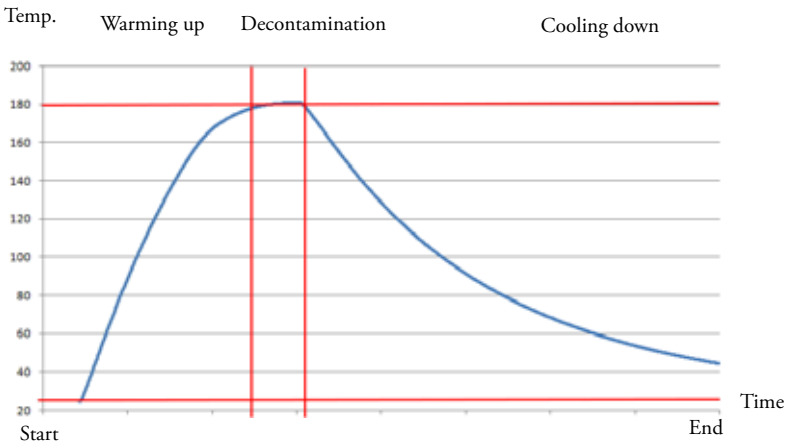

Figure 6-4. Sterilization Routine Phases

Activating Steri-Run

The steri-run sterilization routine is used to sterilize the complete workspace.

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

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

The steri-run menu is displayed.

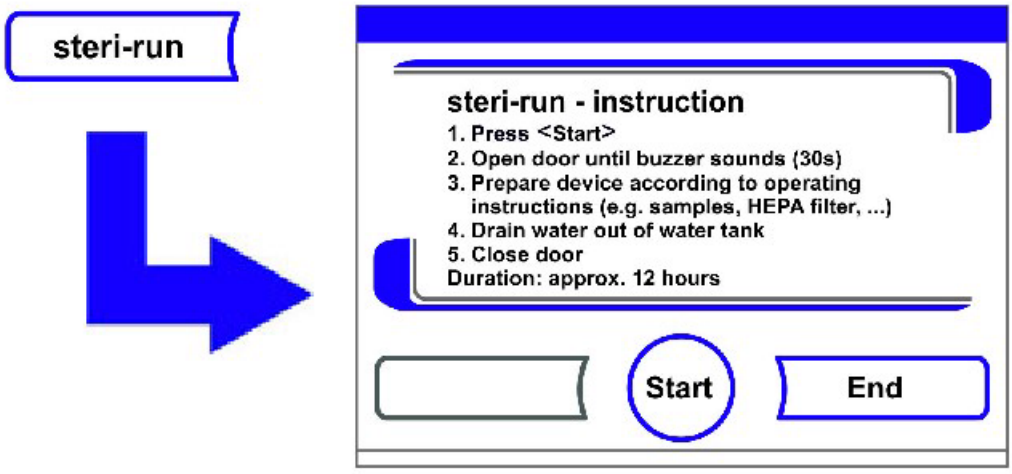

Figure 6-5. Steri-Run Menu - Progress

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

- Press the **End** key.

The system returns to the main menu.

Activating steri-run:

- Press the START key.

The steri-run-Progress dialog window is displayed.

2. To air the workspace, open both device doors when the audible alarm sounds after 30 seconds.
3. Remove all samples from the workspace.
4. Drain water from the reservoir, wipe up any residual water.
5. When the audible timer alarm is sounded, close both device doors.

- Start steri-run.

  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.

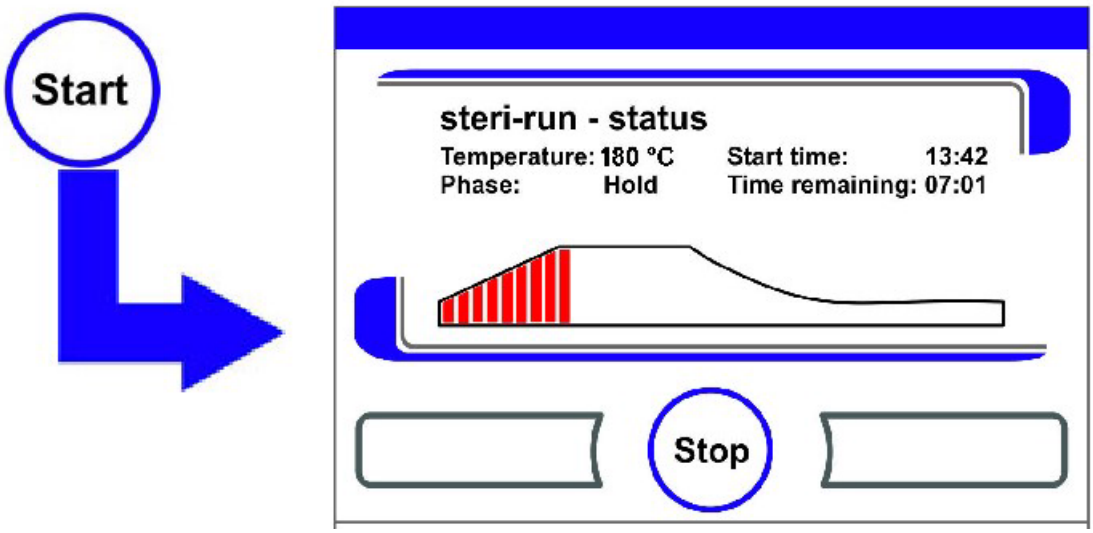

Figure 6-6. Activate Steri-Run

Canceling Steri-Run

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

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.

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.

To resume steri-run:

- Press the **Back** key.

  The system returns to the status display, and the sterilization routine is resumed.

To interrupt Steri-Run from the status display:

1. Press the **Stop** key.

   As a safety scan, the steri-run - Stop dialog window appears.

2. Proceed with work step 2 (see section above).

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.

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.

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.

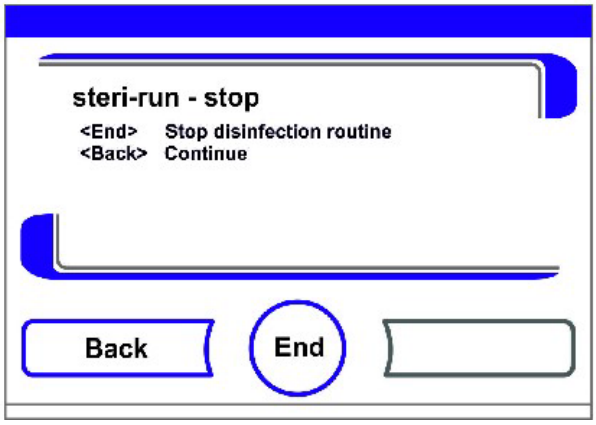

Figure 6-7. Interrupting / Canceling Steri-Run

Completing Steri-Run

When all three phases have been completed, the **Steri-Run End** (Figure 6-8) dialog window is displayed automatically. The sterilization routine must be stopped manually.

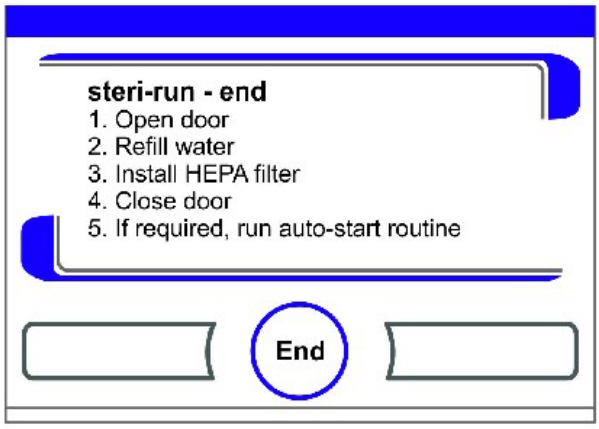

Figure 6-8. To stop Steri-Run

- To stop steri-run:
  - Press the **End** key [3].

  The system returns to the main menu.

Note Opening door during steri-run 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.

Maintenance

Table of Contents

CAUTION

Only trained and authorized qualified service technicians with the knowledge of these instructions are allowed to maintenance components of the device.

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.

Daily Check

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

Annual Inspection

- Permeability of the pressure compensation opening with insert.
- Perform functional check of the control panel and of the incubator's built-in controller.

– Electrical safety check in accordance with the relevant national regulations (e.g. BGV 3).

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

Service Intervals

CAUTION

Disconnect from the external 24 V power supply (optional) using the switch on the second interface box during the procedure.

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_2-/O_2 comparison measurement.
- Check the drive belt of the door. Replace it, if necessary.

6-Month-Service

- Check the gasket of the door every 6 months. Replace if necessary.

Annual Service

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

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

Preparing Temperature Calibration

To determine the exact measured value of the incubator's integral temperature sensor, a temperature comparison measurement must be performed every three months. If a major temperature deviation is found during this check, temperature calibration is required. During this process, the temperature controller of the incubator is set to the value measured during the temperature comparison measurement.
Use a calibrated measuring instrument with an accuracy of < ± 0.1°C for this test.
Use the center of the work space as the reference location for the comparison measurement.

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

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

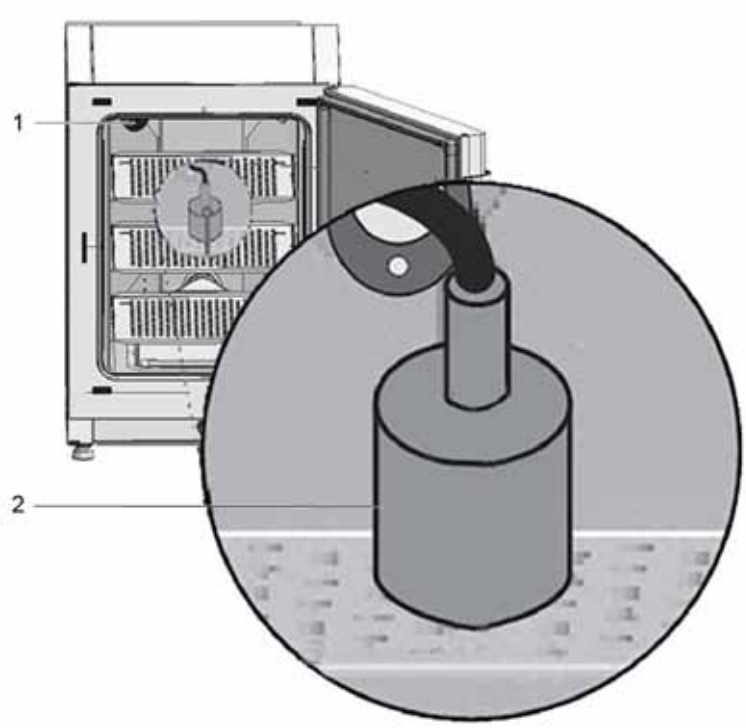

Figure 7-1. Preparing Temperature Calibration[1]

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.

[1] Figure similar.

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 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 7-2) is displayed.

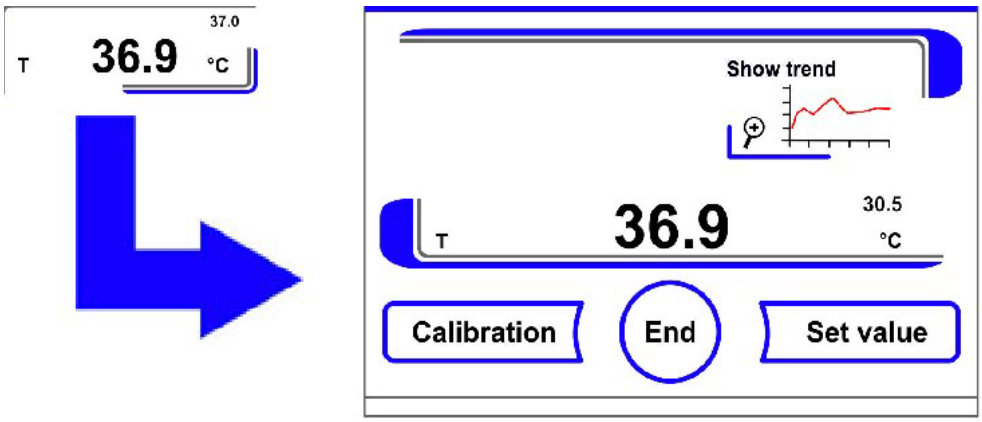

Figure 7-2. Temperature Display Field and Temperature Selection Menu

To exit the Temperature menu:

- Press the **End** key [3].

To enter the Calibration submenu:

- Press the **Calibration** key.

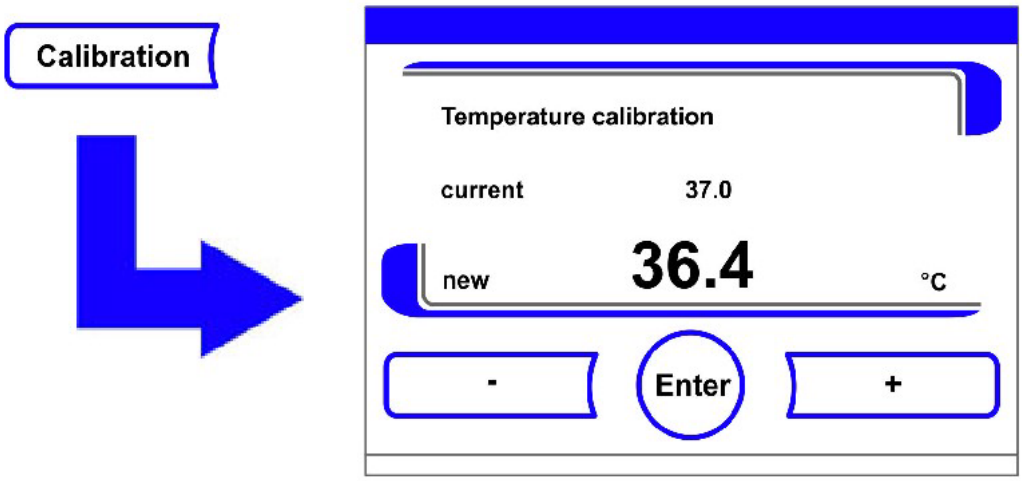

Figure 7-3. Temperature Calibration Procedure

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

To increase the targeting value:

- Press the + key.

To reduce the set value:

- Press the - key.

3. Accept and save the target value:

- Press the **Enter** key.
- Press the **Save** key.

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

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

Value reset:

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

Preparing the CO_2 Calibration

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

Suitable Instrument

- Portable IR readout instrument.
  The comparison measurement must be performed when the device is completely heated up.

Comparison Measurement Procedure

1. Turn on the device using the power switch.
2. Adjust the CO_2 set value and wait until the unit has fully heated up and developed the correct humidity level.
3. Insert the measuring instrument probe into the workspace. Wait until the CO_2 value displayed by the instrument has stabilized.
4. Remove the measuring probe and plug the measurement opening (Access Port).

Calibrate the CO_2 control.

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

CO_2 Calibration Procedure

Measurement example:

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

1. Press the CO_2 display key.

   The CO_2 menu is displayed.

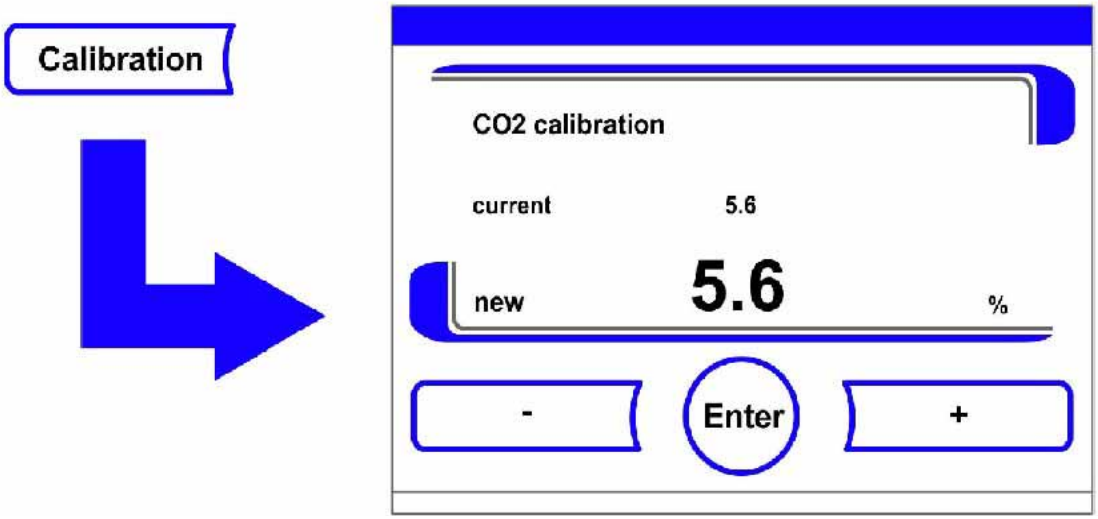

Figure 7-4. CO2 Calibration

To exit the CO_2 menu:

- Press the **End** key.

To enter the Calibration submenu:

- Press the **Calibration** key.

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

To increase the targeting value:

- Press the + key.

To reduce the set value:

- Press the - key.

Accept and save the target value:

- Press the **Enter** key.
- Press the **Save** key.

The system returns to the main menu. The CO_2 display shows the actual value currently measured in the workspace.

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

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

Replacing the HEPA-Filter

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

Steps for replacing the HEPA-filter:

1. Power down the unit, shut off the gas supply and allow the workspace to vent.
2. Take the center and bottom insert out of the workspace.
3. Lift the water reservoir cover at the front side (1/Figure 7-5).

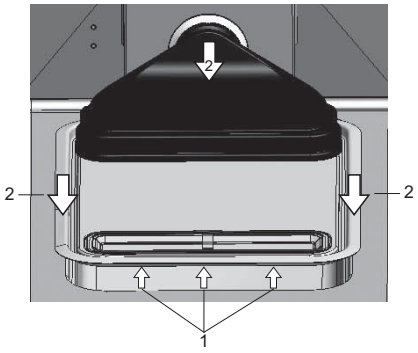

Figure 7-5. Removing the Airbox

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

Figure 7-6. Installing the HEPA-Filter

8. Install the new HEPA-filter in airbox (1/Figure 7-6) 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 5-46.
11. If necessary, set the reminder interval for the HEPA-filter replacement in the user configuration according to instructions “Reminder Interval Setting“ on page 5-35. The reminder interval for HEPA-filter replacement may be set between 1 and 12 months. We recommend setting this parameter to the factory preset value of 12 months.

Replacing the Gas Inlet Filter

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

Procedure for gas supply gas inlet filter:

1. Make sure that the gas supply is shut off.
2. Loosen the hose clamp (3/Figure 7-7).
3. Remove the gas hose (4/Figure 7-7) from the gas inlet filter sleeve.

Procedure for all gas inlet filters:

4. Unscrew the gas inlet filter(1/Figure 7-7) from the threaded hole (2/Figure 7-7).
5. When installing the new gas inlet filter, make sure that the plastic thread is not canted. Install the filter using caution and fix it securely.

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.

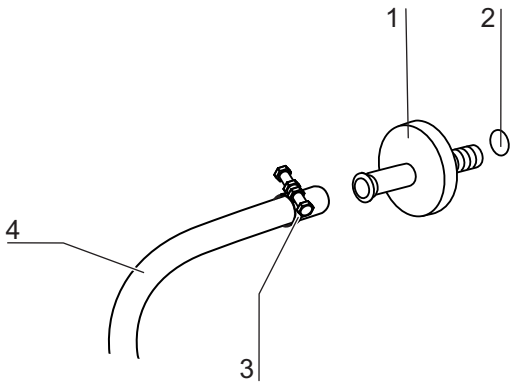

Figure 7-7. Gas Inlet Filter Installation

Device Fusing Replacement

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

Replacing the Door Seals

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

Waste Disposal

Content

Disposal

WEEE Conformity:

This product is required to comply with the European Union’s Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EC. It is marked with the adjacent symbol.

WARNING Contamination hazard!

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

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

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

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

Overview of the Materials Used

Component	Material
Thermal insulation components	Glass wool, glass wool with single-sided glass mat lining
Printed circuit boards	Coated electrical components contain various plastics materials. Components mounted on circuit boards containing epoxy resin bonder.
Plastic components, general	ABS and PPS GF40, note material identification
Exterior housing	Galvanized and painted steel sheet, Stainless steel 1.4016
Incubator rear panel	Galvanized steel sheet
Outer door	Galvanized and painted steel sheet, Stainless steel 1.4016
Door inner panel	1.4301 stainless steel sheeting
Control panel and display window protective foil	Polyethylene
Heater	Silicone-sheathed resistance heater wires
Workspace containers, installed components and shelves	Stainless steel 1.4301, Copper
Insert for pressure compensation opening	Stainless steel 1.4301 (base), 1.4404 (sinter filter)
Sensor block (TCD)	Stainless steel 1.4301
Cables	Plastics- and silicon-sheathed copper stranded wire
Elastomers, general	Silicone
Filter	HEPA-filter, micro-fine glass, Membrane filter Cell locker with ABS and silicone Gas filter with polypropylene casing and GF/PTFE membrane, Pre-filter, stainless steel 1.4401 wire mesh
Packaging	Corrugated cardboard, polyethylene foil, styrofoam shaped elements and polypropylene
Door seal magnet	Permanent magnet

Specifications

Name	Unit	Value
Mechanical		
Outer dimensions (W x H x D)	mm	780 x 970 x 945 (30.71 x 38.19 x 37.20 inch)
Inner dimensions (W x H x D)	mm	607 x 670 x 629 (23.90 x 26.38 x 24.76 inch)
Inner space volume, of which usable volume	l	approx. 255 approx. 162
Inserts (B x T) Quantity of components delivered Quantity, maximum Surface loading capacity, maximum	mm pcs. pcs. kg	560 x 500 (22.05 x 19.68 inch) 3 12 14 per stainless steel shelf
Overall device loading capacity, maximum	kg	42 stainless steel shelves
Weight, without accessories	kg	98.5
Thermal		
Thermal safety features to DIN 12880:2007-05		Class 3.1 (Overtemperature controller, providing alarming function upon excessive temperature condition)
Ambient temperature range	°C	+ 18...34
Ambient temperature for stacked devices	°C	+ 18...28
Temperature control range	°C	RT + 3...55
Temperature deviation from set value, over time (DIN 12880, part 2)	°C	± 0.1
Temperature deviation from set value, spatial (DIN 12880, part 2) at 37 °C *1)	°C	± 0.3
Duration of the auto-start routine: to 37 °C Ambient temperature 20 °C	h	5...10
Heat transfer to environment: at 37 °C during steri-run decontamination	 kWh/h kWh/h	 0.07 0.75

Name	Unit	Value
Humidity		
Water qualities		Electrical resistance: 50 kOhmcm to 1 MOhmcm Conductivity: 1 to 20 µS/cm
Capacities: Incubation operation	l	max. 3 / min 0.5
Constant humidity at 37 °C (high humidity mode) Constant humidity at 37 °C (low humidity mode)	%rH %rH	approx. 93 approx. 90
Others		
Sound pressure level (DIN 45 635, part 1)	dB(A)	< 50
Relative ambient humidity	%rH	max. 80
Altitude of site	m above sea level	max. 2000

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

Name	Unit	Value
CO_2 gas supply system		
Gas purity	%	min. 99.5 or med. quality
Primary pressure	bar	min. 0.8 - max. 1 (11.6-14.5 psi)
Measurement and control range	Vol -%	0...20
Control deviation over time	Vol -%	± 0.1
CO_2 measuring cell		
Accuracy at 37 °C and 5% CO_2	%CO_2	± 0.3
O_2 gas supply system		
Gas purity	%	min. 99.5 or med. quality
Primary pressure	bar	min. 0.8 - max. 1 (11.6-14.5 psi)
Measurement and control range	Vol -%	1... 21
Control deviation over time	Vol -%	± 0.2
O_2 measuring cell		
Accuracy at 37 °C and 21% O_2	%O_2	± 0.5 (option: 1.....21% O_2)
Electrical		
Rated voltage	V	1/N/PE 230 V, AC (± 10%) 1/N/PE 120 V, AC (± 10%) 1/N/PE 100 V, AC (± 10%)

Name	Unit	Value
Rated frequency	Hz	50/60
Degree of protection (IEC 60529)		IP 20
Protection class		I
Overvoltage category (EN 61010)		II
Pollution degree (EN 61010)		2
Rated current	A	**230 V:** Decontamination: 5.5 Incubation: 3.3 **120 V:** Decontamination: 10.4 Incubation: 6.3 **100 V:** Decontamination: 8.9 Incubation: 5.3
Circuit breaker		16 A
Rated power	kW	**230 V:** Decontamination: 1.26 Incubation: 0.76 **120 V:** Decontamination: 1.25 Incubation: 0.75 **100 V:** Decontamination: 0.89 Incubation: 0.53
EMV class		B

Name	Unit	Value
Automated Door Operator		
Operating Voltage	V DC	24
Rated Current	A	1
Rated Power	W	8
Rated Speed	RPM	48
Ambient Temperature	°C	- 18 to + 34

Data Communication

Content

USB Interface

General

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

Note Installing the USB port with the virtual COM port:

If the USB port is to be used for data exchange between PC and incubator, the USB port is installed as virtual COM port (USB serial port) using the supplied driver.
The assigned COM port can be located in the Windows Device Manager/Ports dialog box, e.g. USB Serial Port (COM5), and is then defined as communication port in the ***HERACELL VIOS 250i AxD*** (see "Program HERACELL VIOS 250i AxD" on page 10-24).

Figure 10-1. Device Manager

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 250i AxD*** and connect with a PC.
As soon as the Windows Hardware Detector has identified the USB port, the Find New Hardware Wizard dialog box opens.

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

Figure 10-2. Installing USB Port Drive_1

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

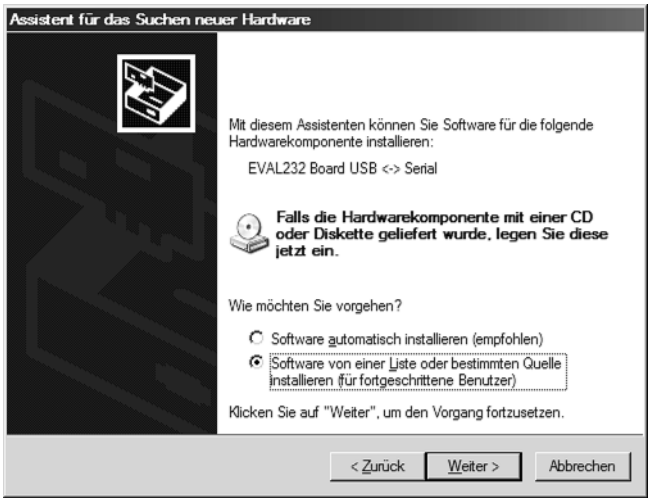

Figure 10-3. Installing USB Port Drive_2

3. Select the data CD as source.

Figure 10-4. Installing USB Port Drive_3

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

Figure 10-5. Installing USB Port Drive_4

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 250i AxD*** (see “Settings / Setup“ on page 5-26).

Structure of the Command Sequences

General

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

Description of Protocol

Character coding
ASCII characters, capital letters are not allowed.

Reading parameters

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

Description of the response elements

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

Example of a software version query (50111927)

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

Writing parameters:

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

Response with an error message

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

Description of the response elements

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

Example of an unknown command

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

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

Overview of General Parameters (Addresses 0xxx)

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

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

Overview of Incubator Parameters (Addresses 2xxx)

Basic Parameters

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

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

*2) All values have two decimal places.

Internal Function Parameters

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

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

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

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

Error Memory Structure

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

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

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

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

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

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

Example of a response

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

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

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

Error Memory Data Set Structure Scheme

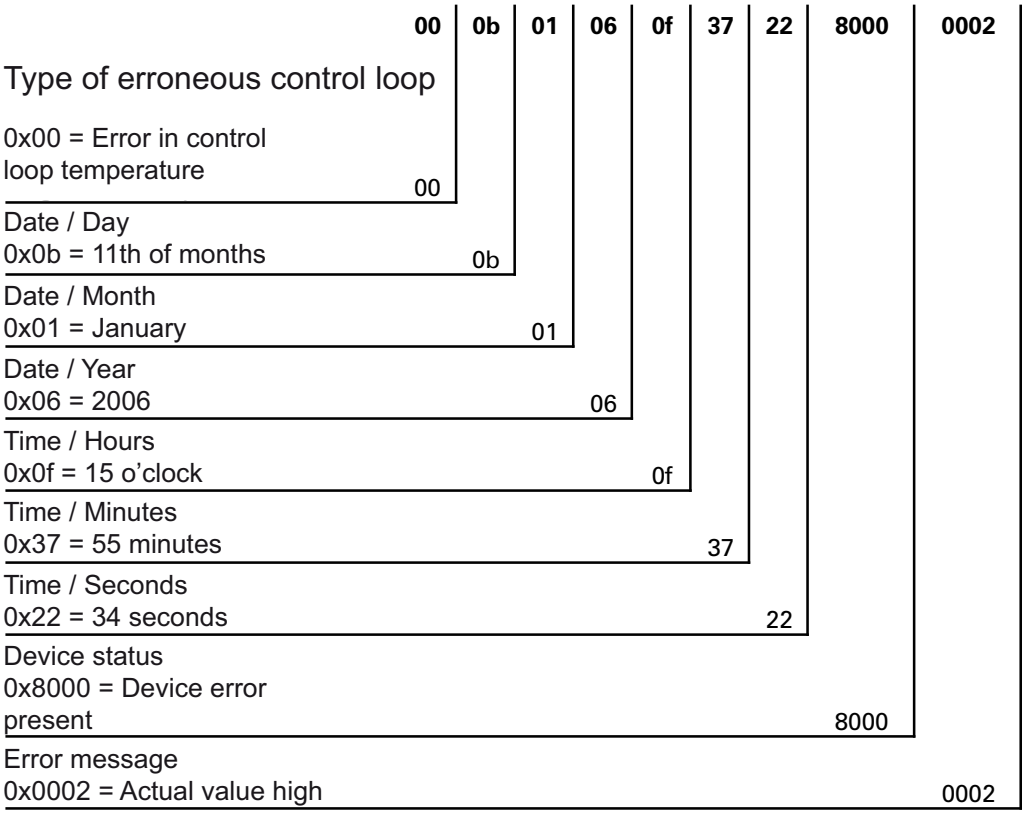

Figure 10-6. Error Memory

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

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

Overview Error Messages in Hex Coding

Hex Code	Description / Type
0x00	Temperature control loop
0x01	$CO_{2\ \text{control loop}}$
0x02	$O_{2\ \text{control loop}}$
0x07	Water level
0x08	General device status

Overview Error Messages in Bit Coding

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

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

Bit	CO_2 control loop error status
0x0001	Sensor breakage
0x0002	Actual value high
0x0004	Actual value low
0x0010	Calibration values too high/low
0x0020	Error communication (to sensor)
0x0040	Error communication (to gas cylinder changing unit)
0x0080	No gas available, bottle A and B empty
0x0200	Cylinder A empty
0x0400	Cylinder B empty

O_2 Control Loop and Water Level

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

Bit	Water level error status
0x0001	No water

Data Logger Structure

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

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

The data logger can be queried using the following commands:

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

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

Query: ?:2402:00::cc<CR>
Repeated output of the most recently read data, this command does not move the reading pointer. This command can be used to avoid data loss after a communication error has occurred

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

Example of a response

!:2400:e0:010b01060f3700000177002800d40000110b01060f38000000172003200d20352 ... ...:80

First data set !:2400:e0:010b01060f3700000177002800d4000011
(consisting of 32 byte ASCII characters)

Second data set 0b01060f38000000172003200d20352... ...:80
(beginning of the second data set after 32 bytes of the first data set)

Data Logger Data Set Structure Scheme

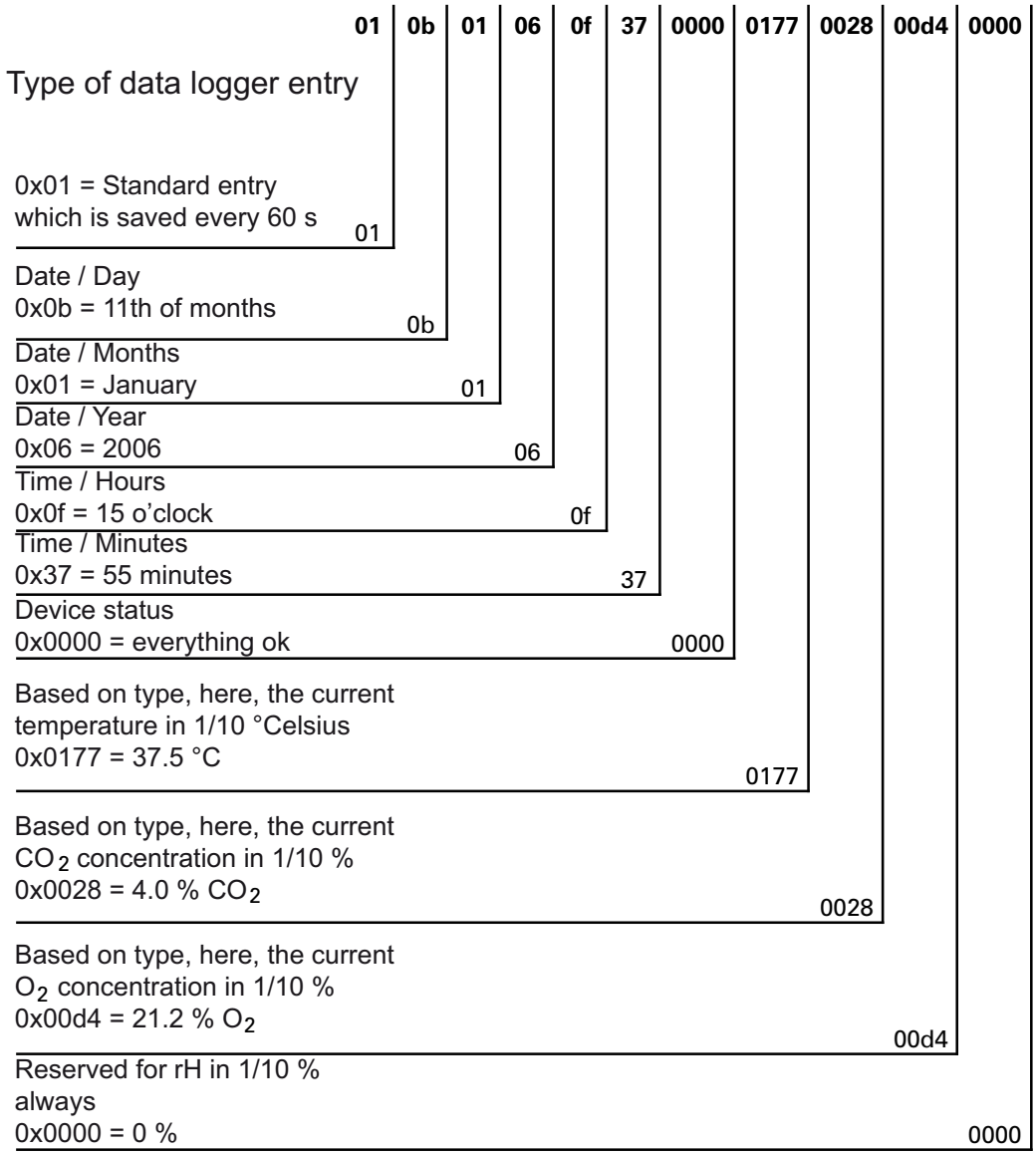

Figure 10-7. Data Logger

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

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

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

Overview Event Entries in Bit Coding

Part I

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

Code	Event	Special information (Byte 8-15)
0x50	Start auto-start	Status / error registration for temperature, CO_2, O_2 and rH
0x51	auto-start successfully completed	Current actual values for temperature, CO_2, O_2 and rH

Part II

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

Examples of Data Logger Codes

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

1st byte: indicates the event (e.g. door open 1x31, measured value entry 0x01)
2nd byte: day of entry
3rd byte: month
4th byte: year

5th byte: hours
6th byte: minutes
7th and 8th byte: device status
9th to 16th byte: various data on the event

Functions for Data Logger Queries

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

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

Example of a Code for a 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 Event Entries in Bit Coding“ on page 10-16)
                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 Event Entries in Bit Coding“ on page 10-16)
// cancel 0xFF indicates the end of the data logger
    case 0xFF:
    WriteFile (FileHandle, „End;\n“,5);
    }
}
return 0;
}
```

Program *HERACELL VIOS 250i AxD*

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

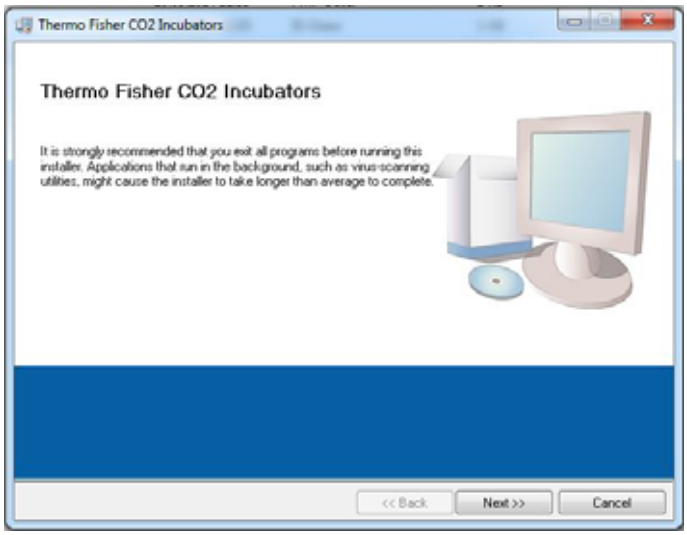

Figure 10-8. Program Heracell VIOS 250i AxD

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 250i AxD*

1. Starting the installation routine:

- On the data CD in the subdirectory PROGRAMS, double-click on the file SETUP.EXE to open this file.

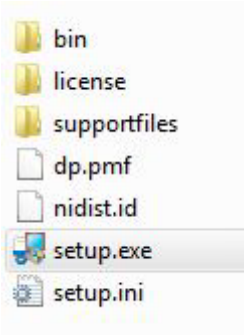

Figure 10-9. Installing Program Heracell VIOS 250i AxD_1

2. Locate the installation directory for the program.

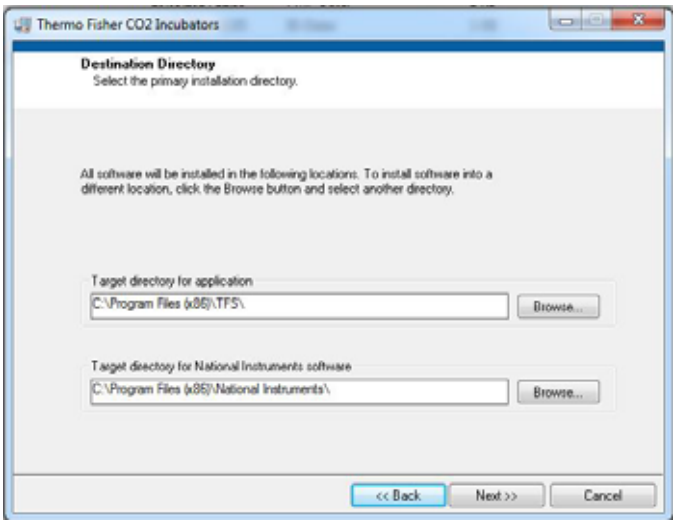

Figure 10-10. Installing Program Heracell VIOS 250i AxD_2

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 250i AxD*

User menu structure

The user surface is divided into two main menus:

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

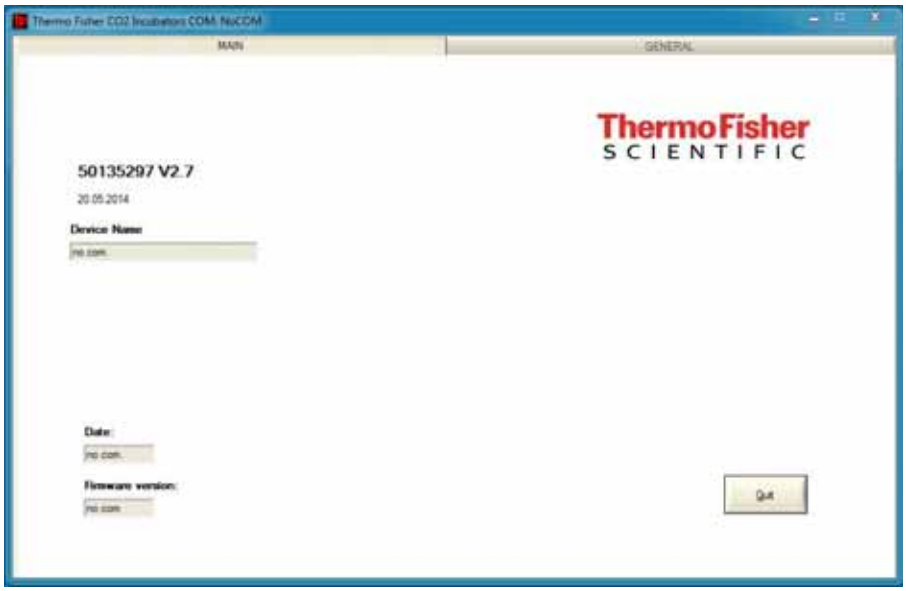

Figure 10-11. Operating Program Heracell VIOS 250i AxD_1

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

Function of the user menu:

PRESETTING

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

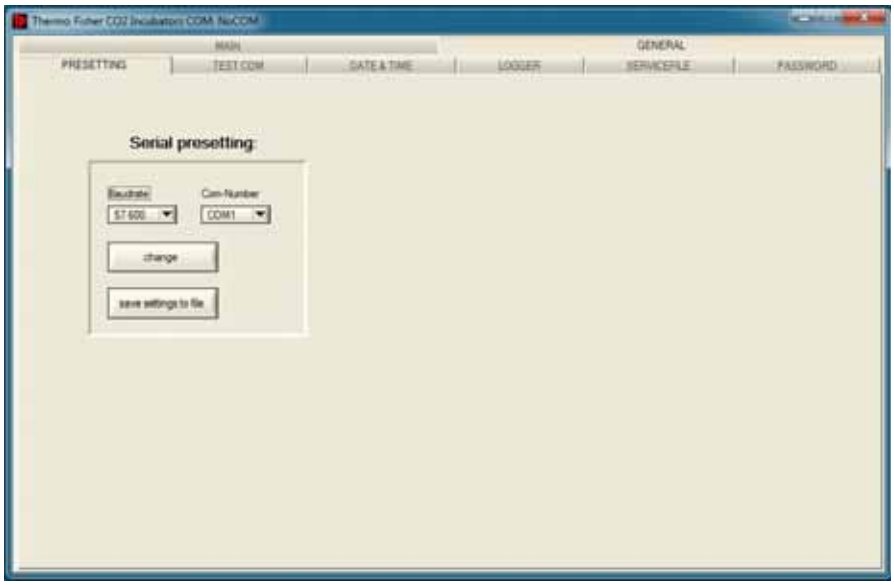

Figure 10-12. Operating Program Heracell VIOS 250i AxD_2

1. Select a transmission speed within the range of 9,600 to 115,200 baud.
2. Select the serial port of the PC. If the USB driver is installed, the (virtual) Com Port assigned to the USB port can be selected (see “USB Interface“ on page 10-1).

Accept the settings:

- Press the CHANGE key.

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.

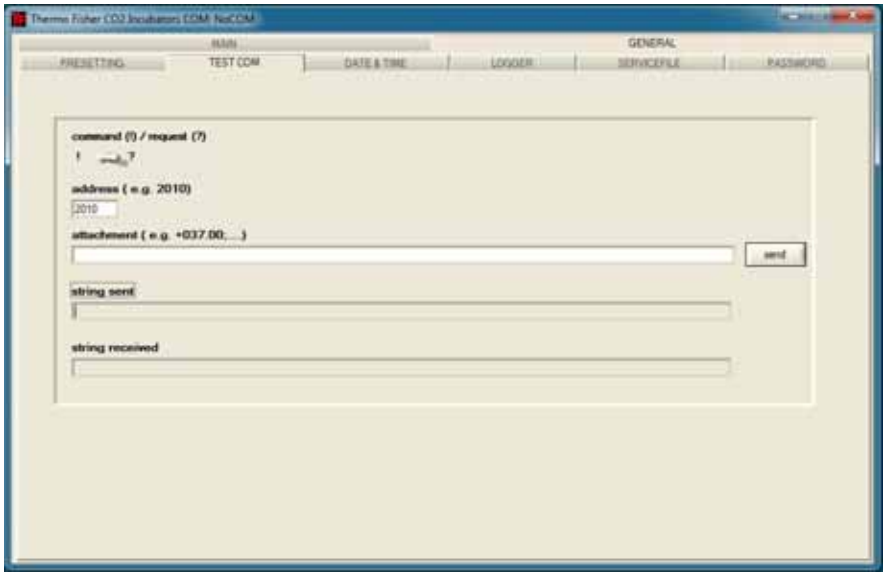

Figure 10-13. Operating Program Heracell VIOS 250i AxD_3

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)

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:

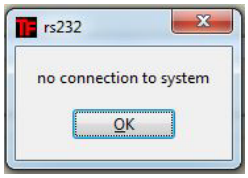

Figure 10-14. Operating Program Heracell VIOS 250i AxD_4

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.

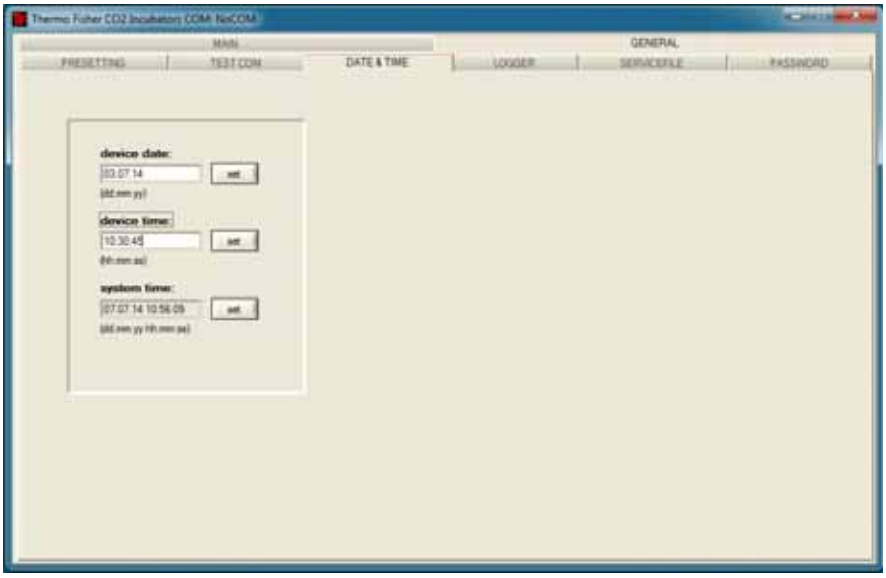

Figure 10-15. Operating Program Heracell VIOS 250i AxD_5

1. Enter the data in the two text boxes in the format DD.MM.YY (day, month, year).

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.

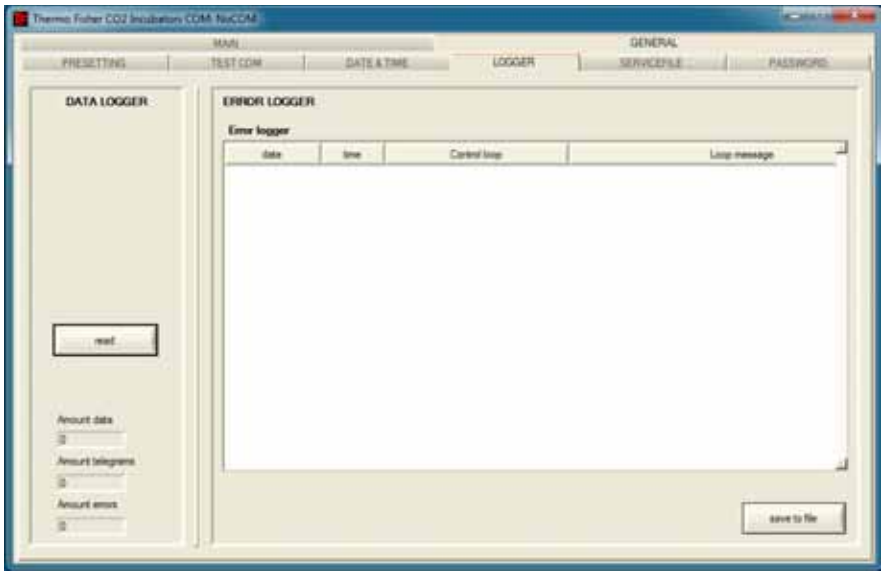

Figure 10-16. Operating Program Heracell VIOS 250i AxD_6

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.

Read the data sets:

- Press the READ key.

The progress of the data transmission is indicated in the three text boxes:

- AMOUNT DATA: Total number of transmitted data sets.
- AMOUNT TELEGRAMS: Therein the number of transmitted event entries.
- AMOUNT ERRORS: Therein the number of transmitted error messages.

Note Duration of the data transmission:
As the data logger can contain up to 10,000 data sets, the data transmission to a PC may take some time.

SERVICEFILE

The submenu SERVICEFILE is used for reading error informations and for creating a service file from it, saved with the proprietary extension *srf. The service file is transmitted to the Technical Service of Thermo Fisher Scientific for fault analysis.

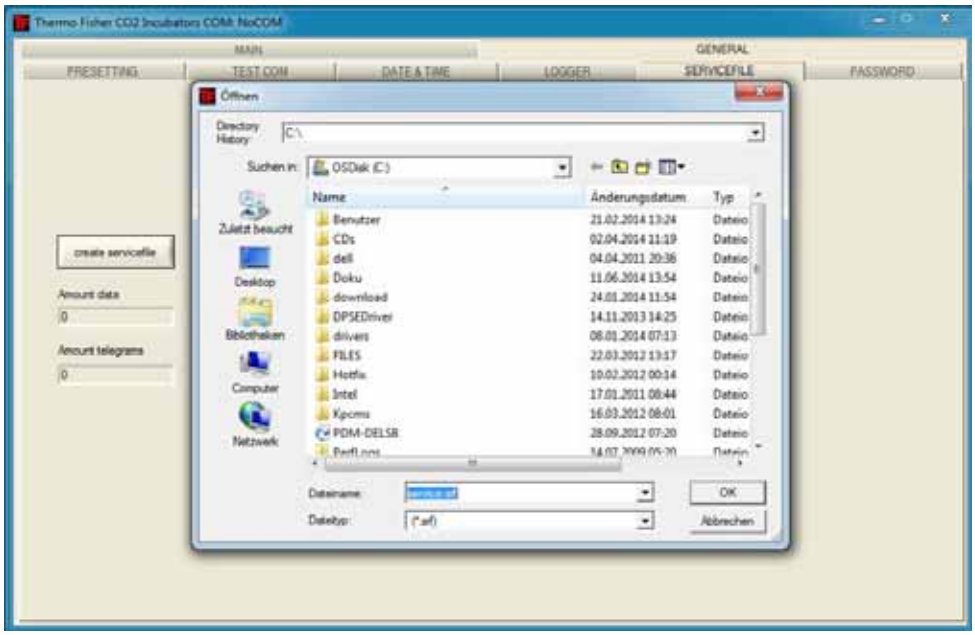

Figure 10-17. Operating Program Heracell VIOS 250i AxD_7

Create the service file:

- Press the CREATE SERVICEFILE key.
- Define file name and saving directory in the Windows dialog box.

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.

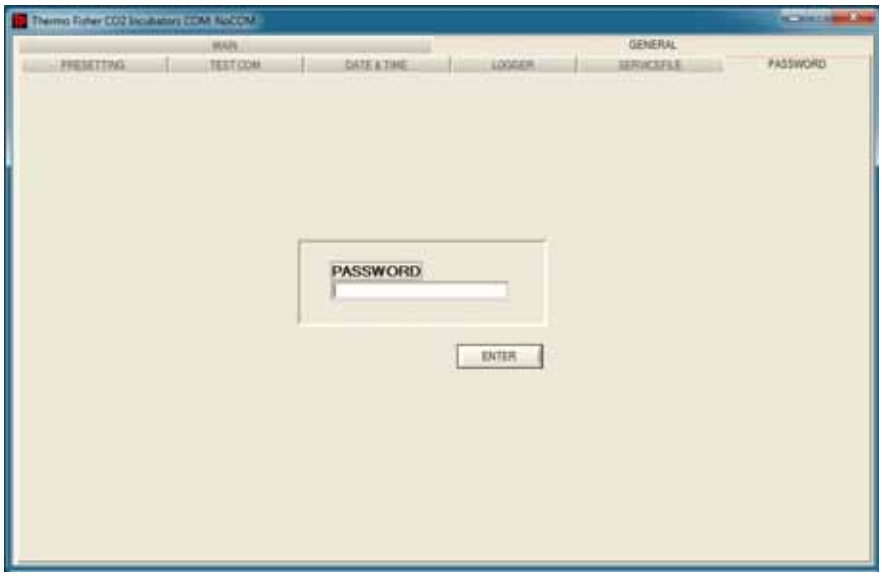

Figure 10-18. Operating Program Heracell VIOS 250i AxD_8

Device Log

Please list carried out works here:

Device type:		Part No.:	
Serial number:		Service number:	
Location:		Operator's note:	

Work carried out:	Comments:	Date	Signature

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