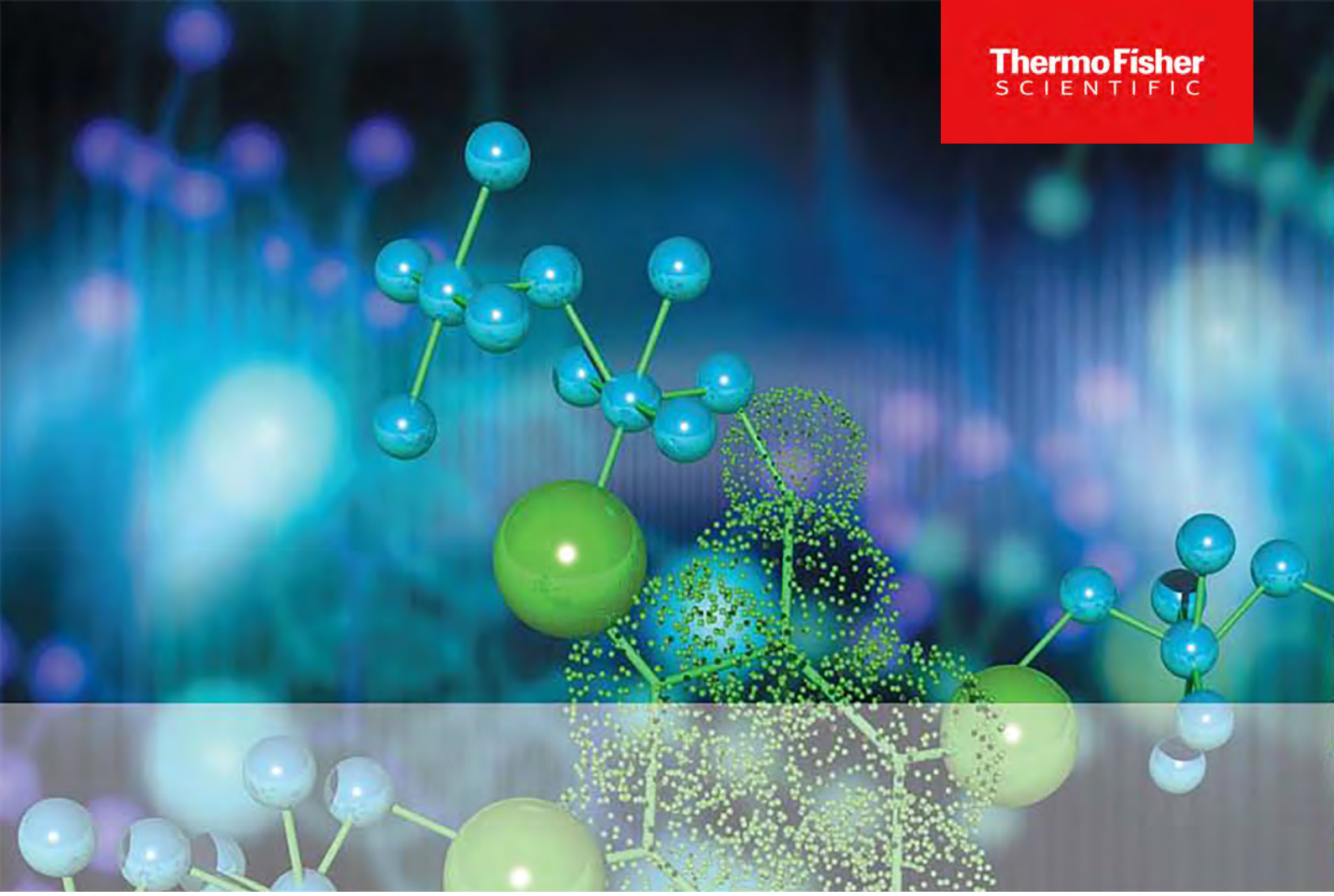

Thermo Scientific

CO_2 Incubator

Vios iDx

165 / 255

Operating instructions

50173012_Rev. _

February 2025

Trademarks

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Thermo Electron LED GmbH
Robert-Bosch-Straße 1
D-63505 Langenselbold
Germany

Thermo Electron LED GmbH is a subsidiary of:
Thermo Fisher Scientific Inc.
168 3rd Avenue
Waltham, MA 02451
USA

UK importer

Life Technologies, 3 Fountain Drive
Inchinnan Business Park
PA4 9RF
Scotland

Table of Contents

List of figures

Preface

General notes

These operating instructions describe the CO_2 incubators Vios iDx 165/255. The CO_2 incubators were manufactured according to the state of the art in technology and were tested for functionality before delivery.

However, these devices may be hazardous. Especially if they are not operated by sufficiently trained personnel, or if they are used improperly and not as intended.

Therefore, the following should be observed to prevent accidents:

The equipment may only be operated by operating personnel and may only be maintained and repaired by trained personnel. Personnel must know and understand the contents of this manual before working on or with the devices.

Safety instructions on the devices must be kept in a legible condition and may not be removed.

Keep these operating instructions close to the device so that safety instructions and information for operation can be consulted at all times.

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

The device may only be operated using original replacement parts and original accessories.

Occupational safety regulations must be observed without fail!

Personnel requirements

CAUTION

Persons who are still in training or have not yet completed their training in the handling of the device may only work on the device under the constant supervision of an experienced person.

Operating personnel

Trained specialist personnel

Trained experts 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 arising from laboratory equipment. They meet the country-specific requirements regarding compliance with a minimum age.

Instructed users

Instructed users are untrained and inexperienced persons who were instructed by trained specialist personnel so that they can avoid dangers arising from the device.

Service personnel

Trained personnel

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

Qualified electricians

Qualified electricians are persons who, due to their training and professional experience, know and can avoid all risks and dangers posed by laboratory equipment and can also avoid all risks to the device itself to the extent possible.

Features of the device and device documentation

Device identification

Device identification
Device name: CO_2 incubators
Name of device: Vios iDx 165/255

Certification and quality audit:
Conformity: CE marking
Certification mark: cTÜVus

Responsibility of the operator

The operator is responsible for the proper condition of the device. In particular, the following must be ensured:

- the device is in perfect condition before being put into service.
- the device is used properly and for its intended purpose.
- the performance of the products is appropriate to the client's specific use or application.
- the incubator is only operated by the operating personnel.
- these personnel always wear the required protective equipment when working on or with the device.
- if hazardous substances are spilled on or in the incubator, appropriate remedial action will be taken.
- (s)he is aware of all rules and regulations and passes these on to the staff.
- written procedures will be established for personnel working with this device.

These must be based on:

- these operating instructions
- the valid safety data sheets
- the company's hygiene guidelines
- the relevant technical regulations

In particular, this includes operating instructions:

- which disinfection measures should be applied for the device and the accessories used,
- what safety measures are to be taken during the processing of certain working materials,
- wearing protective equipment, e.g. when handling microbiological and biological cultures,

  - what safety measures are to be taken when gases and pressurized gas containers are used,
  - what action is to be taken in the event of accidents,
  - what safety measures and rules of conduct are necessary 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 have access to the device.

Instructing the personnel

Personnel who work on systems involving a CO_2 supply must be instructed in the special handling of CO_2 before starting work:

- the proper operation of pressurized gas containers and gas supply systems
- the obligation to report damage to and defects in the CO_2 feed lines
- Action to be taken in the event of accidents and malfunctions

The instructions must be repeated at appropriate intervals. The gas supplier’s specific operating instructions should be included in the instructions.

Applicability of the instructions

- The contents of these operating instructions are subject to change at any time without notice.
- In the case of conflicting translations into foreign languages, the German language version of these operating instructions is binding.
- Keep these operating instructions close to the device so that safety instructions and information important for operation can be consulted at all times.

Should you encounter questions that have not been covered in sufficient detail in these operating instructions, contact Thermo Scientific for your own safety.

Warranty

- Thermo Scientific warrants the safety and functionality of the CO_2 incubator (for 2 years) only on 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 approved by Thermo Fisher Scientific are used,
- inspections and maintenance work are performed at the specified intervals.

The Cell Locker and all accessories have a one year warranty. The warranty period begins with the delivery of the device to the orderer.

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 injury.

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

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

Note Provides application tips and useful information.

Additional symbols for safety information

Wear safety gloves!

Wear safety goggles!

Wear a mask!

Pull out the mains plug!

Read the operating instructions!

Tilting hazard!

Crushing hazard!

Bio Hazard!

Environmental pollution!

Lift the device with at least 4 persons!

The device is heavy! Do not lift alone!

Lift with mechanical aids!

Take care to handle gas correctly!

Hazardous liquids!

Electric shock!

Hot surfaces!

Fire hazard!

Explosion hazard!

Suffocation hazard!

Symbols on the device

CE marking: confirms conformity to EU guidelines

Mark of conformity for USA/Canada

Observe operating instructions!

Hot surfaces!

Intended Use

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. It is not permissible to use substances or liquids as cultures that:

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

The Cell Lockers are not for use in medical devices.

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

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

Typically, the CO_2 incubator was developed for installation and operation in the following areas of application:

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

This device is designed for professional use only and may only be operated by trained specialist personnel.

Standards and directives

The device complies with the following standards and directives:

- Low voltage directive 2014/35/EU
- IEC 61010-1:2020 / AMD1:2016, Safety requirements for electrical equipment for instrumentation and control and laboratory use - Part 1: General requirements
- IEC 61010-2-010:2019, Safety requirements for electrical equipment for instrumentation and control and laboratory use - Part 2-010: Particular requirements for laboratory equipment for the heating of materials
- EMC Directive 2014/30/EU
- IEC 61326-1:2020, Electrical equipment for instrumentation and control and laboratory use - EMC requirements, Part 1: General requirements

In other countries, the corresponding national regulations are binding.

Note

US (FCC)

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

Canada (ICES-001)

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

Safety notes on gases

DANGER

Installation work:

Work on supply lines and pressurized gas containers, cylinders, or collecting containers, in which CO_2 and/or O_2/N_2 are kept may only be carried out by specialist personnel using the appropriate tools.

WARNING

Ensure that the occupational exposure limits for CO_2 and/or O_2/N_2 are not exceeded.

For the Federal Republic of Germany, it is recommended that the TRGS 900 be observed; other countries may have different limit values. The country-specific national workplace exposure limits must be adhered to.

Safety notes on carbon dioxide (CO_2)

CO_2 is classified as a hazardous gas. Therefore, when putting the CO_2 incubator into service and while using it, the following safety measures must be observed:

DANGER

Suffocation hazard!

If large amounts of carbon dioxide (CO_2) are released into the room atmosphere, there is a risk of suffocation.
If CO_2 leaks, take safety measures immediately!

- Leave the room immediately and secure the entrances!
- Inform the 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.

DANGER

Oxygen explosion!

Oxygen (O_2) explodes in combination with oils, greases, and lubricants. If highly compressed oxygen comes into contact with grease- or oil-containing substances, there is a risk of explosion!

- To clean these device parts, use only oil- and fat-free cleaning agents.
- Keep all connections and components of the oxygen system free of substances that contain oil, grease, or lubricant!

DANGER

Fire hazard!

Leaking oxygen (O_2) is extremely combustion-promoting. Do not use open flames in the vicinity of oxygen-supplying systems!

- Do not smoke near the oxygen system!
- Do not subject the oxygen system components to strong heat.

Safety notes on nitrogen (N_2)

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

DANGER

Suffocation hazard!

If large amounts of nitrogen (N_2) are released into the room atmosphere, there is a risk of suffocation.
If N_2 leaks, take safety measures immediately!

- Leave the room immediately and secure the entrances!
- Inform the security service or fire department!

Delivery of the device

Contents

Packaging

The CO_2 incubators Vios iDx 165/255 are delivered in a stable packing crate. All packaging materials can be separated and are reusable:

- Packing box: recycled paper
- Plastic foam: polyethylene
- Packing film: polyethylene
- Packing tapes: polypropylene
- Feet: polypropylene
- Pallet: untreated wood

Delivery inspection

Upon delivery, immediately check:

- completeness of the delivery,
- condition of the device on delivery.

If components are missing or damage from transport is found on the device or the packaging, especially damage caused by humidity and water, contact the carrier as well as technical support immediately.

Scope of delivery Vios iDx 165/255

Standard equipment Vios iDx 165/255

Device components supplied	Number of items
Water reservoir cover panel	1
Max. water level sensor	1
Rear wall air duct	1
Air duct, top	1
Airbox incl. seal	1
Pre-filter	1
Insert shelves	3
Support rails for shelves	4
Support bracket for shelves	6
Plug for access port	1
Power cable	1
CO_2 connecting hose set	1
Operating instructions	1
Quick-release connector with hose for water drain	1

Additional equipment Vios iDx 165/255

Components	Number of items
Oxygen regulation	
O_2 sensor head	1
O_2 connecting hose set	1
Filters	
HEPA filter	1
Interface 4…20 mA	
Plug 4...20mA	1
Threefold segmented inner door	1
Sixfold segmented inner door	1
Cell Locker	6
Filling cylinder	1

Additional equipment for Vios iDx 255

255 L devices with divided shelves	Number of items
Support frame	3
Divided shelves	6

Installation

Contents

Environmental conditions

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

Requirements

- Draft-free and dry location.
- The minimum distances from adjacent areas on all sides must be maintained, see "Space requirements" on Page 2-3.
- The operating room must be equipped with appropriate room ventilation.
- Solid, level, non-combustible surface.
- In addition, use a stable, vibration-proof substructure (base frame, lab table) capable of bearing the weight of the device and of accessories (particularly if several devices are stacked).
- The device is designed for operation at one location at a maximum of 2000 m above sea level.
- To ensure a constant incubation temperature of 37°C (98.6 °F), the ambient temperature must be within a range of +18°C to +34°C (+ 64.4 °F to + 93.2 °F).
- Relative humidity up to max. 80%.
- No direct exposure to sunlight.

- Devices that generate high amounts of heat must not be installed or placed near the **Vios iDx 165/255**.

Room ventilation

When CO_2/O_2/N_2 is supplied, the incubator workspace of the incubator is slightly pressurized. The pressure is released through the pressure compensation opening into the operating room.
Pressure compensation and opening of the glass door/segmented inner 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 off the released gas safely into the open.
In addition, heat dissipating from the device during continuous operation may cause a change in the room climate.

- Deploy the **Vios iDx 165/255** only in adequately ventilated rooms.
- Do not set up the device in unventilated alcoves.
- The room ventilation should be technical ventilation that complies with the national requirements for laboratories or a ventilation system with equivalent performance.

Space requirements

WARNING

EMERGENCY STOP!

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

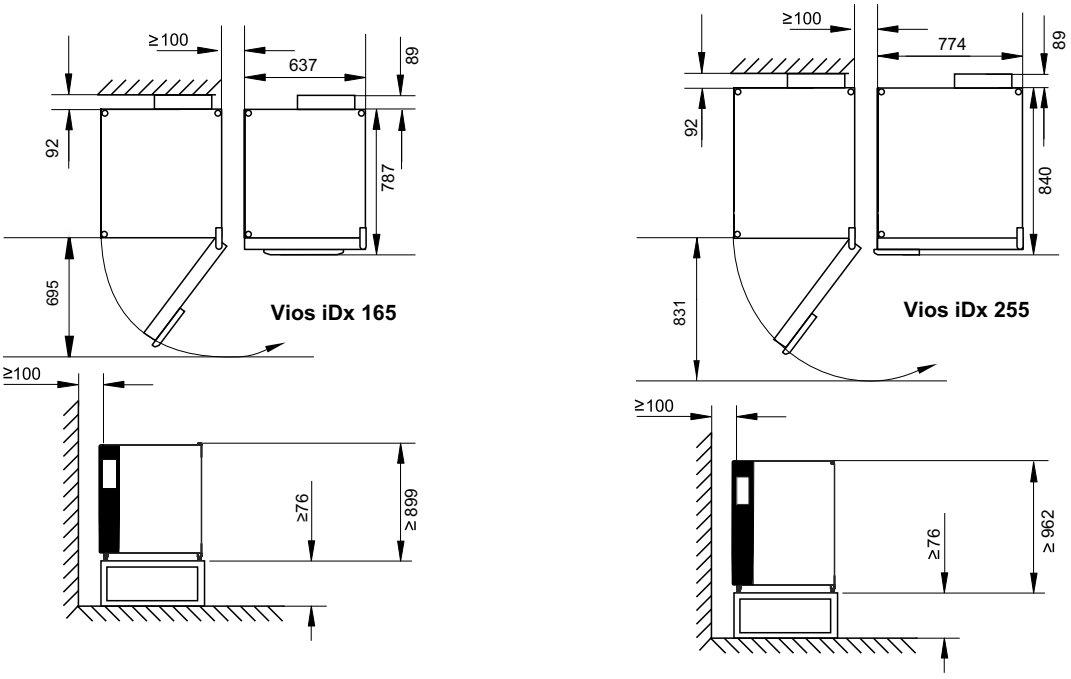

Figure 2-1. Device measurements (All dimensions in mm)

Note

Accessibility of the devices:

To ensure better accessibility for care and maintenance work, it is recommended to keep larger side and rear distances. In order to swing out the door, there must be a distance of ≥31 cm / 12.2" from the wall on the door hinge side of devices with a six-segment inner door and Cell Locker.

Transport

WARNING

Heavy loads! Lifting hazard!

- Never attempt to lift the incubator alone! This could result in strain injuries, such as sprains and intervertebral disc lesions.
- When lifting the incubator, always wear personal protective equipment such as safety shoes.
- To avoid crushing fingers or hands (particularly when closing the door) or damaging the incubator, do not use any lifting points other than those indicated in the figure below.

CAUTION

Lifting points:

- Only load the device at the lifting points marked in the figure.
- Do not lift the device by the doors or attached parts, such as the rear switch box.

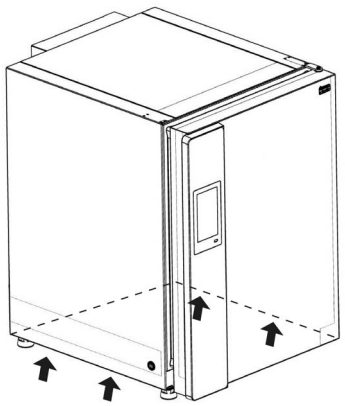

Figure 2-2. Lifting points

Stacking devices

WARNING

Risk of tilting and falling of stacked devices!

To avoid the risk of tilting of the device, the support frame must be mounted on a wall of the building that is capable of bearing the load of the stacked devices. The installation must be carried out by qualified personnel only. To attach the support frame to the building structure, use appropriate screws and wall plugs with a load rating of at least 25 kg.

CAUTION

Moving stacked devices:

- Before moving stacked devices, be sure to remove the support frames!
- Only move stacked devices on a mobile base frame in rooms with an even floor without slopes.

CAUTION

- When installing the stacking adapter plate and stacking the devices, follow the assembly instructions included with the stacking adapter.

CAUTION

Transporting stacked devices!

Stacking elements are not connection elements. Stacked devices on a mobile base frame may only be moved inside rooms on even floors without any slopes.

CAUTION

Fastening on mobile base frames:

If you place the devices on mobile base frames, you must ensure that the casters are locked with a parking brake during operation of the incubators and that the casters are facing forwards for greater stability.

CAUTION

Condensate formation during the operation of stacked devices

In general, when operating stacked devices of the **Vios iDx 165/255** type, an adapter plate must be used as thermal separation. If stacked devices are operated at an ambient temperature of more than 28°C (82.4 °F), an overtemperature alarm is triggered on the upper device while the Steri-run sterilization cycle is running on the lower device. Condensate formation may then occur on the upper device.

The Vios iDx 165/255 devices are suitable for stacking a maximum of two devices of the same device type. For this purpose, an optional stacking adapter (Figure 2-3, 1) is used between the two devices.
Optionally, a mobile base frame (Figure 2-3, 2) is available for moving the devices.

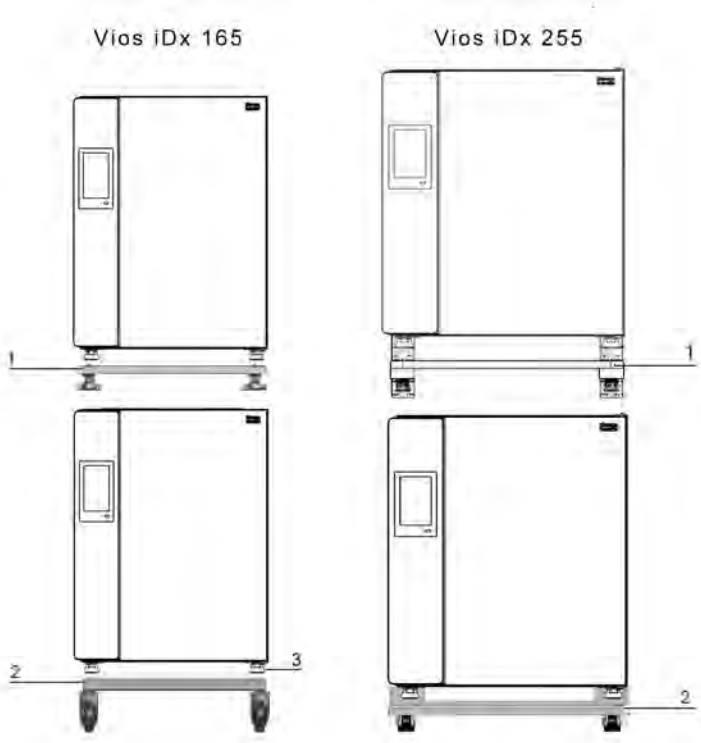

Figure 2-3. Stacking devices

1. Place the lower device with the device feet (Figure 2-3, 3) on the stacking elements (Figure 2-4, 1) or on the top of the mobile base frame (Figure 2-4, 2).

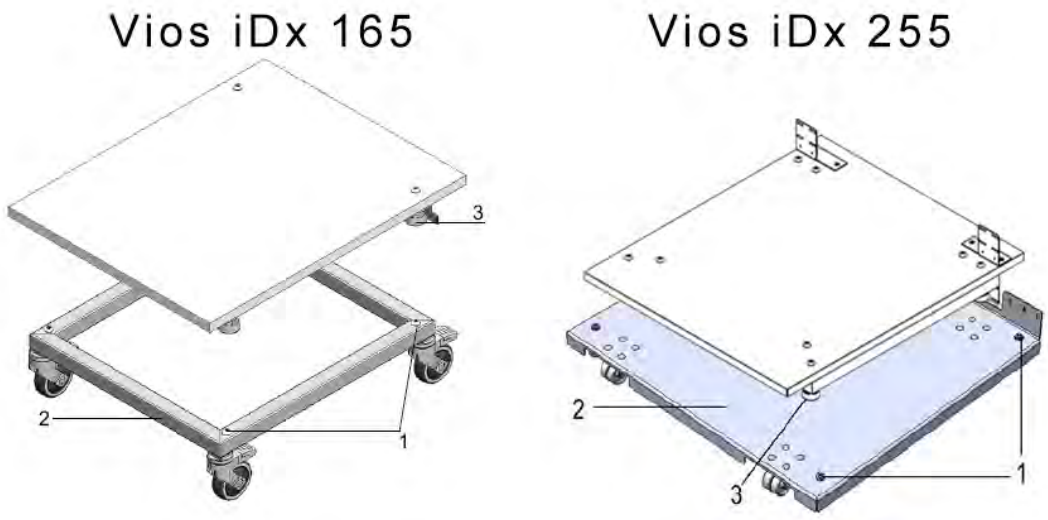

Figure 2-4. Stacking frame and base frame with stacking elements

2. Place the adapter plate (Figure 2-5, 7) with the underside on the top of the lower device (Figure 2-5, 8).
3. Align the holes in the connection tab (Figure 2-5, 9) of the adapter plate (Figure 2-5, 7) on both sides with the holes in the rear wall of the lower device (Figure 2-5, 8).

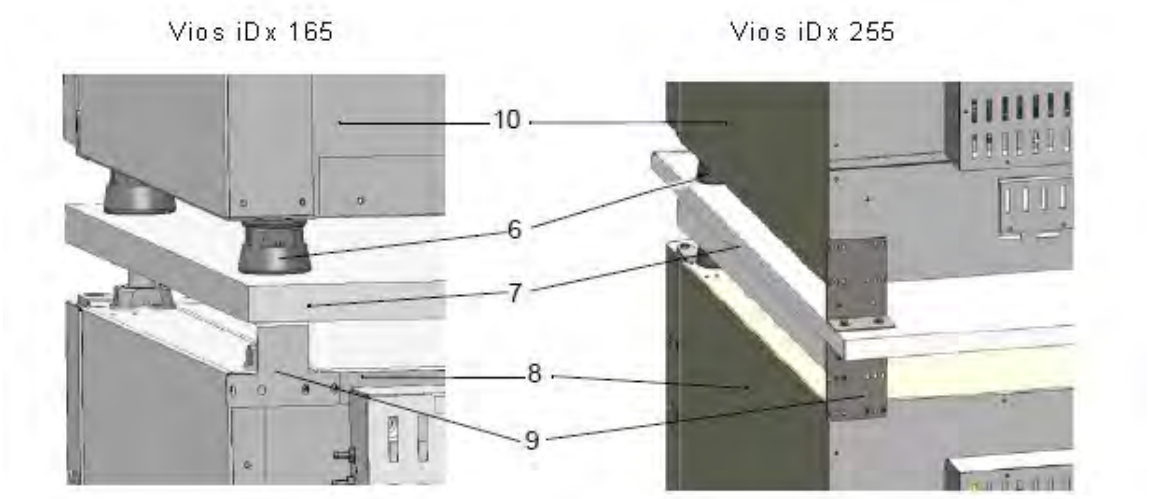

Figure 2-5. Screwing the adapter plate to the lower device

4. Screw the adapter plate (Figure 2-5, 7) to the rear wall of the lower device using the fastening screws provided (Figure 2-5, 8).
5. Attach the adapter plate (Figure 2-5, 7) to the other corner of the device using two screws.
6. Place the device to be stacked with the device feet (Figure 2-5, 6) on the stacking elements (Figure 2-4, 1) on the top of the adapter plate.

The devices are fixed to each other by the weight of the adapter plate (Figure 2-5, 7) and the upper device (Figure 2-5, 10).

7. Remove the four screws at the top rear edge of the top device; see arrows in Figure 2-6.

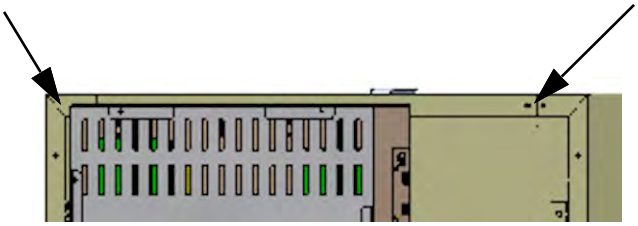

Figure 2-6. Removing the screws for the support frames

8. Bend both ends of the support frames (Figure 2-7, 4) by an angle of approximately 90° to obtain two right-angled tabs.
9. Use the four screws to secure the support frame to the back of the device, with the tab facing downward on the side of the device.
10. Make sure that the stacking feet of the upper device are correctly aligned on the stacking adapter.
11. Secure the support frames to a load-bearing structural part of the building using suitable mounting equipment, such as wood screws and dowels.

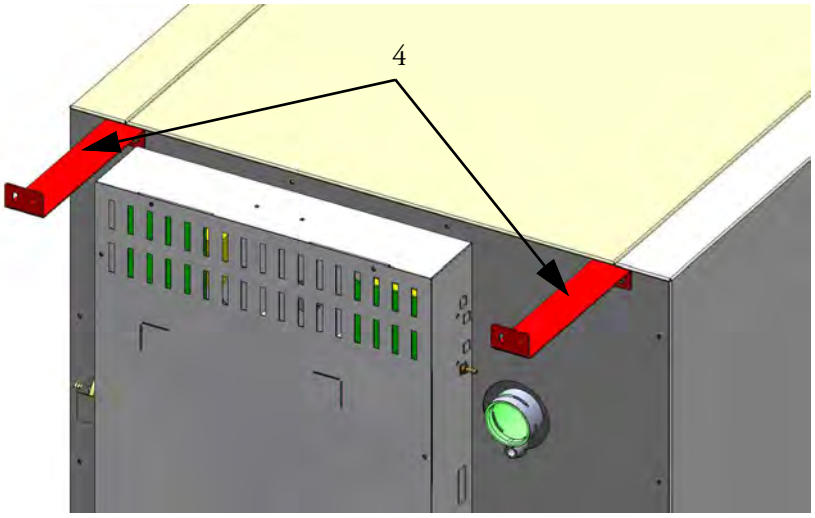

Figure 2-7. Mounting the support frames

Stacking variants

Possible stacking combinations		Lower stacking position			
		Vios iDx 165	Vios iDx 255	150i	240i
Upper stacking position	Vios iDx 165	501712144	50171746	50148172	
	Vios iDx 255		50171746		50148175

For further information, refer to the stacking adapter kit assembly instructions.

Installing casters on the base frame

CAUTION

Ensuring stability

- Make sure that the base frame casters are locked during operation of the device and that the casters are facing forward.

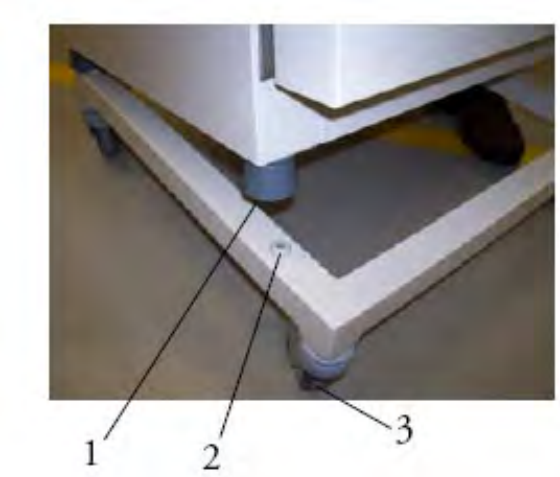

Figure 2-8. Base frame with casters, without feet (Vios iDx 165 version)

- Lock the base frame with the lever (Figure 2-8, 3) on the top of the casters.
- Place the feet of the device (Figure 2-8, 1) exactly on the 4 stacking plates (Figure 2-8, 2). To position the device, lift it only at the lifting points (Figure 2-2). Do not lift the device by the doors or components, such as the control box on the rear wall).

Installing casters and feet on the base frame

WARNING

The device must be moved with the greatest care. Careless braking or accelerating of the device may result in tilting from the base frame with casters.
Do not move the device with the door open. The base frame with casters should only be used near the installation location in the laboratory and not for transportation purposes.

WARNING

Ensuring stability

Ensure that the feet have been unscrewed and correctly adjusted after the device has been positioned in the desired location ("Adjusting the feet" on Page 2-12).

WARNING

Heavy loads! Lifting hazard!

For the prevention of strain-related injuries, e.g. sprains and intervertebral disc lesions, never attempt to lift the incubator alone!

To avoid injury through falling loads, be sure to wear personal protective equipment, such as safety shoes, when lifting the incubator. To avoid crushing your fingers or hands (particularly when closing the door) or damaging the incubator, use only the lifting points indicated in the figure above.

CAUTION

Please always screw in the feet of the assembled base frame completely before using it to move the incubator ("Adjusting the feet" on Page 2-12).

CAUTION

Only lift the instrument by the lifting points shown in the figure (Figure 2-2).

Figure 2-9. Base frame with casters and feet

1. Remove the six screws at the bottom rear side of the device. They will be replaced with the six new screws.
2. Place the device on the base frame, ensuring that the feet are correctly positioned. Make sure that the holes of the removed screws exactly align with the holes in the corners of the base frame.
3. Insert the six new screws and tighten them.

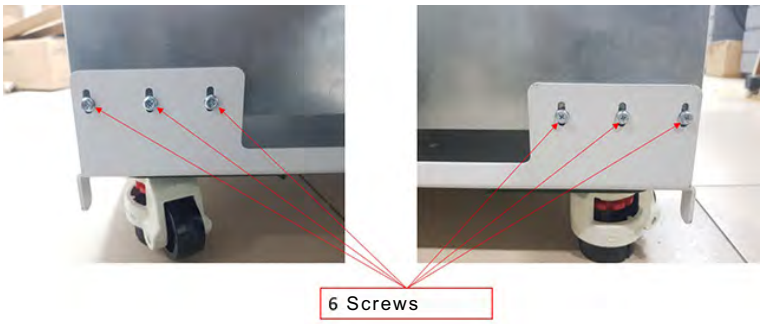

Figure 2-10. Screws on the rear of the device

4. Carefully push the base frame and the mounted device to the desired installation location.

5. Adjust the base frame by screwing the feet onto the adjustment wheel until it is horizontal.

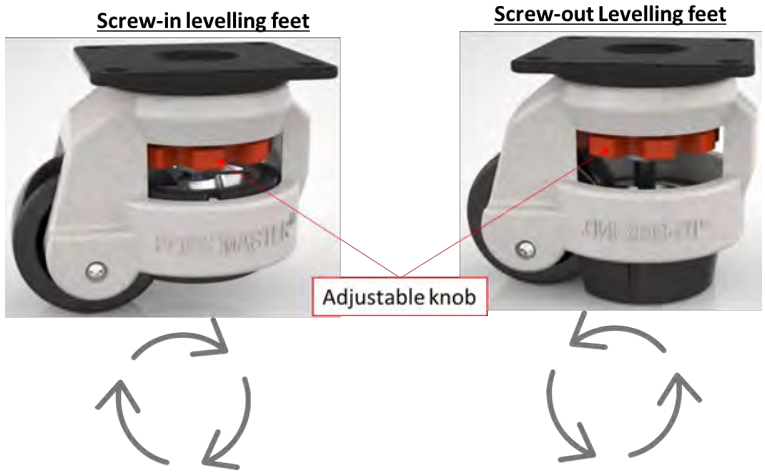

Figure 2-11. Adjusting the feet

Part number	Base frame options	Description
50170980		Base frame with casters for Vios iDx 165
50171152		Base frame with casters and feet for Vios iDx 165
50171157		Base frame with casters and feet for Vios iDx 255
50171568		Base frame for single chamber. Height: 780 mm (without casters) for Vios iDx 165
50171747		Base frame for single chamber. Height: 780 mm (without casters) for Vios iDx 255

Retrofitting/modifications

CAUTION

Modifications

Retrofitting and modifications may only be performed by the Technical Service of Thermo Electron LED GmbH.

The following components can be retrofitted to the standard version:

Vios iDx 165

- Threefold segmented inner door (the segmented inner door is installed instead of the glass door)
- Door hinge replacement on outer door and glass door
- Sixfold segmented inner door with Cell Locker
- Lockable outer door
- IR180Si Infrared (IR) CO_2 sensor (replaces the standard TC180 WLD sensor)
- 4-20 mA measurement data interface

Vios iDx 255

- Threefold segmented inner door (the segmented inner door is installed instead of the glass door)
- Door hinge replacement on outer door and glass door
- Lockable outer door
- Split insert shelves
- IR180Si Infrared (IR) CO_2 sensor (replaces the standard TC180 WLD sensor)
- 4-20 mA measurement data interface

Description of the device

Contents

Vios iDx 165/255 Front view

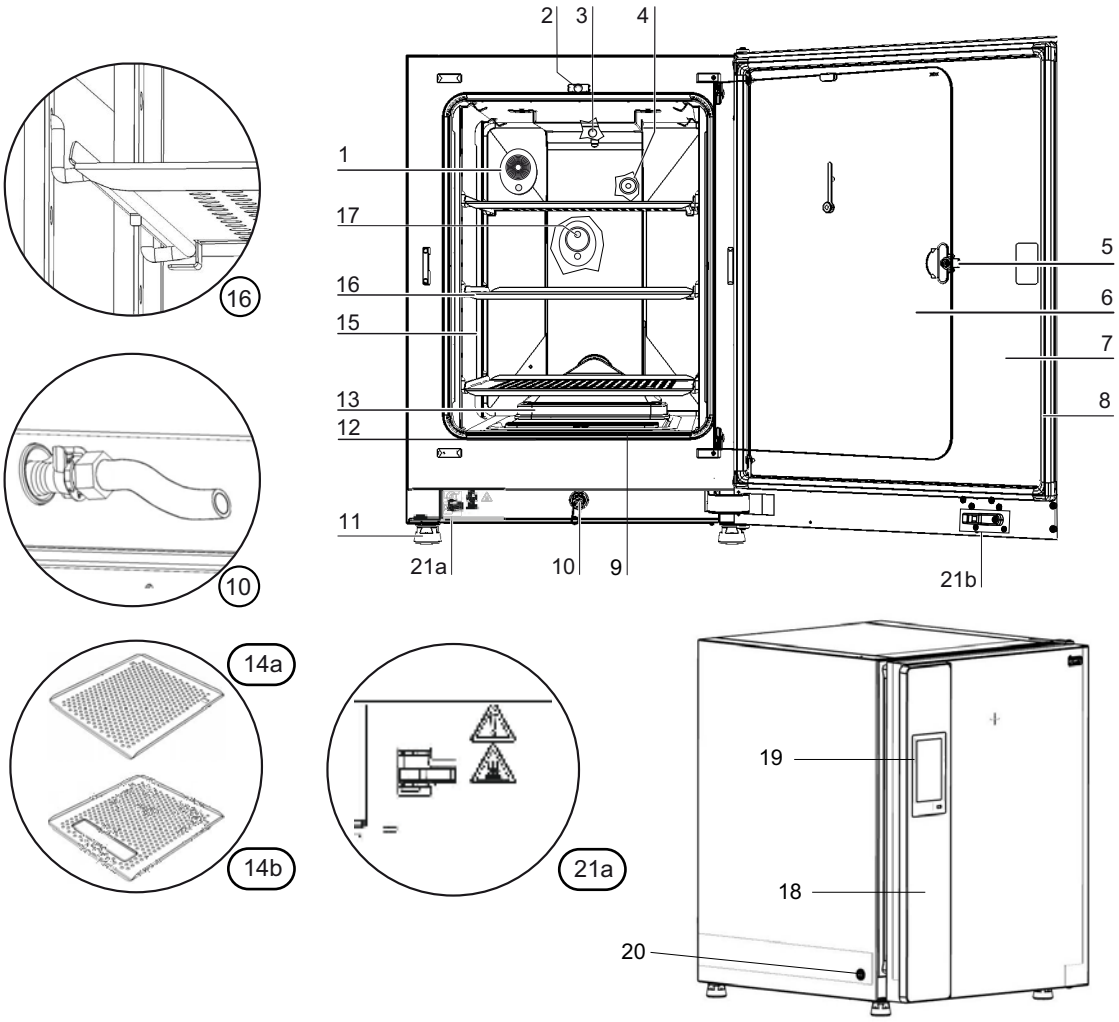

Figure 3-1. Vios iDx 165/255 Front view

Position	Unit
1	Pressure compensation opening/Access port with plug
2	Door switch for glass door
3	Temperature sensor
4	O_2 sensor (optional)
5	Handle of glass door or segmented inner door
6	Glass door or segmented inner door (optional)
7	Device door
8	Magnetic door seal, replaceable
9	Pre-filter
10	Water drain

Position	Unit
11	Foot, height-adjustable
12	Glass door seal, replaceable
13	Airbox with seal and HEPA filter
14	a/b shelves
15	Support rails
16	Shelf with support bracket
17	IR180Si CO_2 sensor
18	Door handle, outer door
19	iCAN2.0™ touchscreen (control panel)
20	Power switch
21	a = Electromechanical door lock / b - Closing hook on outer door (only on devices ordered with the optional door lock)

Vios iDx 165/255 Rear view

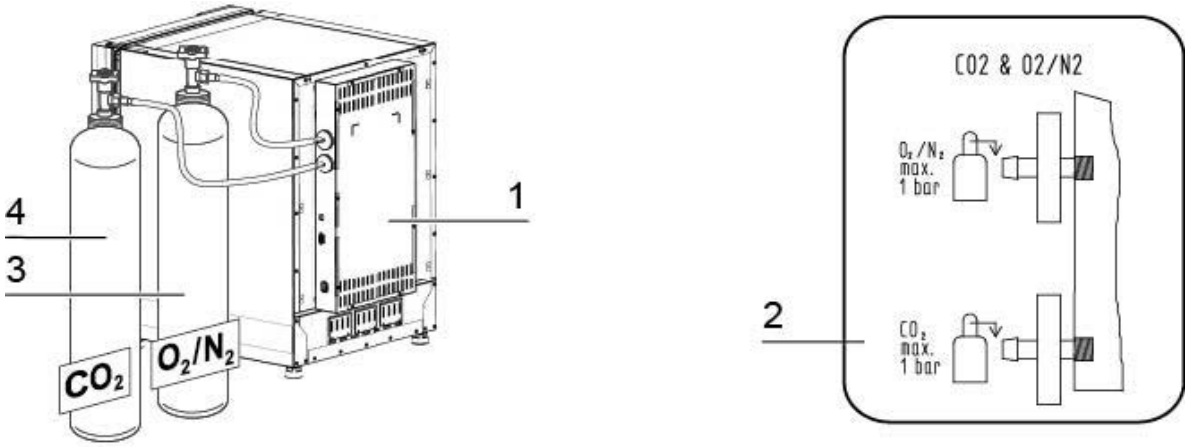

Figure 3-2. Vios iDx 165/255 Rear view

Position	Unit
1	Control box with supply interfaces for combined gas connection (optional) CO_2 and O_2/N_2
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 Vios iDx 165/255

The device is equipped with the following safety devices:

- A door switch interrupts the heating of the workspace and the gas supply for $CO_2/O_2/N_2$ when the glass door is opened.
- An overtemperature protection protects the cultures from harmful overheating in the event of faults.
- A pressure compensation opening ensures pressure compensation in the workspace.
- The alarm relay circuit uses acoustic and visual alarms to indicate errors during operation.
- The active CO_2 control function [1]ensures optimal CO_2 gassing of your cultures by lowering excessively high values. For this purpose, the pump in the control box is activated, which sucks in ambient air via the air intake port and thus ensures that the CO_2 values (increase due to CO_2 emission by your cultures) do not exceed the respective selected set value. The CO_2 control function does not need to be separately activated; it is always active when the device is switched on.

[1] Optional..

Workspace atmosphere

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

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

Temperature

For trouble-free operation, the temperature of the operating room must be at least 18°C (64.4 °F), and the incubation temperature must be at least 3 °C (37.4 °F) above the room temperature of the operating room.
The heating system controls the incubation temperature from this temperature threshold up to 55°C (131 °F). By heating the inner compartment with independent heating circuits and by separately heating the outer door in addition, condensation is prevented on the sidewalls and the ceiling of the workspace and the glass door or segmented inner door.

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:

- Maximum filling quantity for Vios iDx 165/255: 3 L.

Water quality recommendation

For trouble-free operation, the water reservoir must be filled with sterilized distilled water or water treated to an equivalent quality standard. The conductivity of the water should be within the range of 1 to 20 µS/cm (resistivity should be within the range of 50 kΩm to 1 MΩcm).

CAUTION

Termination of warranty!

Using chlorinated tap water or water additives that contain chlorine will void the manufacturer's warranty. The warranty is also voided if ultrapure water is used whose conductivity is outside the range of 1 to 20 µS/cm and whose resistivity is outside the range of 50 kΩcm to 1 MΩcm.
If you have any questions, please contact the Thermo Fisher Scientific Technical Service.

CAUTION

No tap or ultrapure water in the humidity reservoir

Sterile distilled water or water treated to an equivalent quality standard is recommended for use in the integrated water reservoir. The acceptable conductivity should be within the range of 1 to 20 µS/cm (resistivity should be within the range of 50 kΩcm to 1 MΩcm). The pH should be in the range of 7-9. Type 1 ultrapure water or deionized (DI) water with a resistivity approaching or equal to 18.2 MΩcm contains very few ions and will actively pull ions from interior components, damaging stainless steel, copper, and glass.

CAUTION

Do not use chloride-containing disinfectants.

While stainless steel is resistant to corrosion, it is not corrosion-proof. Many chemicals have a negative effect on stainless steel, especially chlorine and derivatives with oxidizing activity.
The addition of chloride-containing disinfectants or copper sulfate to the water as a constant disinfectant is not recommended, as these can damage the connecting discharge joint, which is made of a steel/copper alloy. To clean the inside, a mild soap and water solution is recommended for rinsing out to remove residues. Wipe the interior surfaces and parts with a diluted quaternary ammonium disinfectant. Then wipe with 70% alcohol to remove any remaining traces of the disinfectant.

Under normal operating conditions and at the usual incubation temperature of 37°C (98.6 °F), a constant relative humidity of approximately 93% is achieved in the workspace. If condensation forms on the culture containers due to high relative humidity, the humidity in the workspace can be set at a lower level. With the activation of the low humidity mode, the relative humidity in the workspace falls from approx. 93% to approx. 90%. The change requires an extended adaptation phase. To ensure that it effectively prevents the formation of condensation on culture containers, it must be used as a permanent setting.

Instructions for activating the Low Humidity function are given in section „Adjusting humidity” on page 10.

Pre-filter

A pre-filter is mounted on the front section of the water reservoir cover. 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 cycle, but is removed for filling the water reservoir.

HEPA filter and air duct

The air flow from the water reservoir to the workspace is channeled through a HEPA filter to minimize the risk of aerogenic contamination. The filter works with a capture rate of at least 99.95%@MPPS (HEPA filter quality). Smaller and larger particles are captured with even greater efficiency.

The HEPA filter (Figure 3-3, 2) is inserted into the airbox (Figure 3-3, 1) from below. The airbox sits on a base on the water reservoir cover (Figure 4-6, 2) and is pushed onto the fan inlet.

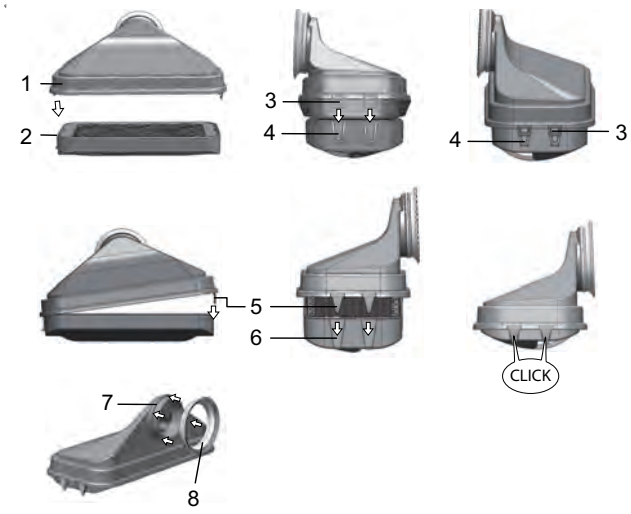

Figure 3-3. HEPA filter and airbox

Instructions for activating the HEPA filter can be found in section "HEPA configuration" on Page 6-19.

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

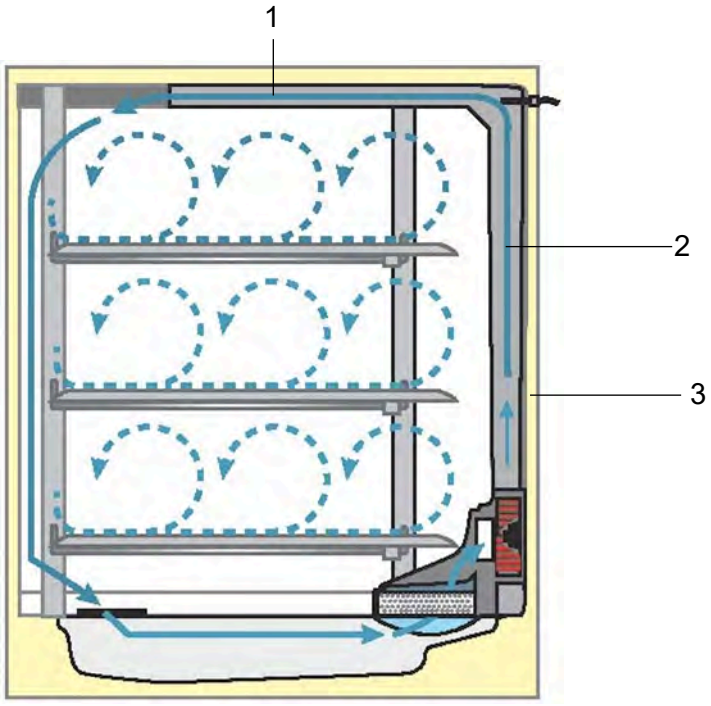

Figure 3-4. Air duct

The air duct consists of two fittings made of electropolished stainless steel or copper:

1. Ceiling duct (Figure 3-4, 1)
2. Rear wall duct (Figure 3-4, 2)
3. Rear wall of the workspace (Figure 3-4, 3)

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

Gas supply

Note

Please note that the inner diameter of the gas pressure tube for Vios iDx 165/255 should be 3.175 mm.

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 level of the workspace atmosphere.
The CO_2 level 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 min. 99.5%
- Medical gas quality.

O_2 supply

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

When operating at higher oxygen concentrations, the fire protection instructions in the "Preface" on Page 0-1 and in the section "Safety notes on gases" on Page 0-11 must be followed.

N_2 supply

If the oxygen content during operation is to be lowered to below 21% (air oxygen content), the workspace is supplied with nitrogen. The O_2 level in the workspace atmosphere can be controlled in this way, depending on the version of the sensor.

Door switch

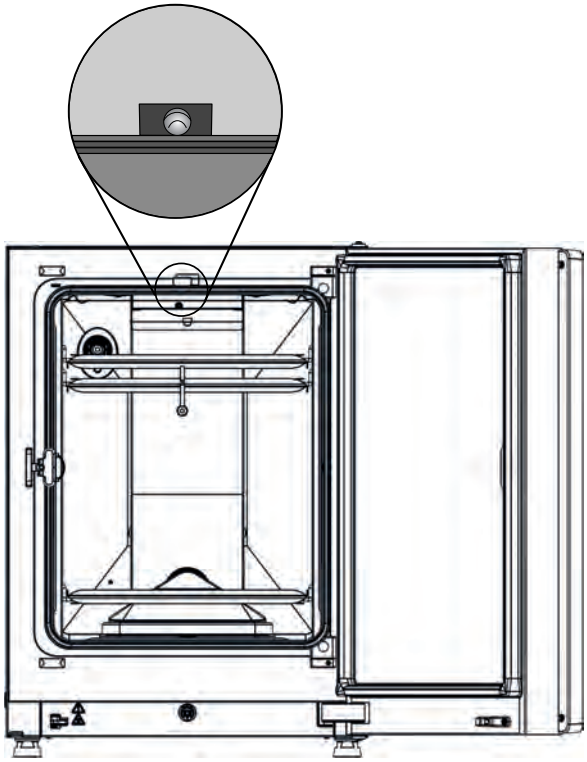

Figure 3-5. Door switch

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

Note

Version with segmented inner door:
For devices with the optional segmented inner door, the door switch function described above is activated as soon as the outer door is opened.

Sensors

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

- Sensor for measuring the workspace temperature and the overtemperature protection (Figure 3-6, 1).
- O_2 sensor (optional) for measuring the oxygen level of the workspace atmosphere (Figure 3-6, 2).
- CO_2 sensor for measuring the CO_2 level of the workspace atmosphere (Figure 3-6, 3). Depending on the configuration, a TC180 WLD sensor or IR180Si IR sensor (option) is mounted in this location.
- RH sensor for monitoring the humidity of the workspace atmosphere (Figure 3-6, 4). The RH sensor (option) teams up with the TCD180 WLD sensor to provide humidity compensation and is not present on units operated with an IR180SI IR sensor.

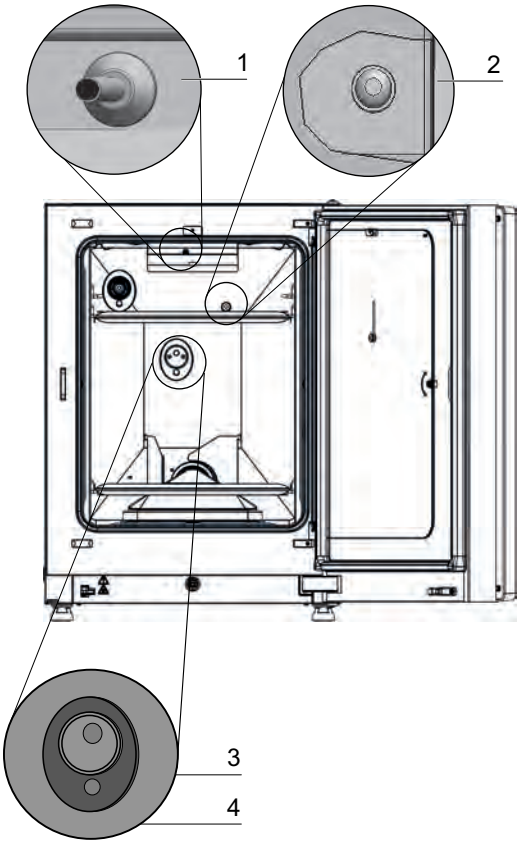

Figure 3-6. Temperature, O_2, CO_2, and humidity sensors

- The water level sensor (Figure 3-7, 1) alerts the user when the water reservoir (Figure 3-7, 2) needs to be refilled. If the water reservoir falls to 0.5 L, the message **Error - RH - No water** appears in the **RH** field of the display (see also "Error messages" on Page 6-46).

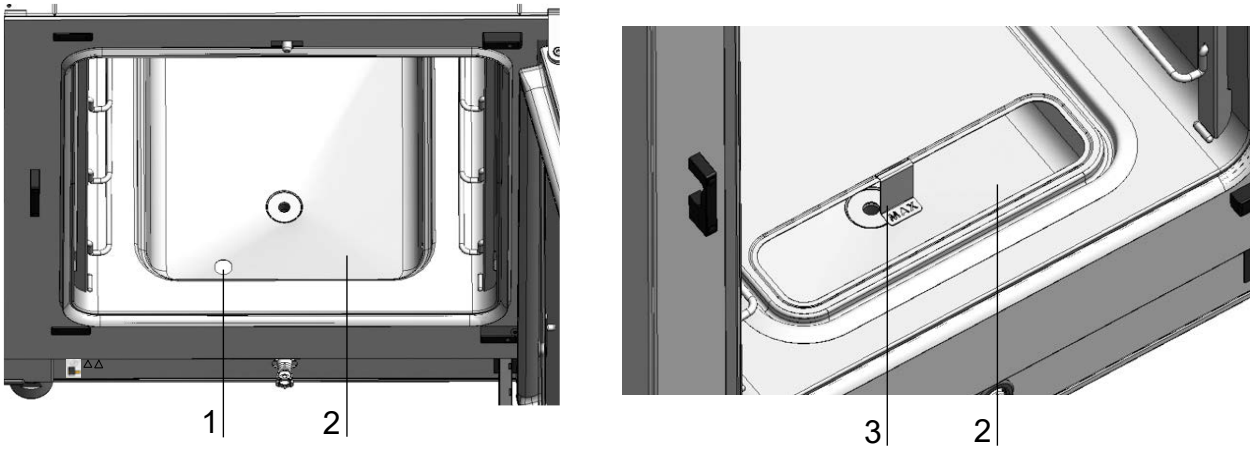

Figure 3-7. Water level sensor

– Additionally, a mechanical/visual indicator of the maximum water level is available to assist the user in filling the water reservoir (see Figure 3-7, 3).

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

The overtemperature protection feature is factory-preprogrammed and may only be changed by trained service personnel. It protects the stored cultures from overheating. If the set temperature is exceeded by more than 1°C (33.8 °F), the over-temperature protection is activated and the workspace temperature is automatically reduced to the selected set value. Incubation mode is thus continued even in the event of a fault. Any activation of the overtemperature protection simultaneously triggers a visual alarm. If the overtemperature protection is activated:

– an error message (Temp. actual value high) and a buzzer are issued,
– the alarm relay responds.

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

Supply interface

Standard interfaces

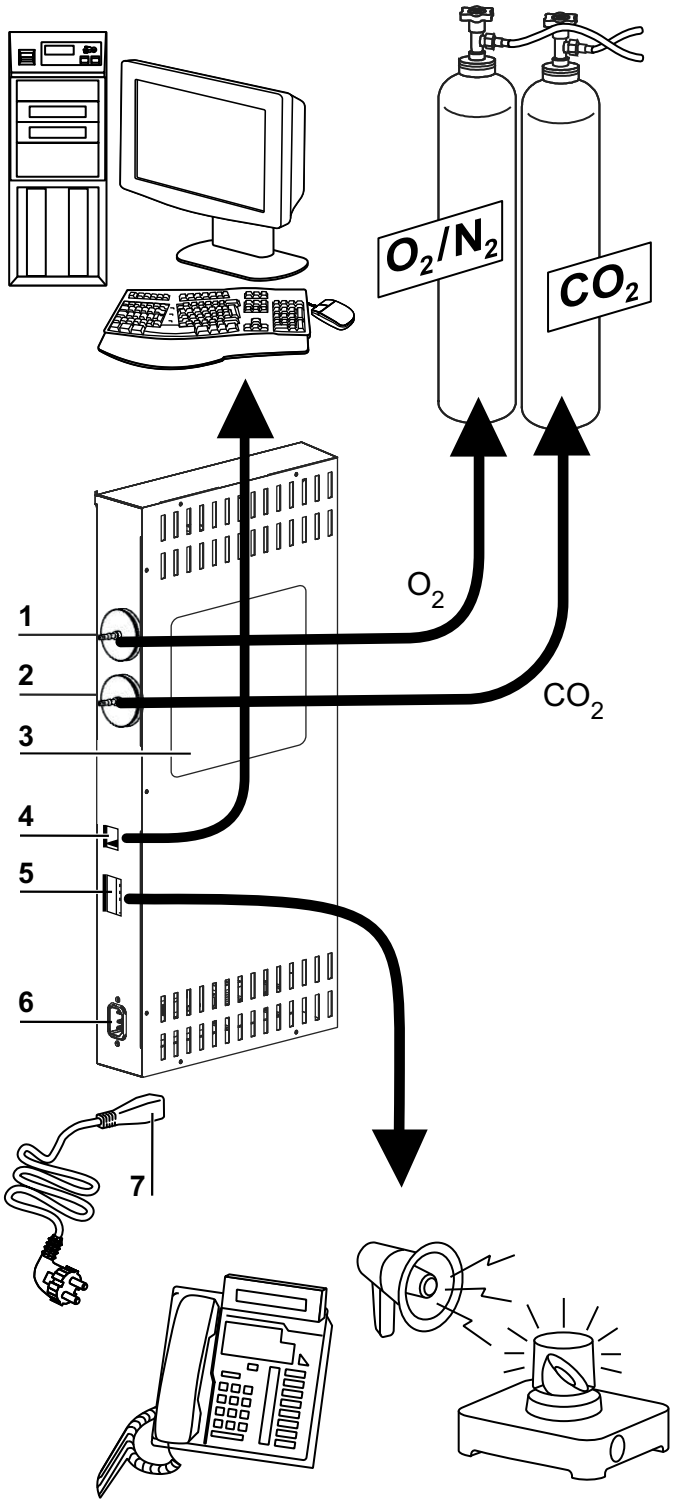

Figure 3-8. Device interfaces (right side of control box)

All supply connections are installed at the supply interface (control box) on the back of the device.

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

1. O_2 connector
2. CO_2 connector
3. Label
4. USB interface
5. Alarm contact
6. Power connection
7. Mains plug

Optional interfaces

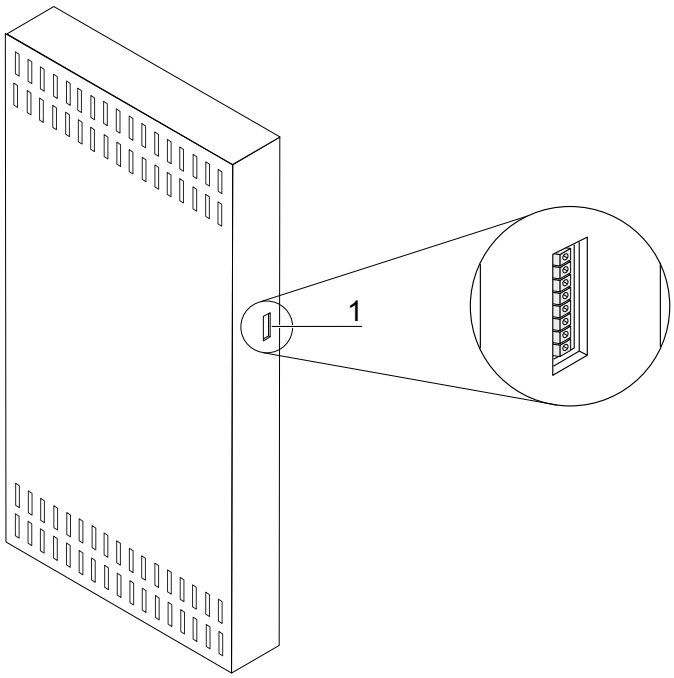

Figure 3-9. Optional device interfaces (left side of control box)

The connectors on the left side (Figure 3-9) are only available with devices equipped with the respective options:

1. 4...20 mA interface (optional)

Gas connections

The gas supply lines between the device and the gas supply system are connected through the supplied connecting hoses. CO_2 and O_2/N_2 are supplied to the device through connectors (Figure 3-8, 2, and 3, as well as Figure 3-9, 3). All process gasses must be supplied to the device at a fixed, pre-set, unchangeable pressure in the range of min. 0.8 and max. 1.0 bar. Before the gases are fed into the workspace, they flow through a gas inlet filter with a separation rate of 99.998% for a particle size of 0.3 µm.
The figure shows the combined gas connection (optional).

Label

The label (Figure 3-8, 4) contains information about gas supply, an alarm contact connection legend, and notes about the electrical fusing of the device.

USB interface

The USB interface (Figure 3-8, 5) makes it possible to connect the incubator to a PC. This connection - USB 1.1 / USB 2.0 / USB 3.0 full speed compatible - allows fast (and temporary) access to the major operating parameters (temperature, $CO_2/O_2/N_2$ concentration, error codes, etc.).

4-20 mA Interface

The optional 4-20 mA interface (Figure 3-9, 2) converts the digital actual values displayed for temperature, CO_2 concentration, and O_2 concentration (optional) into a continuous output current of 4-20 mA each. This is accomplished by a microprocessor supported by a 4-channel D/A converter. The D/A converter provides a resolution of 16 bit per channel, equivalent to 65536 incremental values.

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

The table below lists the output signals:

Channel No.	Issued parameter (actual value)	Resolution	Measurement range	Output signal
1	Temperature	0.08 mA/°C 0.044 mA/°F	0...200 °C (32..392 °F)	4...20mA
2	CO_2 concentration	0.8 mA/%	0...20% CO_2	4...20mA
3	O_2 concentration*	0.16 mA/%	0...100% O_2	4...20mA
4	Free			

Parameters marked with an asterisk “*” are only issued if the respective option is installed.

The measured values are governed by the following function:

$$DV = MR * (OS - I_0) / (I_{max}-I_0)$$

DV = displayed value (in °C or %)

MR = measurement range (in mA / °C or mA / %)

OS = output signal (in mA)

I0 = 4 mA

Imax = 20 mA

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

Current	Meaning
4 mA	The measured value is less than or equal to the minimum value of the measurement range.
20 mA	The measured value is greater than or equal to the maximum value of the measurement range.
2 mA	The device is fully functional, but there is no valid measured value available (e.g. the optional sensor is not installed, the device is in the heating phase, or similar).
0 mA	Error

The four 4-20 mA output signals are broken out onto a disconnectable, 8-pin terminal block (3,5 mm). The mating connector is delivered as a standard accessory. The pin assignment is shown in the following table.

Pin No.	Channel description
1	Channel 1: temperature
2	Channel 1 ground
3	Channel 2: CO2
4	Channel 2 ground
5	Channel 3: O2
6	Channel 3 ground
7	Channel 4: free
8	Channel 4 ground

Alarm contact

Note

Alarm contact:

The alarm contact responds to all errors reported by the control loops (see section Error messages).

The device can be connected to an external reporting system provided by the customer (e.g. telephone system, building management system, visual or acoustic alarms).
For this purpose, a potential-free alarm contact is preinstalled in the device. This contact is led out of the control box on the back of the device (Figure 3-8, 6).

Power connection

The device is connected to the power supply using a cable with an IEC connector plugged into the IEC socket in the control box (Figure 3-8, 7). The mains plug must be easily identifiable by the user and freely accessible at all times.

Workspace components

CAUTION

The HEPA filter cartridge is only resistant to temperatures up to 60°C (140 °F), is not autoclavable, and must be removed prior to the Steri-Run sterilization cycle.

Inner chamber

The incubator workspace is designed in such a way that any contamination that could prove detrimental to incubation operation is excluded. This is achieved by preventing the formation of condensation and by using a HEPA filtration system built into the workspace, which protects the water supply used for humidification without compromising the area that can be used for incubating the cultures and ensures clean room air quality in accordance with ISO 5.

Materials of the inner chamber

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

Depending on the material of the inner 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 heat-resistant plastic material and must remain installed while the Steri-Run sterilization cycle is run.

Note

Oxidation of copper components:
Exposure to heat and humidity leads to oxidation of the 100% copper material of the inner chamber. This results in discoloration of the copper components during the test run in the device check.
Do not remove the oxide layer when performing routine cleaning, as the anti-microbial effect of the copper material is intensified by the oxidized patina.

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

Glass door and optional segmented inner door

The standard version of the Vios iDx 165/255 devices are equipped with a single-locking door made of single-pane safety glass.

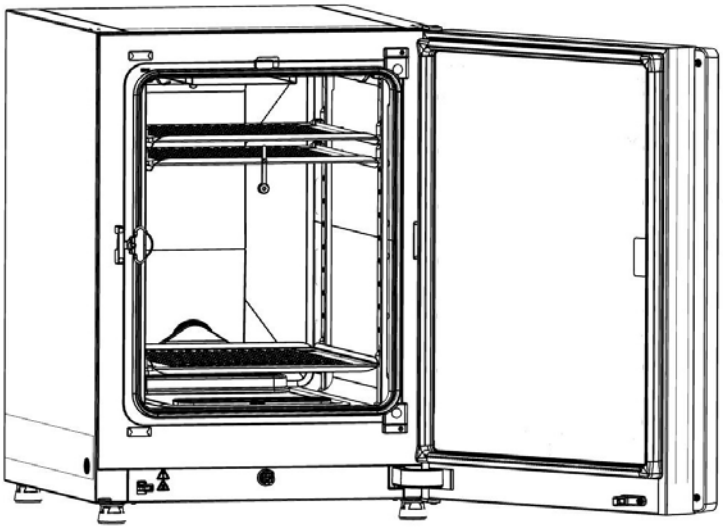

Figure 3-10. Vios iDx 165/255 with glass door

Devices equipped with the optional segmented inner door have a far lower risk of contamination due to the significantly smaller opening cross-sections when accessing the cultures and achieve shorter recovery times for the incubation parameters:

- Workspace temperature,
- CO_2 concentration
- O_2/N_2 concentration,
- Relative humidity

The following segmented inner doors are available as optional equipment variants:

- Vios iDx 165: threefold segmented inner door (see Figure 3-11), Optional sixfold segmented inner door with Cell Locker (see Appendix)
- Vios iDx 255: sixfold segmented inner door

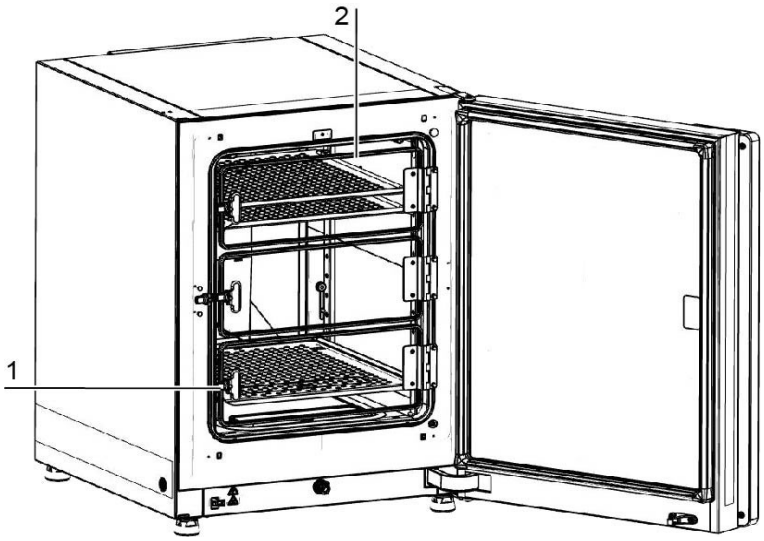

Figure 3-11. Vios iDx 165 with three-segment inner door

Each glass door of the segmented inner door (Figure 3-11, 2) possesses its own locking (Figure 3-11, 1).

Water reservoir

The water reservoir is integrated into the floor of the inner chamber and is separated from the workspace by means of a cover. A drain (Figure 3-12, 2) provided in the front section of the water reservoir permits quick draining through the fill and drain valve (Figure 3-12, 3) located at the front section of the device.

In the front area of the water reservoir cover, a pre-filter (Figure 3-12, 4) is mounted. The pre-filter consists of a dual-layer wire mesh with a silicone frame and is autoclavable and heat-resistant. The pre-filter must remain installed in the device during the Steri-Run sterilization cycle, but is removed when filling the water reservoir.

Further information on filling with the sixfold segmented inner door can be found in the Appendix.

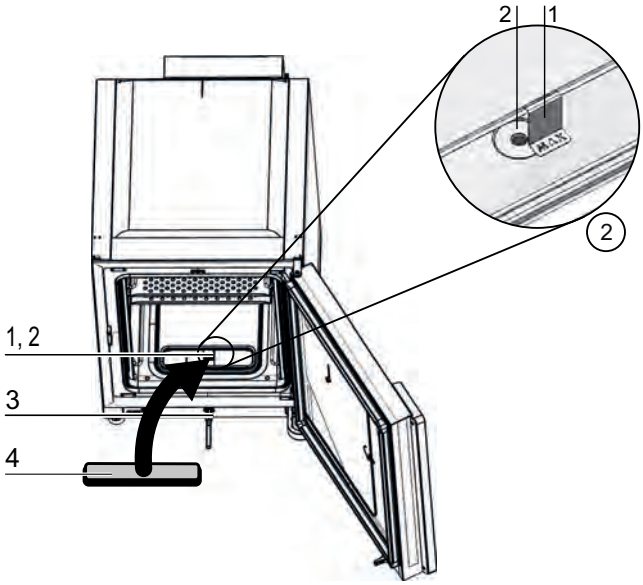

Figure 3-12. Water reservoir

The water reservoir is monitored by the water level sensor described in the section "Sensors" on Page 3-11 .

A fill level indicator labeled “MAX” (Figure 3-12, 1) is suspended in the water reservoir as a mark for the maximum fill level. The maximum permissible fill volume of the water reservoir is 3 L.

In order to minimize interference with the workspace atmosphere when water is changed during incubation, the device has a quick-drain valve at the front. Plugging the drain tube supplied into the quick-drain valve at the front starts draining immediately.

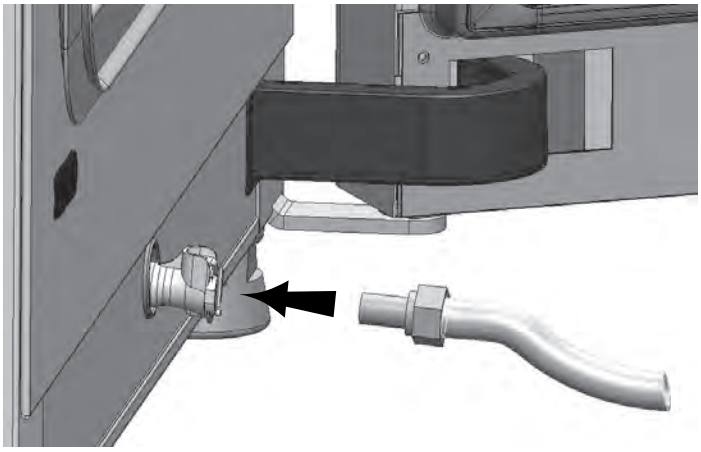

Figure 3-13. Fill and drain valve of the water reservoir

Heating system

The workspace is heated by a surface heating system. The arrangement of the heating elements ensures that the formation of condensation above the water reservoir is largely prevented.
The outer door of the device and the perimeter of the door opening are also heated. The heat radiated onto the interior glass door prevents the formation of condensation.
The workspace of the device always remains visible, despite high humidity.

Rear panel openings

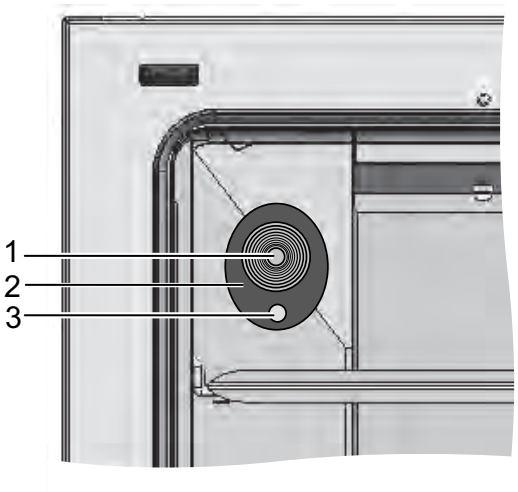

Figure 3-14. Rear panel openings

The pipe opening with insert (Figure 3-14, diameter 42 mm) which can be closed with a plug (Figure 3-14, 1) enables the installation of cables, hoses, or additional sensors in the device workspace.

The pressure compensation opening (Figure 3-14, 3) below the access port in the rear wall of the device ensures pressure compensation between the device workspace and the operating room.

Note

Operating conditions:

When accessories are used 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. Introducing additional sources of heat into the workspace can lead to the formation of condensation (e.g. on the glass door).

Introduced energy	Beginning of the temperature control range	
	Generally	Example: RT* = 21°C (69.8 °F)
0 W	RT + 3°C (37.4 °F)	24°C (75.2 °F)
5 W	RT + 6.5°C (43.7 °F)	27.5°C (81.5 °F)
10 W	RT + 9.5°C (49.1 °F)	30.5°C (86.9 °F)
15 W	RT + 13°C (55.4 °F)	34°C (93.2 °F)
20 W	RT + 16°C (60.8 °F)	37°C (98.6 °F)
*RT = Room temperature		

Shelf system

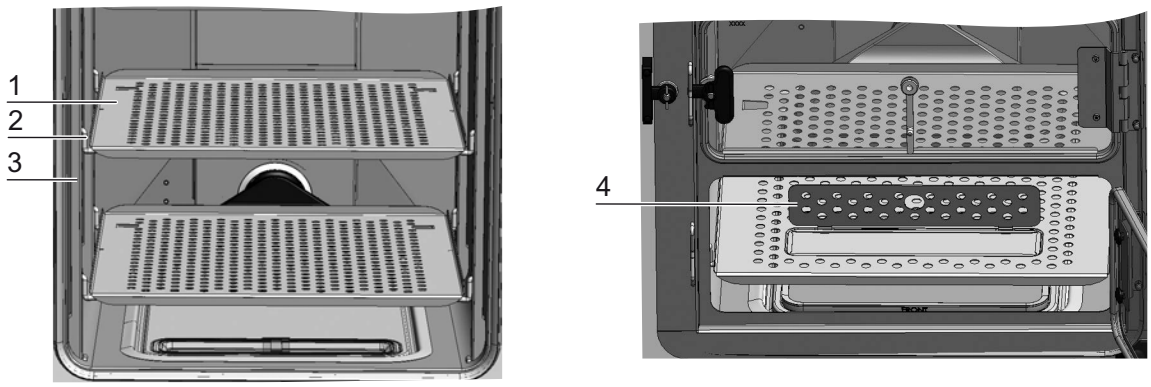

Figure 3-15. Shelf system components

The supporting rails (Figure 3-15, 3) of the shelving system must be perforated at intervals of 42 mm. The support brackets (Figure 3-15, 2) can thus be used variably for any required culture vessel size. A tilt protector and pull-out limiter are incorporated into the shelves ((Figure 3-15, 1). The Vios iDx 165/255 devices come with a lower shelf with a filling cut-out (Figure 3-15, 4). The shelving system is discussed in detail in the chapter "Start-up" on Page 4-1.

Further information on the use of the shelf system with a sixfold segmented inner door can be found in the Appendix.

Electromechanical door lock kit

The electromechanical door lock kit consists of a rotary latch (detail A in Figure 3-16) driven by a built-in motor, a built-in mechanical emergency release lever (detail C), and a locking hook (detail B) mounted on the inner side of the door.

The door lock kit is a safety device that prevents access to the incubator workspace during the Steri-Run sterilization cycle. This safety device locks the incubator door as soon as the workspace temperature reaches/exceeds 65°C (149 °F). On completion of the Steri-Run sterilization cycle, the door lock kit unlocks the door shortly after the temperature drops below 65°C (149 °F).

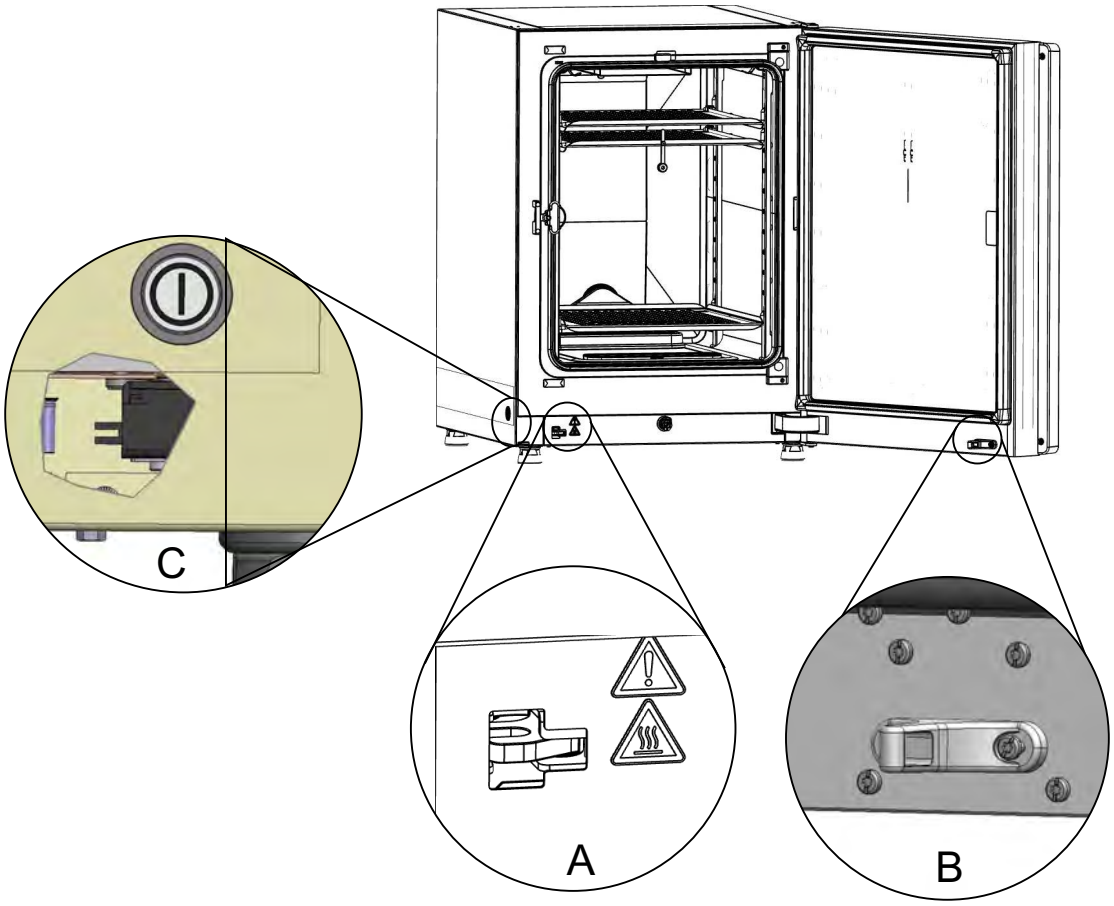

Figure 3-16. Door lock lever and emergency release

When a power failure occurs, the latch stays in its current position. When power returns, and the decontamination routine continues, the latch unlocks the door automatically when the temperature drops below 65°C (149 °F). If necessary, the door may be unlocked at any time by pulling the emergency release lever (C) towards the side wall. The emergency release lever is located on the underside of the incubator next to the power switch. Detail C in Figure 3-16 shows a section view through the side wall to illustrate the position of the lever.

Start-up

Contents

Acclimatizing the device

CAUTION

Acclimatize the device!

Prior to start-up, allow sufficient time for the device to acclimatize.

- Before switching on, stand the instrument for approximately 2 h in the operating room at the expected operating room temperature.
- Open the instrument doors.

Preparing the workspace

CAUTION

Observe the notes and technical data in the manuals delivered with replacement parts or accessories. The instructions or technical data may differ from those stated in this manual.

Note

Disinfection:
Details of the cleaning and disinfection of the device are described in a separate chapter (see "Cleaning and disinfection" on Page 8-1).

Upon delivery the CO_2 incubator is not in a sterile state. Prior to starting operation, the device must be cleaned and disinfected.
In addition, the following workspace components must be previously cleaned and disinfected:

- Support rails
- Support bracket
- Pre-filter
- Air duct
- Airbox
- Insert shelves
- Workspace surfaces
- Glass door seal
- Glass door/segmented inner door

Installing the “MAX” fill level Indicator and the pre-filter

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

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

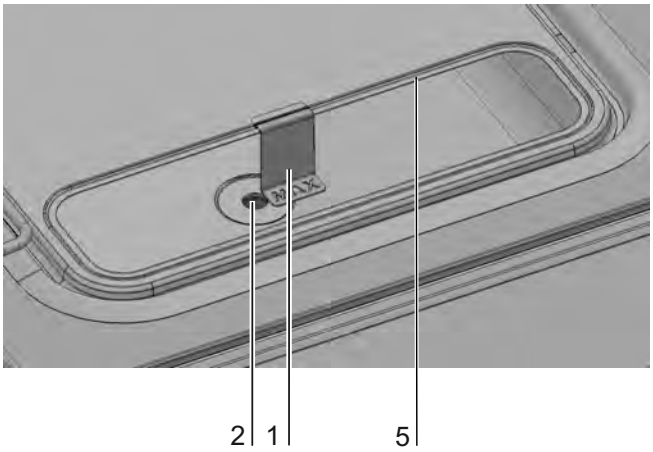

Figure 4-1. “MAX” fill level indicator

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

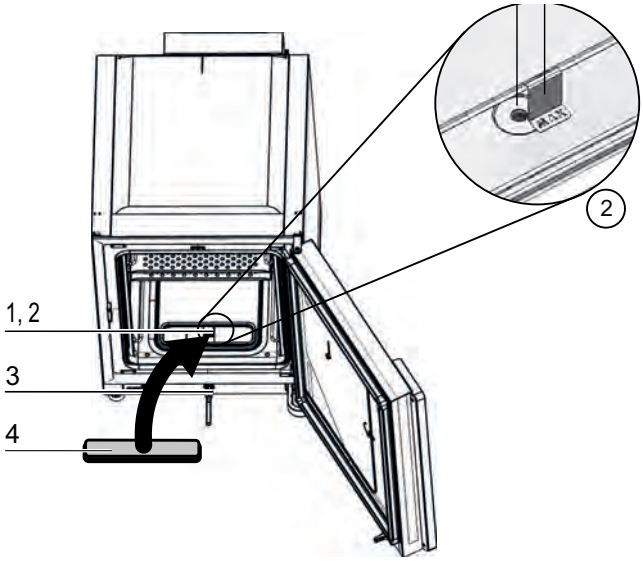

Figure 4-2. “MAX” Fill Level Indicator and pre-filter

Air duct

Components of the air duct

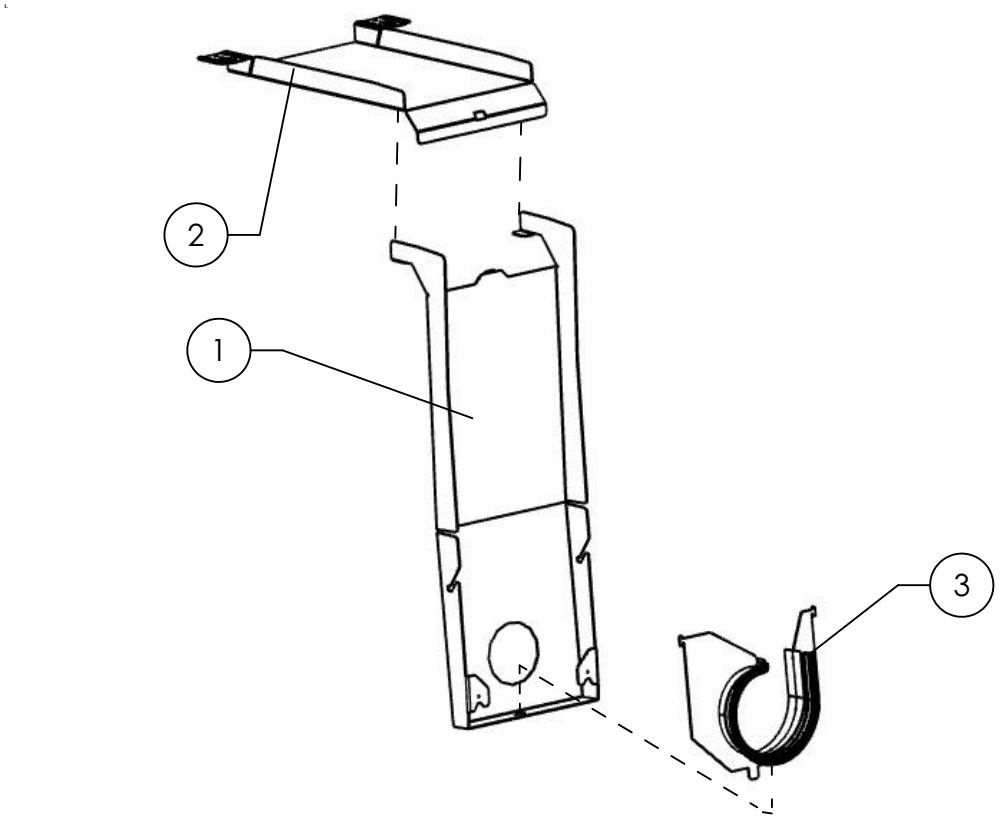

Figure 4-3. Air duct parts Vios iDx 165/255

Pos.	Name
1	LLB rear wall (replacement part includes 3 and 4)
2	LLB ceiling duct
3	Compressor plate with spiral seal profile

Installation of the air duct

Note

For Vios iDx 165 versions, do not remove the air duct seals before the rear wall is installed. The air ducts on the rear wall are important for correct airflow into the Vios iDx 165 versions with a stainless steel inner chamber.

1. Join the top part (Figure 4-4, 1) of the air duct to the back part (Figure 4-4, 2) according to Figure 4-4, steps A-E. When doing so, make sure that the positioning tab on the back part snaps into the corresponding square hole in the base part at step C in Figure 4-4.
2. Place the bar at the foot of the back part (Figure 4-4, 2) on the two stud bolts on the rear wall and tilt the air duct backwards.

3. Latch the keyholes at the sides on the upper part (Figure 4-4, G) in the retaining screws in the workspace ceiling.

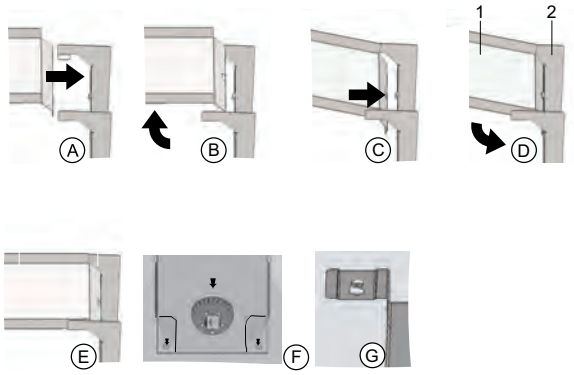

Figure 4-4. Assembling the air duct

Installing the HEPA filter and water reservoir cover

The HEPA filter (Figure 4-5, 2) is inserted into the airbox (Figure 4-5, 1) from below. The airbox sits on a base on the water reservoir cover (Figure 4-6, 2) and is pushed onto the fan inlet.

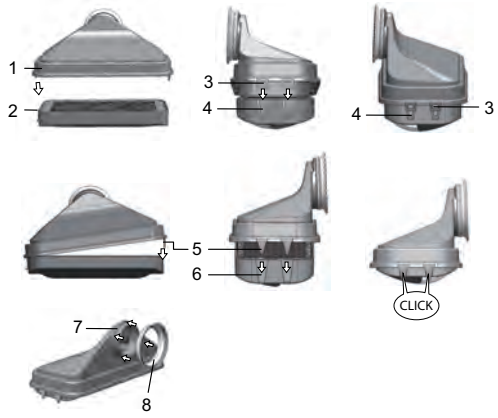

Figure 4-5. Assembling the HEPA filter and the airbox

1. Place the HEPA filter (Figure 4-5, 2) on a flat surface.
2. Tilt the airbox (Figure 4-5, 1) to the left and insert it with the tabs on the left side (Figure 4-5, 3) into the corresponding grooves in the HEPA filter (Figure 4-5, 4).
3. Snap the tabs (Figure 4-5, 5) on the right side of the airbox into the notches (Figure 4-5, 6)) of the HEPA filter.
4. Insert the seal (Figure 4-5, 8) into the groove (Figure 4-5, 7) on the pipe socket of the air box and press it tight all around.

5. Mount the airbox (Figure 4-6, 1) onto the base (Figure 4-6, 2) of the water reservoir cover.

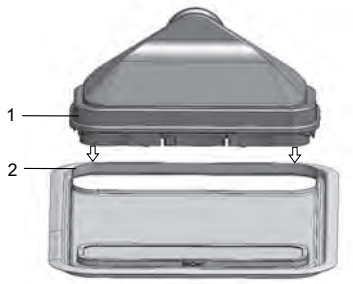

Figure 4-6. Mounting the airbox on the water reservoir cover

6. Place the water reservoir cover on the workspace floor.
7. Lift the water reservoir cover at the front and push it towards the rear wall (Figure 4-7, 1).

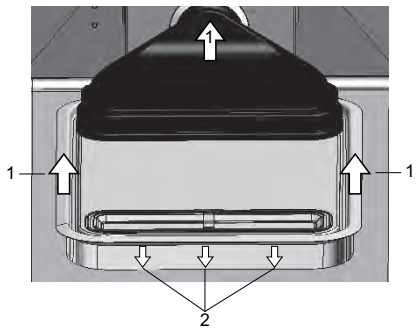

Figure 4-7. Installing the airbox

8. Push the water reservoir cover towards the rear wall until it stops. The cover slides into its final position in the reservoir, and the pipe socket of the airbox slides into the fan outlet.
9. Slide the leading edge of the water reservoir cover into the reservoir (Figure 4-7, 2). The airbox tubing slides into the fan outlet.

Installing the shelf system

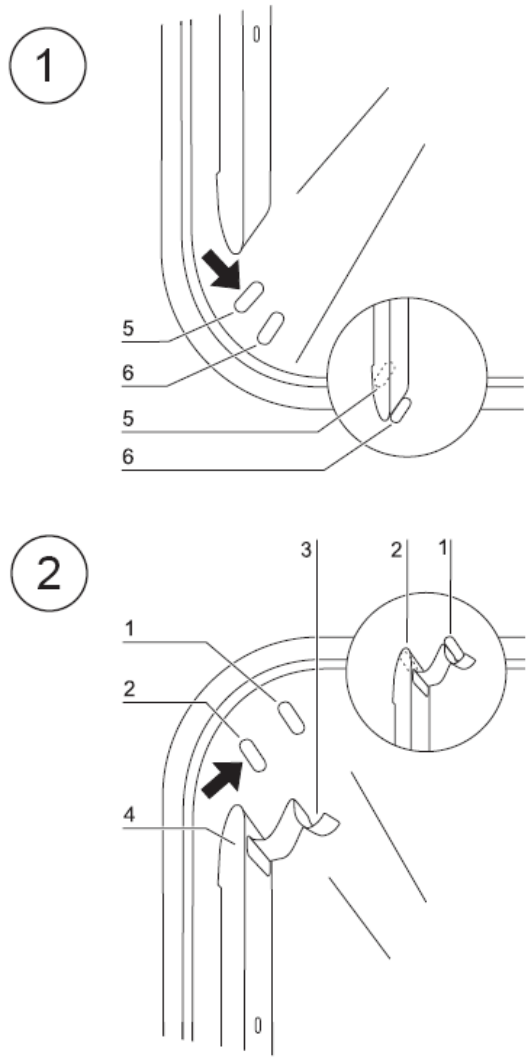

Figure 4-8. Shelf system installation/removal

Tools are not required for the installation of the shelf system. The support rails are secured using spring pressure.

Installation/removal of the support rails

The support rails are guided and held in place at the sides by the recesses. The locking springs of the support rail must point upwards.

1. Place the support rail (Figure 4-8, 4) on the lower recess (Figure 4-8, 6) and fold it onto the side wall of the workspace so that the support rail sits above the two recesses.
2. Squeeze the retaining spring (Figure 4-8, 3) behind the upper recess (Figure 4-8, 1).
3. To remove the support rails, pull the locking spring (Figure 4-8, 3) on the tab downwards out of the recess (Figure 4-8, 1) and remove the support rail.

Installing the support brackets

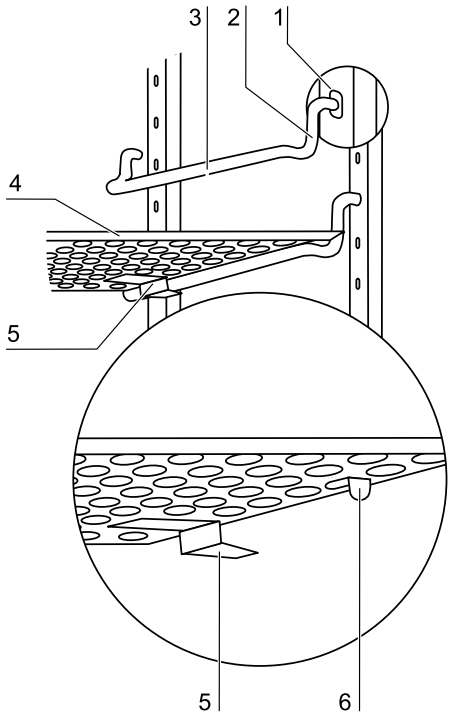

Figure 4-9. Installing the support brackets

1. Insert the support brackets (Figure 4-9, 3 + 2) into the perforation of the support rail (Figure 4-8, 1) so that the support rod (Figure 4-8, 3) points downwards.
2. Ensure that the two vertical pieces (Figure 4-8, 2) of the support bracket rest against the support rail.

Installing the shelves:

1. Slide the insert shelves with the anti-tilt protection (Figure 4-9, 5) onto the support bracket, pointing towards the rear of the device. The anti-tilt protection is also used as a guide for the insert shelf.
2. Slightly raise the shelf so that the extension limiter (Figure 4-9 , 6) can be guided over the support bracket.
3. Make sure that the support bracket runs freely in the two anti-tilt devices.

Note

Insert the shelf with the filling device (water) into the lowest position of the Vios iDx 165 incubator.
For the six-segment inner door, the support brackets are only inserted into the square holes; see Appendix.

Leveling the device

CAUTION

Do not turn the feet out more than 13 mm.

1. Position a bubble level onto the center shelf or onto the roller holder.
2. Use a wrench (size 36 cm) to turn the device feet until the shelf is level and perpendicular in all directions. Perform the height adjustment of the device feet from left to right and from rear to front.

Vios iDx 255 split insert shelves (optional)

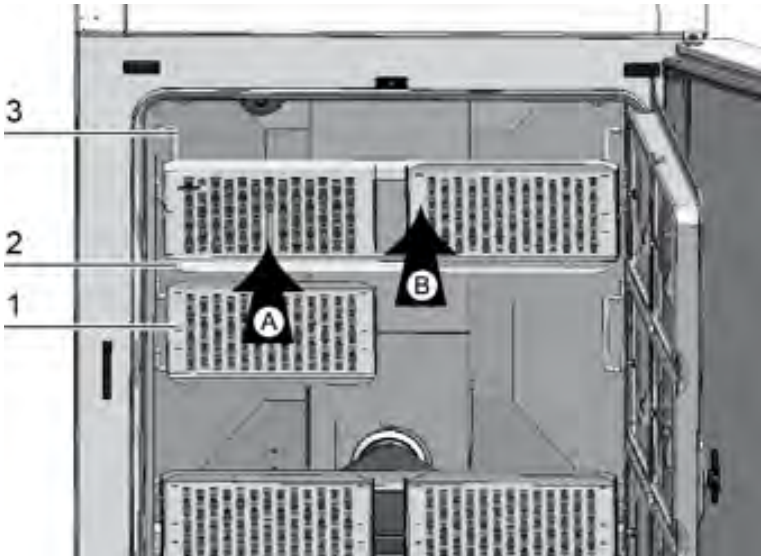

Figure 4-10. Installation of split shelves

If Vios iDx 255 with the optional sixfold segmented inner door and the shelves split into six are fitted, three support frames with two shelves each are placed on the support brackets of the side support rails instead of the one-piece shelves of the standard equipment.

1. Insert both shelves (Figure 4-10, 1) on the support frame (Figure 4-10, 2) (Step A)
2. Attach the supporting frames (Figure 4-10, 2) to the support bracket (Figure 4-10, 3) (Step B).

Connecting the gas

Note

Gas quality:

The gases must have one of the following quality characteristics:

- Purity min. 99.5%
- Medical gas quality.

CAUTION

Overpressure!

The operating pressure of the gas supplied to the device must not exceed 1 bar. 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.
Adjust the gas supply to a range of min. 0.8 bar and max. 1 bar and make sure that this preset pressure cannot be changed!

Installing gas pressure hoses

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.

Note

Please note that the inner diameter of the gas pressure hose for Vios iDx 165/255 should be 3.175 mm.

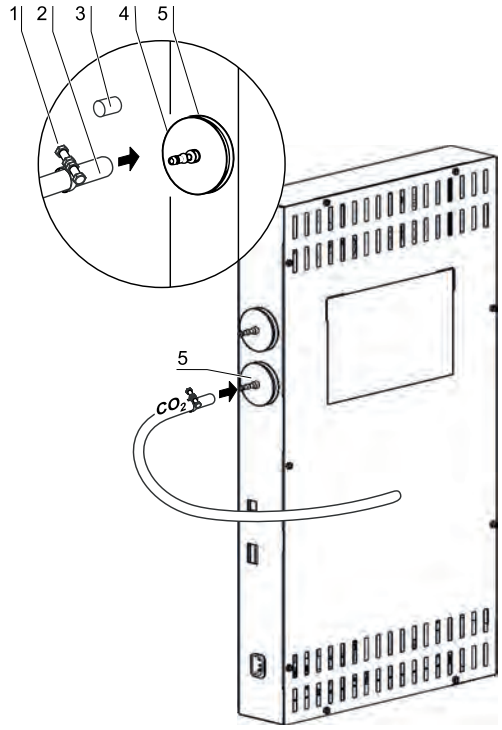

Figure 4-11. Installing gas pressure hoses

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

1. Attach the gas pressure hose to the connection port on the gas supply system.
2. Remove the protective cap (Figure 4-11, 3) of the gas intake filter.
3. Slide the hose clamp (Figure 4-11, 1) onto the gas pressure hose (Figure 4-11, 2) and connect the gas pressure hose to the connector (Figure 4-11, 4) of the gas intake filter (Figure 4-11, 5).
4. Fix the gas pressure hose to the connector of the gas intake filter using the hose clamp.

Gas connection

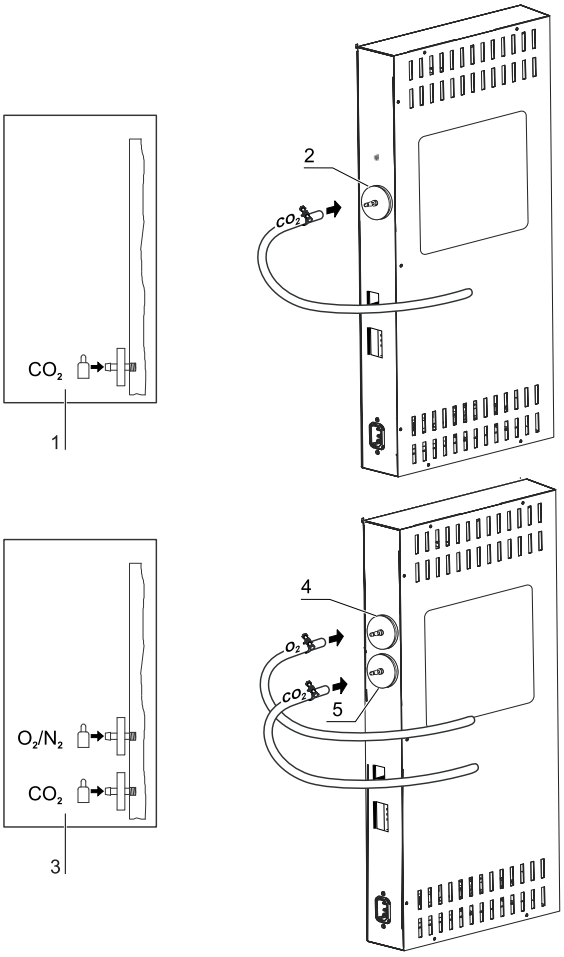

Figure 4-12. Gas connection

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

CO_2 connection

– For a device with CO_2 connection, the gas supply is connected to the gas intake filter (Figure 4-12, 2) in accordance with the connection diagram (Figure 4-12, 1).

Combined CO_2 and O_2/N_2 connection (optional):

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

– Connect the O_2/N_2 supply to the upper gas intake filter (Figure 4-12, 4),

– Connect the CO_2 supply to the lower gas intake filter (Figure 4-12, 5).

Note

Manual gas monitoring

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

Power connection

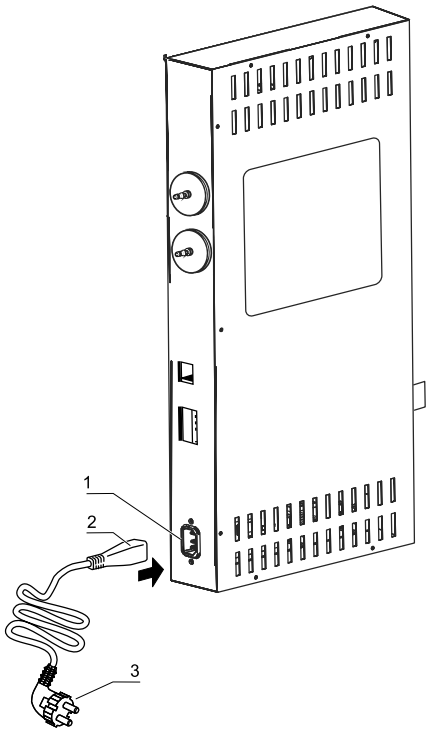

Figure 4-13. Power connection

DANGER

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 cable for damage.
Do not use damaged connection components to connect the device to the power supply!

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

Connecting to the power supply

DANGER

The mains plug 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.

DANGER

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

1. Before connecting the device to the power supply, check to see if the voltage of the power outlet corresponds to the specifications on the nameplate to the left of the device power

switch. If the ratings given for voltage (V) and current (A) do not correspond, the device must not be connected.

2. Insert the IEC connector into the socket on the control box of the device.
3. Insert the grounding plug of the power cable into a properly grounded and fused outlet.
4. Make sure the power cable is not subjected to tensile or compressive force.

Connecting the USB interface

The devices 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 connector type B, PC side: USB connector type A).

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

Connecting the alarm contact

Note

Technical work

Thermo Scientific warrants the safety and functionality of the device only if installation and maintenance are performed properly.
The connection of the device to an external alarm system may only be carried out by trained and authorized electrical/telecommunications engineers!

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

Alarm relay

Note

Circuit structure

The alarm relay responds to all errors reported by the control loops
(see "Error messages" on Page 6-46).

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

Operating states	Contact 3 - 2	Contact 3 - 1
Operational Power monitoring “OFF”	X	O
Operational Power monitoring “ON”	O	X
Error Power monitoring “OFF”	O	X
Error Power monitoring “ON”	X	O
Legend: X: contact closed / O: contact open		

Connection example:

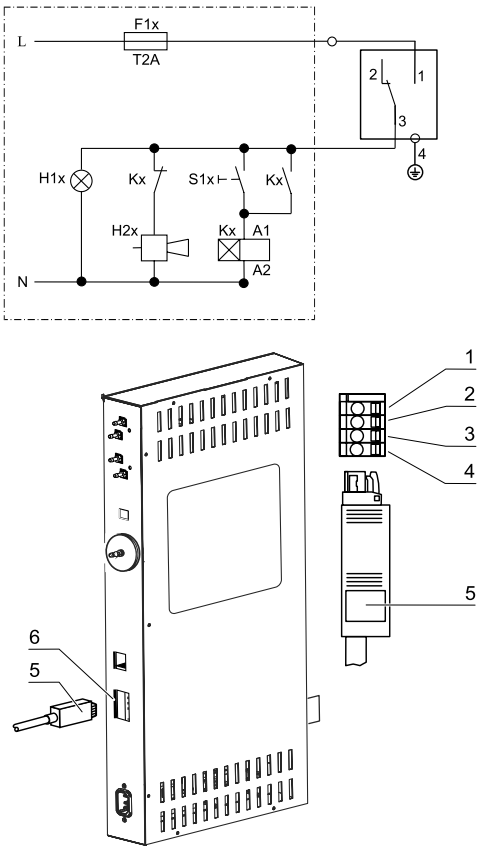

Figure 4-14. Example of alarm contact connection

Note

The plug (Figure 4-14, 5) for connecting the connection cable is not included in the scope of delivery but can be ordered separately. The values for the operating voltage and the fusing of external alarm circuits are given in the table above.

1. Clip on the individual strands of the connection cable (Figure 4-14, 1-4) according to the assignments in the power connection diagram (Figure 4-14).
2. Insert the plug of the connection cable (Figure 4-14, 5) to the external alarm system into the interface (Figure 4-14, 6) on the control box on the back of the device.

Connecting the 4-20 mA interface

Note

Technical work

Thermo Scientific warrants the safety and functionality of the device only if installation and maintenance are performed properly.
The connection of the device to an external alarm system may only be carried out by trained and authorized electrical/telecommunications engineers!

Note

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

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

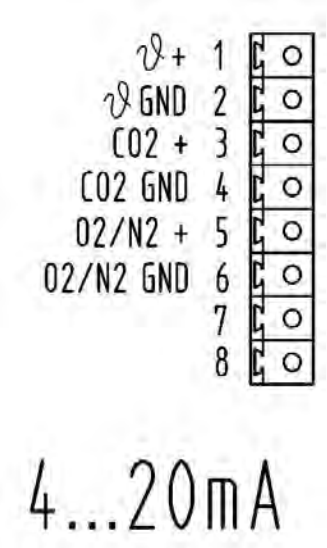

Figure 4-15. Pin-out of the 4-20 mA interface

Operation

Contents

Preparing the device

CAUTION

The device may only be released for operation when all major start-up steps have been performed (see "Start-up" on Page 4-1).

Device check

Prior to starting operation, the condition of the following components must be checked in a device check:

- Gas hoses must be seated tight on the connecting filters and must be secured using a hose clamp.
- The access port must be closed.
- The pressure compensation opening must be permeable; its insert must be installed in the workspace.
- The glass door seal must not be damaged.
- The measurement opening of the glass door/segmented inner door must be closed.
- The shelf system components must be installed safely.
- The airbox with the HEPA filter and the air duct must be properly installed.

Decontaminating the device workspace

CAUTION

Operating temperature limits for the Cell Locker!

- Remove the Cell Lockers prior to performing a Steri-Run sterilization cycle.

The maximum operating temperature for Cell Lockers is 121°C/250°F.

Cell Lockers melt in the incubator if exposed to the Steri-Run cycle.

Cell Lockers can be sterilized in an autoclave at 121°C (250 °F) for 15 minutes with rapid depressurization.

Cell Locker membrane filters may not be sterilized in an autoclave.

Note

Hygiene guidelines:

To protect the cultures, the device workspace must be cleaned and disinfected before any operation in accordance with the hygiene guidelines to be established by the operator.

Water store: see "Relative humidity" on Page 3-6.

If the minimum fill quantity is not reached, the water must be topped up, otherwise the alarm will be triggered.

- Perform the Steri-Run sterilization cycle (see "Steri-Run sterilization cycle" on Page 8-5) or disinfect the workspace according to the hygiene guidelines established by the operator.

Fill quantity Vios iDx 165: 3 L

Fill quantity Vios iDx 255: 3 L

Starting operation

Note

During cell cultivation in the culture chamber of the incubator, your cell cultures may themselves emit CO_2 after a certain period of time, and the CO_2 supply limits may be exceeded (depending on the selected set value). To prevent this, you can use the optional CO_2 control function, which is always active and automatically activates the air intake pump if the limits are exceeded.
The starting of the pump and the associated noises are not a malfunction and are completely normal in this case. As soon as the actual CO_2 value in the culture chamber is reached again, the pump will stop working and the noise level will return to normal.

Occasionally, if the set values are very high (max. 20%), the pump (if the CO2 control function is selected) may start without a reason. This is also harmless; the pump will then stop on its own after 1-2 minutes.

1. Open the glass door or the segmented inner door.
2. Remove the pre-filter (Figure 5-1, 2).
3. Open the insert shelf with filling cut-out (Vios iDx 165): Open the flap (Figure 5-1, 3). One-piece insert (Vios iDx 255): Remove the lower insert shelf if there is not enough space for the container used for filling, or use a funnel and tube that have been sterilized in an autoclave or treated with 70% ethanol.
4. Pour sterilized distilled water into the base pan (under cover position 1 in Figure 5-1) of the workspace.

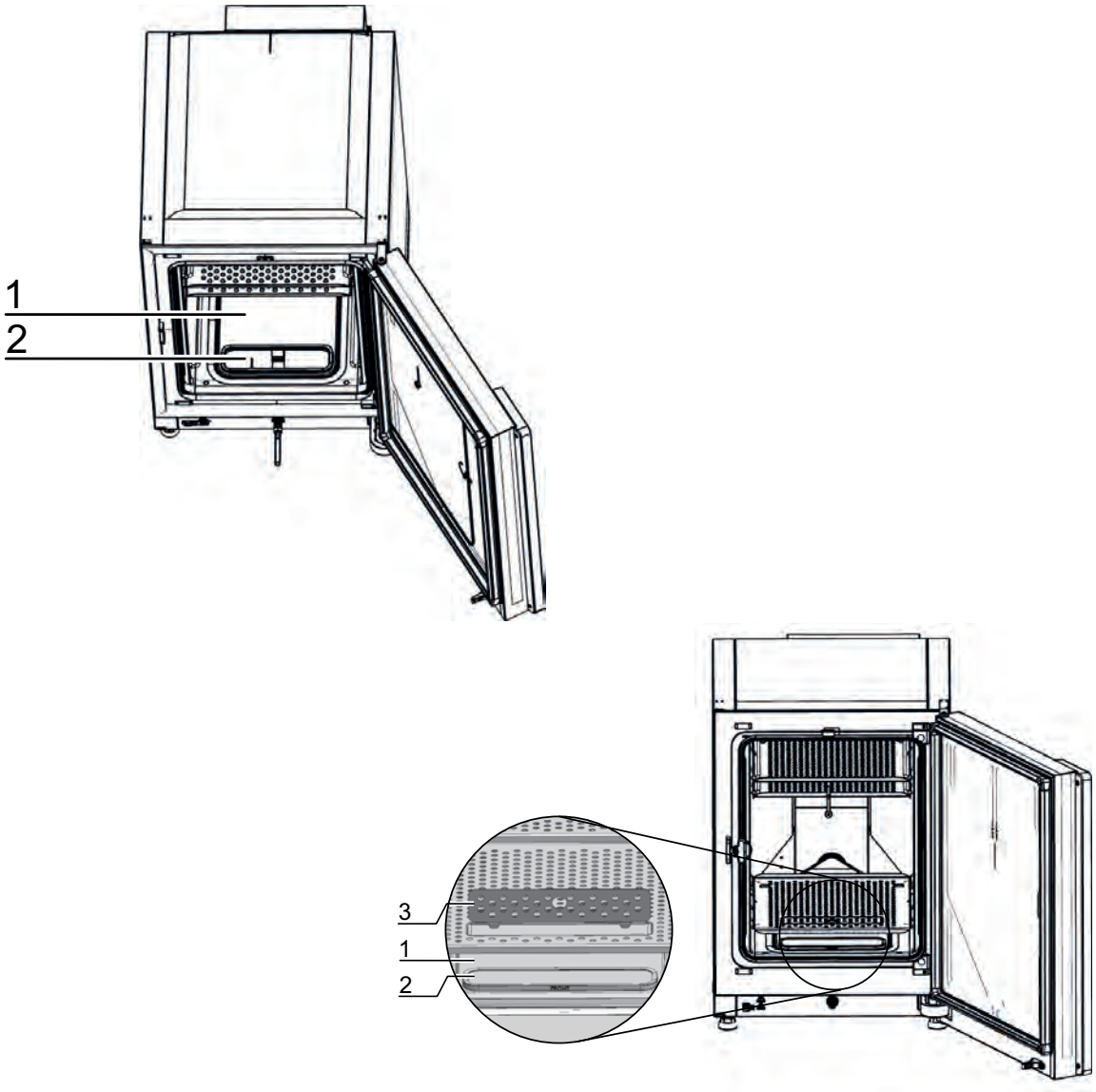

Figure 5-1. Water reservoir

Note

Do not exceed the maximum fill mark "MAX" (Figure 5-3, 1). The maximum fill volume of the water reservoir (Figure 5-3, 5) is 3 L.

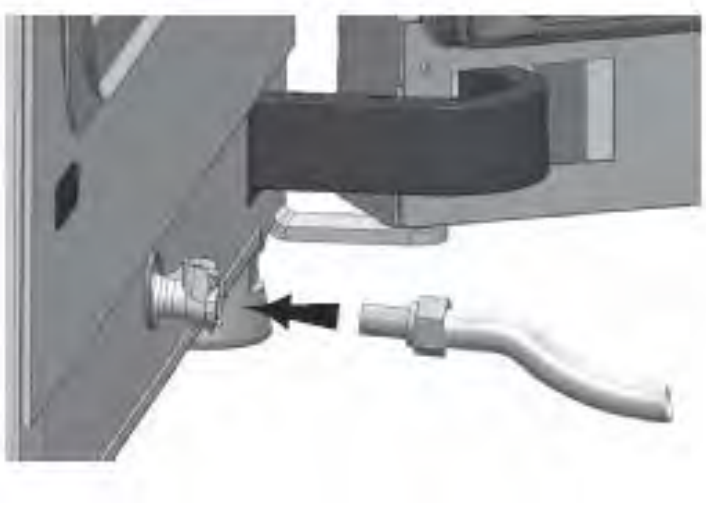

Figure 5-2. Incubator fill and drain valve

5. Connect the tube to the fill and drain valve.
6. Add water until the maximum level mark is reached.

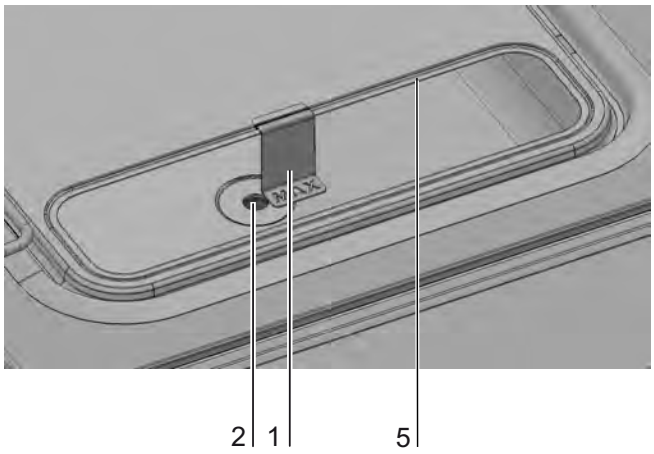

Figure 5-3. “MAX” fill level indicator

7. Wipe the excess water from the lid of the water reservoir.
8. Re-insert the pre-filter (Figure 5-1, 2).
9. Re-insert the lower insert shelf or close the flap of the filling cut-out.
10. Make sure that the valves of the $CO_2/O_2/N_2$ gas supply system are open.
11. Switch on the device at the power switch.
12. Adjust the set values for temperature and CO_2/O_2 content on the iCAN2.0™ Touch Screen.

Starting the device

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.

- Start the device with auto-start (see "Activating auto-start" on Page 6-11).

The auto-start progress indicator appears on the display, and the automatic start routine is run.
The temperature control adjusts the temperature to the selected set value, and humidity builds up.
When temperature and relative humidity are constant, automatic adjustment of the CO_2/O_2 measurement system takes place.
The CO_2/O_2control supplies gas to the CO_2/O_2 set value.
If the auto-start routine has been completed, the progress indicator fades out, and the main menu is displayed. The device is ready for operation.

Loading the device

Note

Loading

To ensure sufficient air circulation and even heating of the cultures, the loading surface in the workspace should be used up to a maximum of 70%. Objects with a large area or devices which emit heat in the workspace can impair heat distribution. Objects with a large area or devices which emit heat in the workspace can impair heat distribution.

- Load the work space with cultures.

Handling

Contents

Power switch

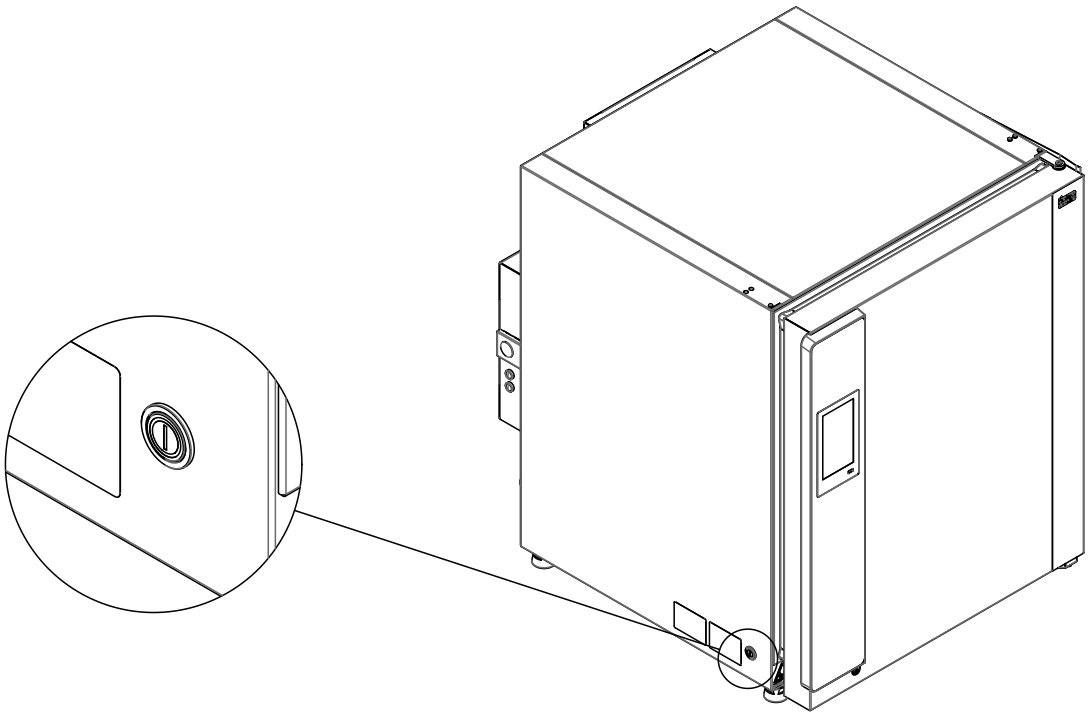

Figure 6-1. Power switch

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

- Powering up: Press the power switch; the switch lights up.
  - After a short beep and a short blank screen phase, the touchscreen is displayed.
  - The sensors in the control loops go through the heating phase ("Heating phase of the control loop sensors" on Page 6-5).
- Powering down: Press the power switch; the switch light goes out.

Operating panel and operating screen layout

The operating panel works as a touchscreen (iCan2.0™ Touchscreen) and can be operated with light pressure using a finger (even wearing gloves) or a blunt pen.

Figure 6-2. Start screen: Touch-sensitive screen areas

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

- Menu key ☰ top right
- Temperature display field
- CO_2 display field
- RH display field
- O_2 display field
- Steri-run key
- Auto-start key

Note

Extended touch-sensitive area

To confirm an error message, the entire touchscreen can be used as a touch-sensitive area.

Explanation of icons

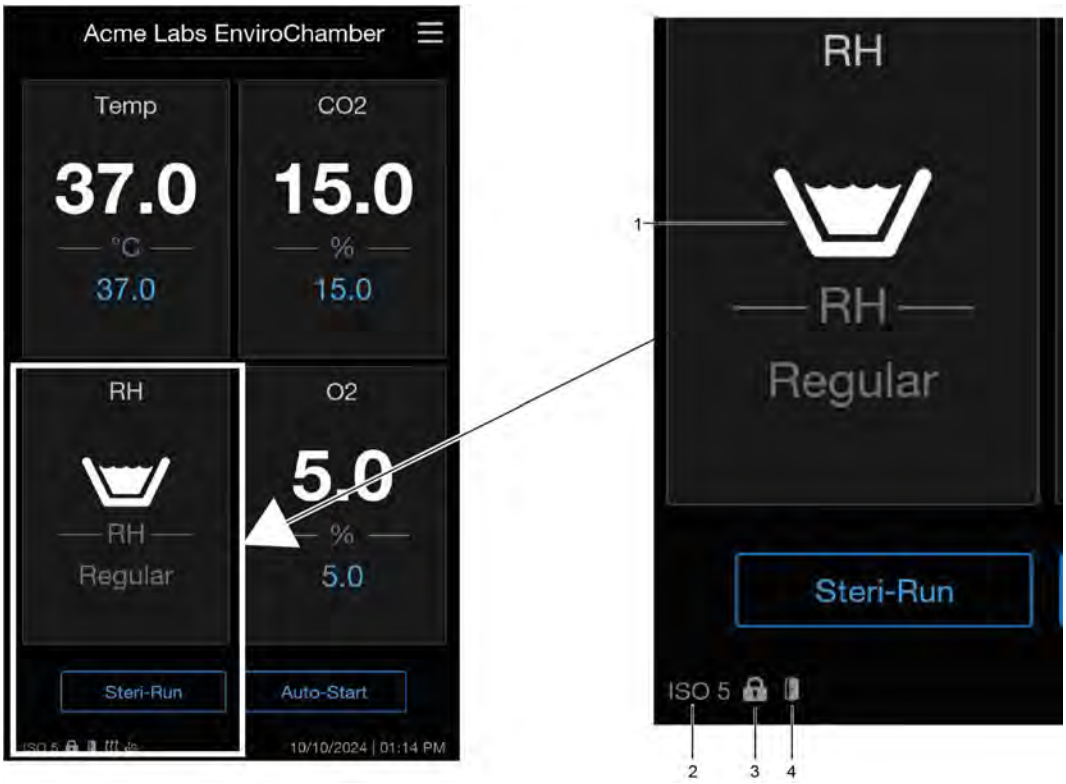

Figure 6-3. Explanation of icons

Pos.	Icon	Meaning
1		Water level above the minimum
-		Water level too low
-		No water - dry
2		HEPA filter activity indicator

Pos.	Icon	Meaning
3		Keypad lock activated
4		Door open

Default settings of the controls

Upon delivery, the devices are preset to the following set values:

- Temperature: 37°C (98.6 °F)
- CO_2 content 0.0 % (is adjusted by the customer)
- O_2 content (optional): 21.0 %

Note

CO_2/O_2 control:

Since the CO_2 concentration of the air is close to 0%, the CO_2 control and the control loop error monitoring are deactivated 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 are deactivated at a set value of 21%.

Heating phase of the control loop sensors

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

- Temperature control loop: 10 s
- CO_2 sensor heating period (WLD and IR): 5 min.
- O2 control loop: 5 min.

The start-up process is indicated by an acoustic signal. During the heating phase, dots (...) are shown instead of values in the following display fields:

- Temperature display field,
- CO_2 display field, and
- O2 display field

After the heating phase has been completed, the control loop actual values are indicated.

Note

CO_2 gassing

During the 5-minute heating phase of the O2 control loop, the CO_2 supply to the workspace and monitoring of the CO_2 control loop are suspended.

Behavior of keys in settings

Pressing a key can gradually increase or reduce a value:

- Keeping the “–” or “+” key depressed switches to rapid run-through mode,
- and after approx. 3 s, the speed of the rapid run-through is additionally increased.

Note

Saving the settings

To save changed values, confirm by pressing the Enter key.

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

Setting the temperature set value

1. Press the temperature display field.

   The temperature menu (Figure 6-4) is displayed.

Figure 6-4. Temperature selection menu

2. Adjust the temperature set value using the “+” and “-” keys.
3. Press the “Done” key to apply the new set value.

   You will be taken back to the start screen.
4. If you do not want to make any changes, press the "Cancel" key to leave the menu and return to the start screen.

Adjusting the CO_2 set value

1. Press the CO2 display field.

   The CO_2 menu (Figure 6-4) is displayed.

Figure 6-5. CO_2 selection menu

2. Adjust the CO_2 set value using the “+” and “-” keys.
3. Press the “Done” key to apply the new set value.

   You will be taken back to the start screen.
4. If you do not want to make any changes, press the "Cancel" key to leave the menu and return to the start screen.

Note

Deactivating the CO_2 control loop:

To deactivate the CO_2 control, the set value is adjusted to 0%. If the control loop is deactivated, error monitoring is also disabled.

Note

Ventilate the internal chamber after the change of CO_2 set value if the new CO_2 set value is lower, so that no alarm message occurs.

Adjusting the O_2 set value

1. Press the O2 display field.

   The O_2 menu (Figure 6-4) is displayed.

Figure 6-6. O_2 selection menu

2. Adjust the O_2 set value using the “+” and “-” keys.
3. Press the “Done” key to apply the new set value.

   You will be taken back to the start screen.
4. If you do not want to make any changes, press the "Cancel" key to leave the menu and return to the start screen.

Note

Ventilate the internal chamber after the change of O_2 set value so that no alarm message occurs.

Note

Default settings

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

Use of the process gases

- For set values below 21 % O_2, connect the device to a nitrogen supply.
- For set values above 21 % O_2, connect the device to an oxygen supply.

For set values of 21 % O_2, the control loop is deactivated, i.e. error monitoring is also disabled.

Adjusting humidity

If condensation occurs on the culture containers due to high relative humidity, the humidity in the workspace can be set to a lower level. Device control is preset at the factory to regular - approx. 93% relative humidity.

1. Press the RH display field.

   The "humidity mode" menu (Figure 6-7) is displayed.

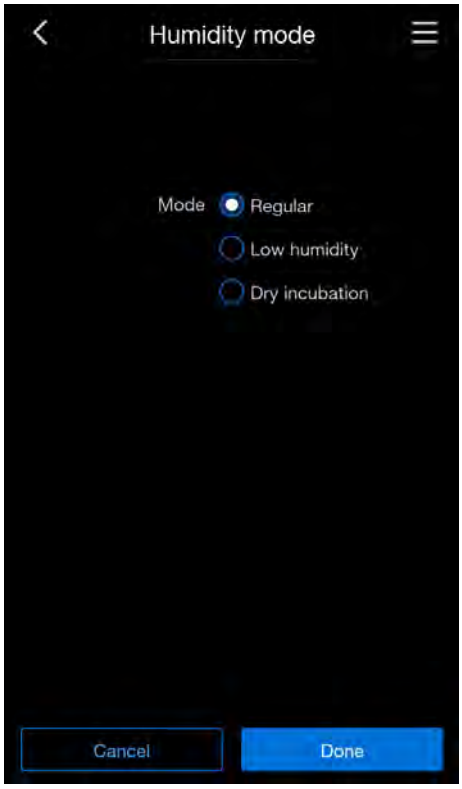

Figure 6-7. “Humidity mode” menu

2. Select the extent to which you wish to regulate the humidity. Choose between:
   - Regular (humidity is 93%)
   - Low humidity (humidity is reduced to 90%)
   - Dry incubation (little humidity)

Note

The “Dry Incubation” function is specially intended for applications that already contain media and water (e.g. “Cell Factory System”).

Precise temperature controls ensure that the cultures are incubated under constant and dry conditions, which increases the reliability and reproducibility of the results.

3. Apply and save the change by pressing the "Done" key.

   You will be returned to the start screen.

After returning to the start screen, the selected option appears in the RH display field.

Auto-start function

CAUTION

Please make sure that the O_2 sensor has been correctly plugged into the socket. Incorrect installation of the sensor may lead to corrosion at the contacts and calibration errors during the auto-start routine. You can verify correct function by simply activating the sensor. If no error message occurs within 10 minutes, the unit is ready for the auto-start routine.

The auto-start function is an automated routine for start-up and subsequent adjustment of the CO_2 measurement system. After start-up, the device control adjusts the temperature set value. Moisture builds up at the same time. 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.

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 detected in the CO_2 control loop,
- the water level is too low,
- the CO_2 value to be set is out of tolerance.

Dry execution of auto-start routine:

If the auto-start routine is to be executed dry - without water filling in the water reservoir of the work space - the water sensor must be deactivated (Chapter "Switching water sensor on/off" on Page 6-17).

Activating auto-start

Preparations for start-up

1. Make sure that the valves of the $CO_2/O_2/N_2$ gas supply system are open.
2. Pour sterilized distilled water into the water reservoir of the work space. Do not exceed the maximum level mark.

Launching the auto-start routine

1. Press the "Auto-start" key.

   The "auto-start sequence" menu is displayed.

Figure 6-8. Activating auto-start

2. If you do not want to make any changes, press the "End" key to leave the menu and return to the start screen.
3. If you want to perform an auto-start, press the “Start” key.
4. Open the door until the acoustic signal sounds (approx. 30 s)
5. Add water if necessary.
6. Close the door.

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

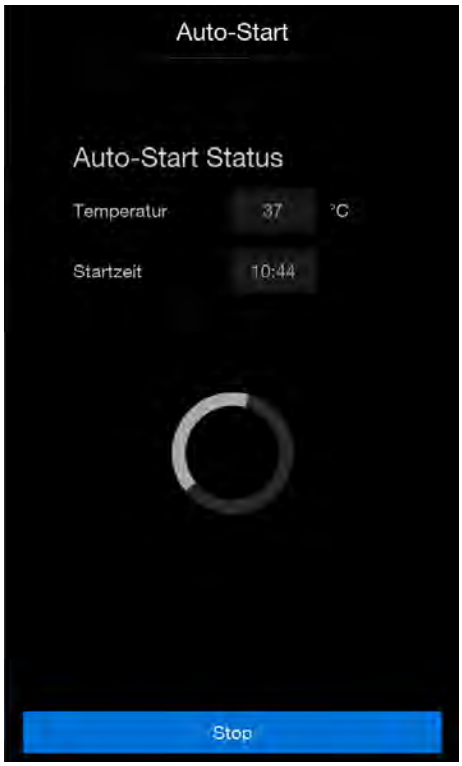

Figure 6-9. Auto-start status display

7. If you want to abort the Auto-Start, press the “Stop” key.

   The “Abort Auto-Start” menu appears (Figure 6-10).

Aborting auto-start

Note

Abort

The Auto-Start routine can be interrupted at any time by pressing the “Stop” key.

Automatic restart:

The Auto-Start routine is restarted automatically if the routine is aborted due to one of the following events:

- the glass door is opened,
- the outer door with an optional segmented inner door is opened,
- the power supply is interrupted

If the "Stop" key in the status display is pressed, the auto-start routine is interrupted and the "Auto-Start Stop" dialog window is displayed as a confirmation prompt. The routine can now be permanently canceled or resumed.

1. To continue Auto-Start, press the "Back" key.

   You are returned to the start screen, and the auto-start routine is resumed.

2. To abort Auto-Start, press the "End" key.

The warning triangle is displayed together with the acoustic signal.

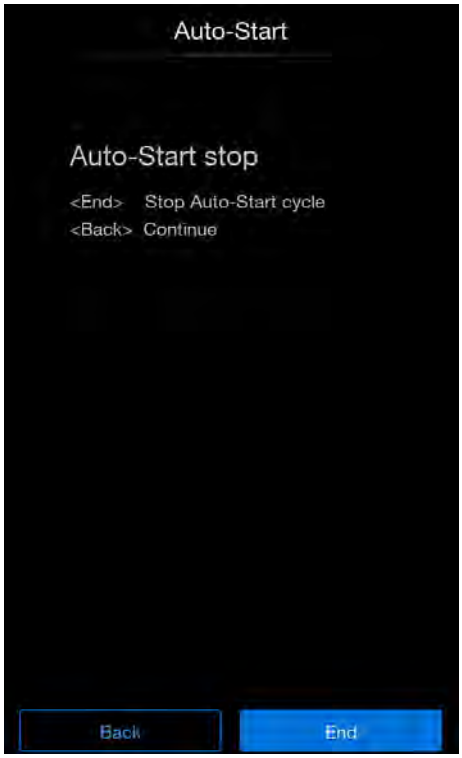

Figure 6-10. Aborting auto-start

Launching Steri-Run

Steri-Run is an automated sterilization cycle for sterilizing the device workspace. The Steri-Run sterilization cycle uses an automated program sequence to decontaminate the complete workspace including the shelf system and the sensors. A detailed sequence of the device function is described in the chapter Cleaning and disinfection ("Steri-Run sterilization cycle" on Page 8-5).

User configuration

The user configuration settings allow you to adjust the user interface and the additional device functions to the requirements of everyday operation. The selection menu for user configuration (Figure 6-11) is accessed via the start screen menu key (Figure 6-2).

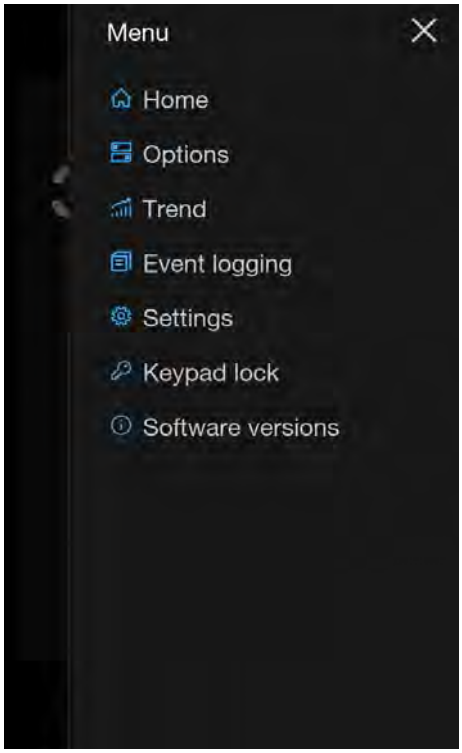

Figure 6-11. User configuration menu

The user configuration menu is organized into six categories:

- Start (return to start screen)
- Options
- Trend
- Data logging
- Settings/Setup
- Keypad lock
- Software versions

Make a user-specific setting in a dialog box by navigating through the sub-menus indicated in the figures and then calling up the dialog box.

Options

The "Options" selection menu (Figure 6-12) permits access to all settings dialogs for the functional options of the device:

- Water sensor
- HEPA configurations
- Door configurations
- O_2 configurations

1. Press the “Menu” key on the start screen (Figure 6-2).
2. The “User configuration” menu appears.
3. Select the “Options” menu command.

   The “Options” selection menu appears:

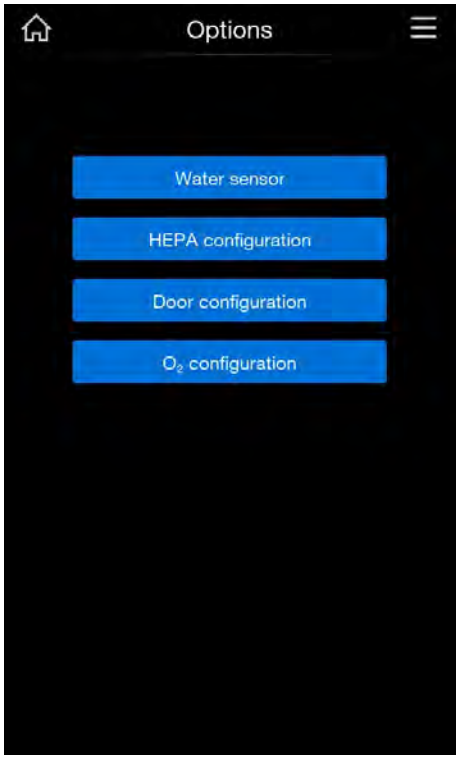

Figure 6-12. Options selection menu

Switching water sensor on/off

CAUTION

When the water sensor is switched off, the Steri-Run routine can be started despite the presence of water in the water reservoir. This is incorrect use and may destroy the fan motor.

1. Press the “Menu” key on the start screen (Figure 6-2).
2. The “User configuration” menu appears.
3. Select the “Options” menu command
4. Select the "Water sensor" option.

   The “water sensor” selection menu appears:

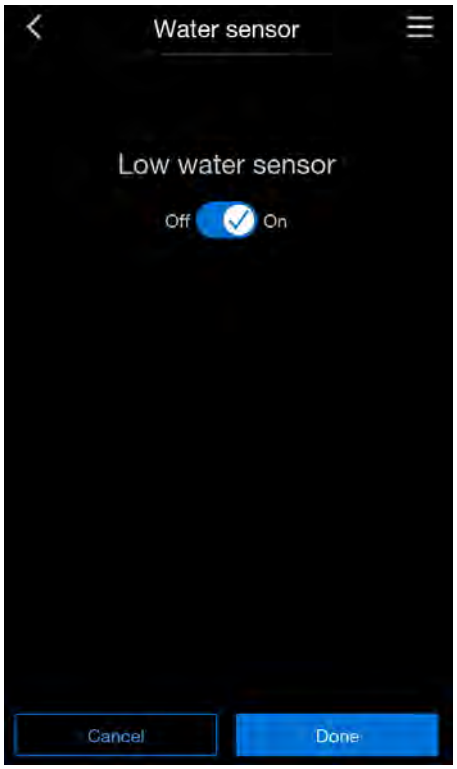

Figure 6-13. Switching water sensor on/off

5. Switch the water sensor on or off as needed.
6. Press “Cancel” to return to the “Options” menu without changes.
7. Press “Done” to apply the changed setting. You will then return to the “Options” menu.

By deactivation of the water sensor and adjustment of the humidity, the relative humidity in the work space can be lowered.
The change requires an extended adaptation phase. To ensure that it effectively prevents condensation on culture containers, it must be used as a permanent setting.

For incubation operation with ambient humidity or if the auto-start routine is to be run dry (without water), the water sensor can be switched off. This prevents water sensor alarm messages from the control system in the device.

If the "Dry Incubation" function is selected, the water sensor is automatically deactivated.

Note

Water sensor off

The on/off switching of the water sensor is entered in the event list.

HEPA configuration

Note

The incubator is optimized for operation with a HEPA filter.

If you do not use a HEPA filter, the specified properties of the device may not be reached.

1. Press the “Menu” key on the start screen (Figure 6-2).
2. The “User configuration” menu appears.
3. Select the “Options” menu command
4. Select the “HEPA configuration” option.

   The “HEPA configuration” selection menu appears:

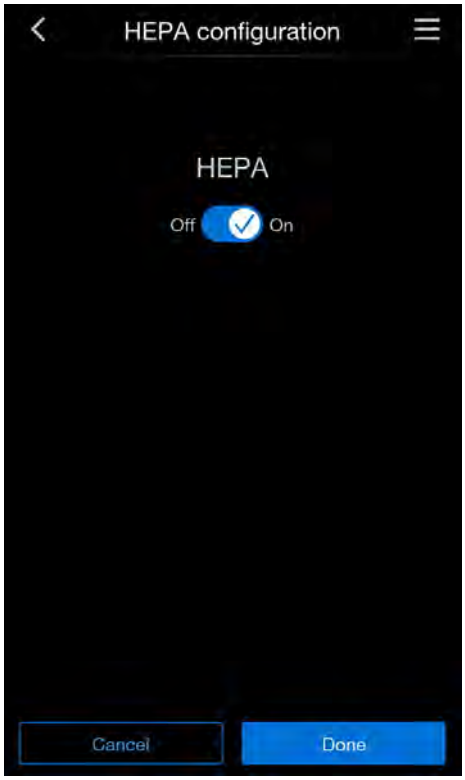

Figure 6-14. HEPA configuration menu

5. Switch the HEPA option on or off as needed.
6. Press “Cancel” to return to the “Options” menu without changes.
7. Press “Done” to apply the changed setting. You will then return to the “Options” menu.

Door configuration

Segmented inner door

Since the opening cross-sections are smaller when accessing the cultures, devices equipped with the optional segmented inner door achieve shorter recovery times of the incubation parameters:

- Work space temperature
- CO_2 concentration
- O_2 concentration
- Relative humidity

After conversion of the device, the device control must be switched to the segmented inner door option.

In the “Segmented inner door” menu, you can choose whether your device has a glass door or a segmented inner door.

Note

Malfunction:

The conversion to a segmented inner door results in a change in the control parameters.

If the “Segmented inner door” function is not set to the door variant actually installed, this can lead to malfunctions in incubation.

Selecting door type

1. Press the “Menu” key on the start screen (Figure 6-2).
2. The “User configuration” menu appears.
3. Select the “Options” menu command
4. Select the “door configuration” option.

   The “Door configuration” selection menu appears:

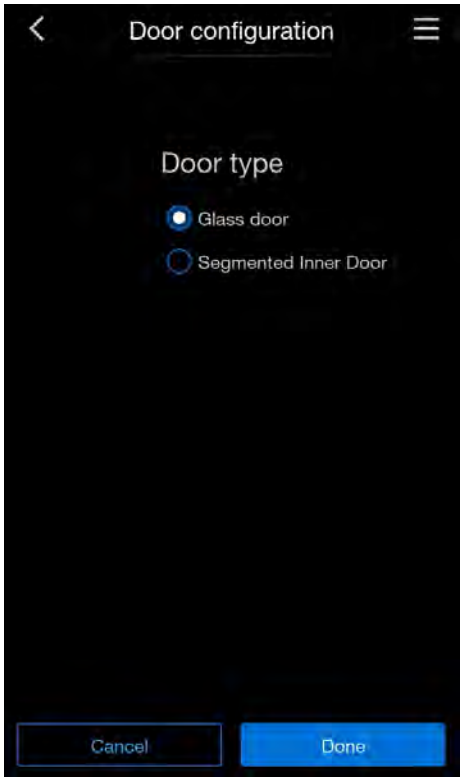

Figure 6-15. Door configuration menu

5. Select the applicable door type.
6. Press “Cancel” to return to the “Options” menu without changes.
7. Press “Done” to apply the changed setting. You will then return to the “Options” menu.

O_2 configuration

1. Press the “Menu” key on the start screen (Figure 6-2).
2. The “User configuration” menu appears.
3. Select the “Options” menu command
4. Select the “O_2 configuration” option.

   The “O_2 configuration” selection menu appears:

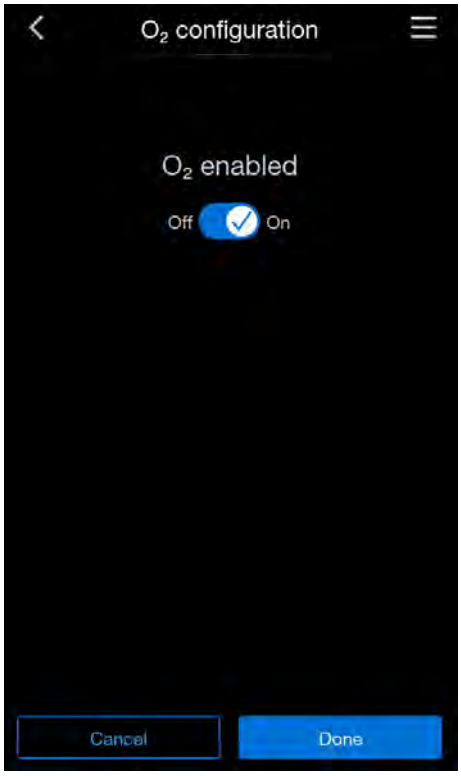

Figure 6-16. O_2 configuration menu

5. Switch the O_2 option on or off as needed.
6. Press “Cancel” to return to the “Options” menu without changes.
7. Press “Done” to apply the changed setting. You will then return to the “Options” menu.

Note

If the device is operated with O_2 or N_2, the workspace must be ventilated after the O_2 control is switched off.

Trend

The “trend” view shows a graphic overview of the temperature, CO_2, and O_2 course of the last 12, 24, and 72 hours.

1. Press the “Menu” key (Figure 6-2).
2. Select the “Trend” menu command

The “Trend” graphic overview appears:

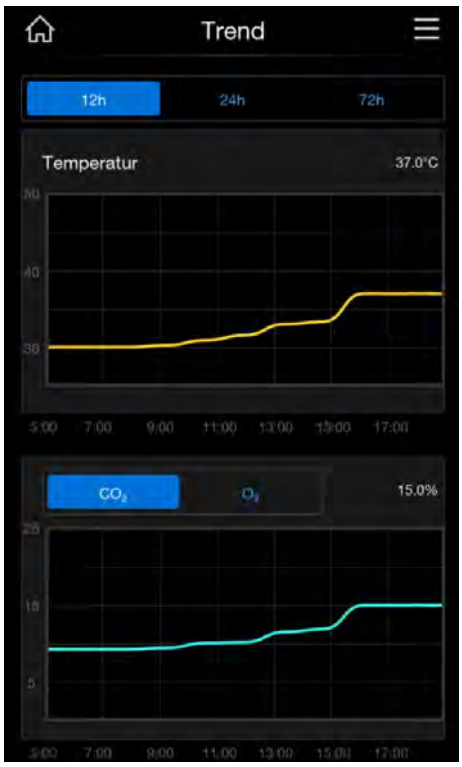

Figure 6-17. “Trend” graphic overview

3. Select the period for which you wish to see a graphic representation of the course by selecting the corresponding option. The following are available:
   - 12 h
   - 24 h
   - 72 h
4. Select whether you want to see the course curve for CO_2 or O_2.
5. Click on the home symbol, top left.

   You will be returned to the start screen.

Data logging

The Data logging selection menu (Figure 6-18) permits access to dialogs for logging and displaying events during device operation:

- Event display
- Error table

– Reminder

1. Press the “Menu” key on the start screen (Figure 6-2).

   The “User configuration” menu appears.

2. Select the “Data logging” menu command.

   The “Data logging” selection menu appears:

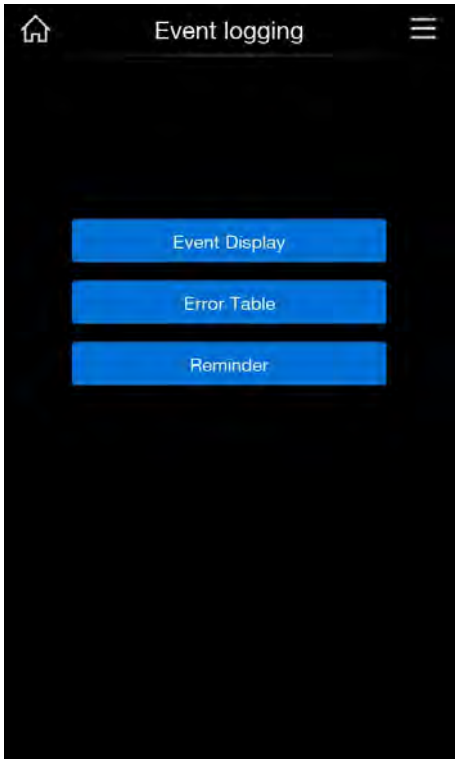

Figure 6-18. Data logging menu

Event display

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

1. Press the "Menu" key.
2. Select the “Data logging” menu command.
3. Select the “Event display” menu command.

   The list shown in Figure 6-19 appears.

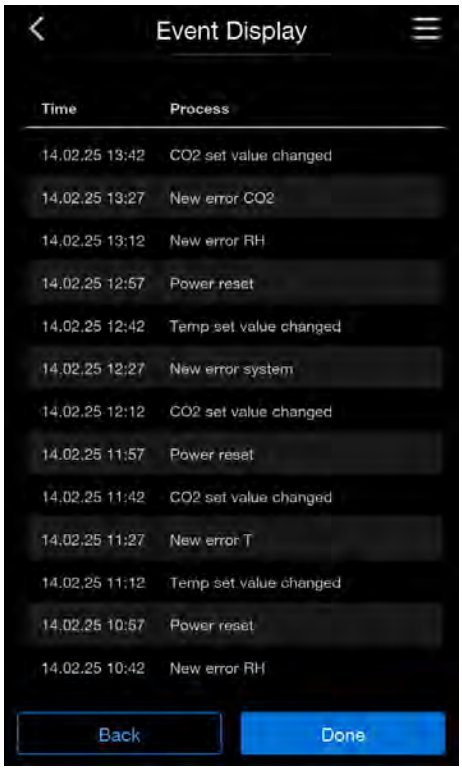

Figure 6-19. Displaying events

4. Press the “End” or “Back" key to reach the “Data logging” selection menu.

Error table

The error table lists the errors detected by the device-internal control system in descending chronological order. The most recently detected error is listed at the top 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 viewed but not edited. If the event display consists of two pages, the user can browse through the list. The status display 001/002 or 002/002 indicates which of the two pages is currently being displayed.

1. Press the "Menu" key.
2. Select the “Data logging” menu command.
3. Select the “Error table” menu command.

The list shown in Figure 6-20 appears.

Figure 6-20. Viewing the error table

> **Note**
>
> Error handling
>
> For a detailed overview of causes of errors and their correction, refer to the end of this chapter.

4. Press the “Done” or “Back" key to reach the “Data logging” selection menu.

Reminder

The set reminder intervals are shown in the “Reminder” list display.

1. Press the "Menu" key.
2. Select the “Data logging” menu command.
3. Select the “Reminder” menu command.

The list shown in Figure 6-20 appears.

Figure 6-21. Reminder list display

Settings

The Settings selection menu (Figure 6-22) permits access to a series of dialog windows with settings options for individual configuration of the user interface:

- Keypad lock code
- Display
- Alarm
- Reminder intervals
- Calibration
- Logging cycle time
- Service level

1. Press the “Menu” key on the start screen (Figure 6-2).

   The “User configuration” menu appears.

2. Select the “Settings” menu command.

   The “Settings” selection menu appears:

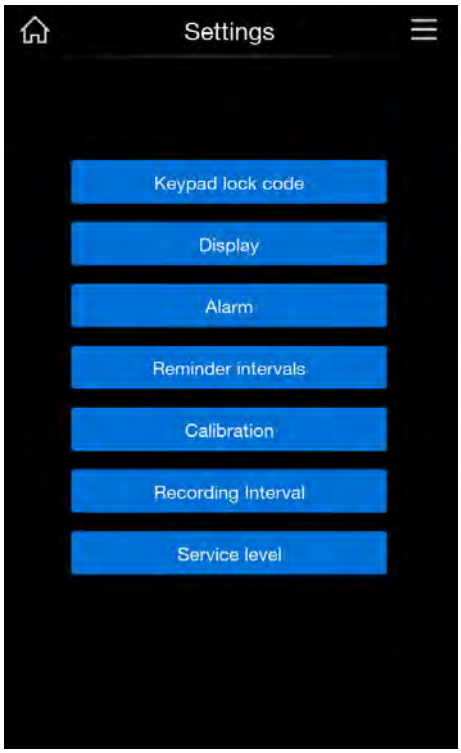

Figure 6-22. Settings menu

Changing the keypad lock code

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

The keypad lock prevents unauthorized modification of the operating settings. Only those keys used to enter values are locked.
The keypad code consists of four numbers.

The default code is: 0000.

This default can be changed to a user-defined code that is then activated using the KEYPAD LOCK dialog window ("Keypad lock" on Page 6-44).

1. Press the "Menu" key (Figure 6-2).
2. Select the “Settings/Setup” menu command
3. Select the “Keypad lock code” menu command.

   The input dialog shown in Figure 6-23 appears:

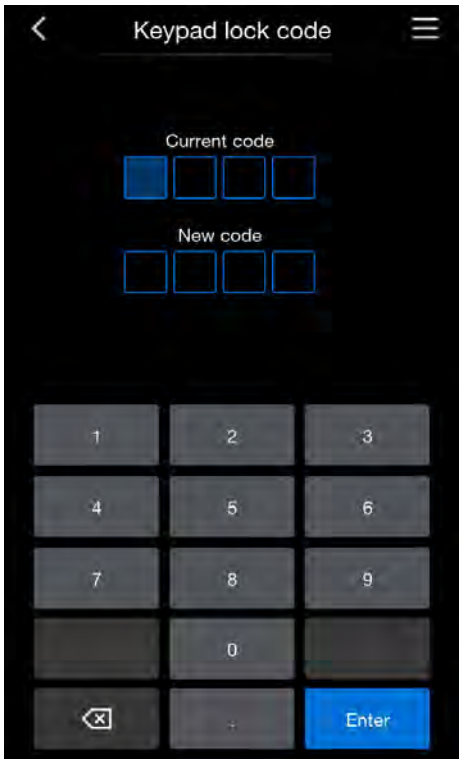

Figure 6-23. Changing the keypad lock code

4. Enter the factory default code 0000 by pressing the corresponding number keys.
5. Now enter the desired new code.
6. Press the "Enter" key

The screen returns to the “Settings/setup" menu.

The lock symbol appears in the icon bar in the main menu (Figure 6-2) as an activity display 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 new code by entering the valid code,
- Enter the new code, and confirm.

Display

The "Display" selection menu (Figure 6-24) permits access to a number of input dialogs with settings options for individual configuration of the user interface:

- Brightness
- Language
- Date/time
- Key tone

1. Press the "Menu” key (Figure 6-2).
2. Select the “Settings/Setup” menu command
3. Select the “Display” menu command.

   The input dialog shown in Figure 6-24 appears:

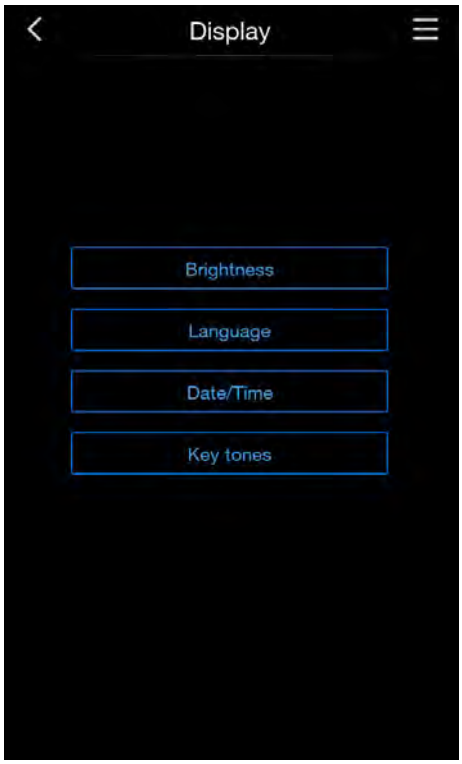

Figure 6-24. Display selection menu

Adjusting display brightness

The input dialog makes it possible to adjust the brightness of the operating panel in a range of 1 through 100%.

1. Press the "Menu” key (Figure 6-2)
2. Select the “Settings” menu command.
3. Select the “Display" menu item.
4. Select the "Brightness" option.

   The input dialog shown in Figure 6-25 appears:

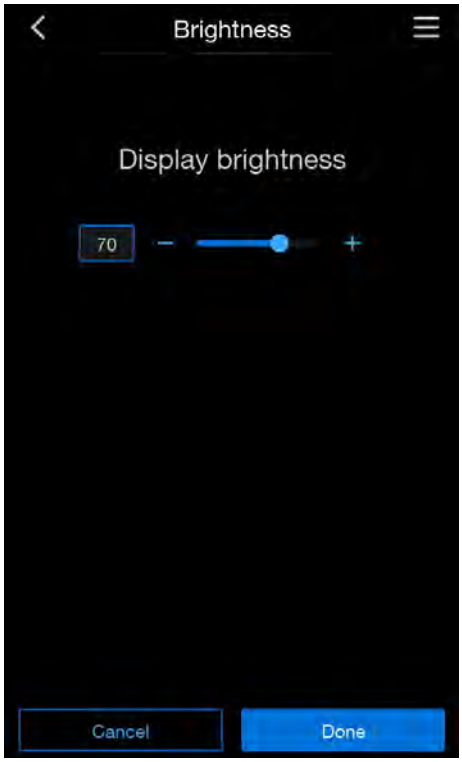

Figure 6-25. Adjusting display brightness

- Press the "+" key to increase the value.
- Press the "-" key to decrease the value.
- Press “Done” to apply the value.

The screen returns to the “Display” selection menu.

- Press “Cancel” to leave the “Display brightness” menu without any changes.

Setting the language of the user interface

The input dialog makes it possible to set the language of the user interface. Seven languages are available:

- English
- German
- Italian
- French
- Spanish
- Japanese
- Chinese (Mandarin)

1. Press the “Menu” key (Figure 6-2).
2. Select the “Settings/Setup” menu command.
3. Select the “Display" menu command
4. Select the “Language” menu command

   The input dialog shown in Figure 6-26 appears.

Figure 6-26. Setting the language

1. Select the desired language by pressing the corresponding key.

   The language of the current display changes to the desired language.
2. Press "Done" to confirm your selection.
3. If you do not wish to make any change, press the “Cancel” key.

   The screen returns to the “Display” selection menu

Setting the date/time

The input dialog makes it possible to set date and time to the desired time zone.

1. Press the “Menu” key (Figure 6-2).
2. Select the “Settings” menu command
3. Select the “Display" menu command
4. Select the “Date/time" menu command.

The input menu shown in Figure 6-27 appears:

Figure 6-27. Date/time selection menu

5. Enter the date using the number keys.
6. Apply and save the entry by pressing the “Enter” key.

   The system returns to the Date/time selection menu.
7. To change the time, select the option “Time“.

The input menu shown in Figure 6-28 appears:

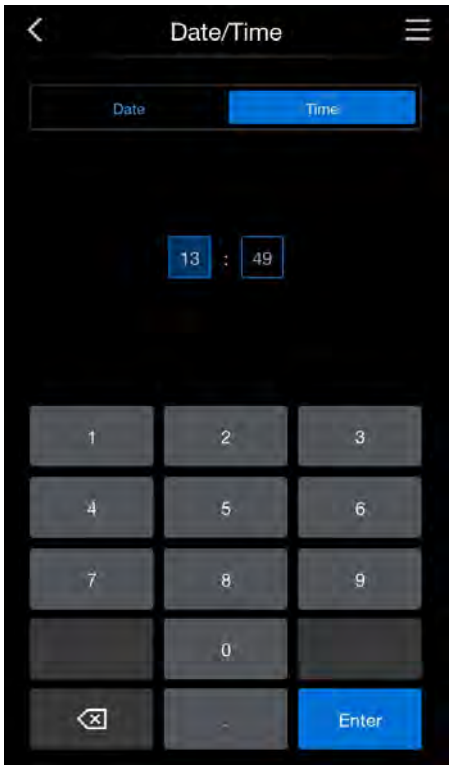

Figure 6-28. Setting the time

8. Enter the time with the number keys.
9. Apply and save the entry by pressing the “Enter” key.

   The system returns to the “Display” selection menu.

Setting the key tone

1. Press the “Menu” key (Figure 6-2).
2. Select the “Settings” menu command
3. Select the “Display" menu command
4. Select the “Key tone" menu command.

The selection menu shown in Figure 6-27 appears:

Figure 6-29. Key tone selection menu

5. Select whether you wish to enable the key tone.
6. Apply and save the entry by pressing the “Done” key.

   The system returns to the “Display” selection menu.
7. Press “Cancel” to return to the “Display” selection menu without any changes.

Alarm

The alarm relay is the electrical interface connecting the device-internal control system to an external power supply monitoring system. Depending on the required input signal of the external monitoring system, power supply monitoring can be enabled or disabled. If power supply monitoring is enabled, a power failure is detected as an error. The wiring of the alarm relay is described in section "Connecting the alarm contact" on Page 4-14.

1. Press the “Menu” key (Figure 6-2).
2. Select the “Settings” menu command
3. Select the “Alarm” menu command

   The input dialog shown in Figure 6-30 appears.

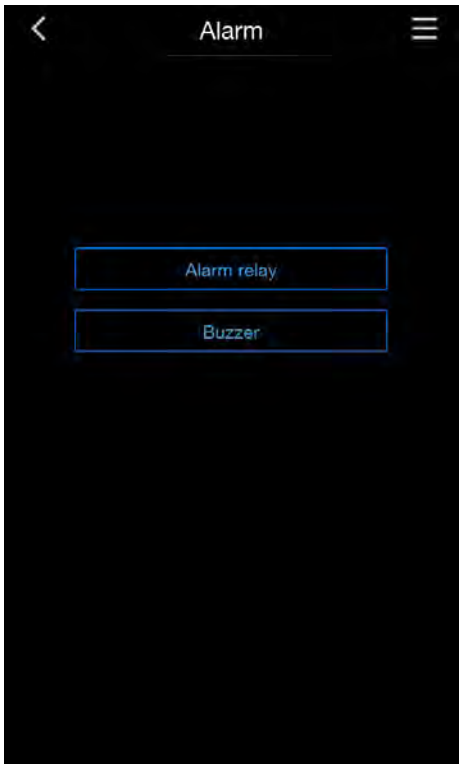

Figure 6-30. Alarm selection menu

Selecting the alarm

1. Select the “Alarm relay” menu command.

   The selection menu shown in Figure 6-31 appears.

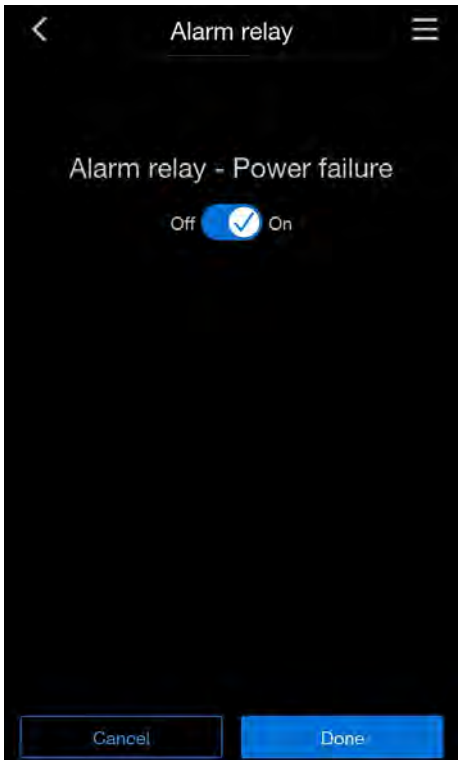

Figure 6-31. Setting the alarm relay

1. Choose whether you wish to switch the alarm relay power supply monitoring on or off.
2. Apply and save the change by pressing the "Done" key.

   The system returns to the “Alarm” selection menu.
3. Press “Cancel” to return to the “Alarm” selection menu without any changes.

Selecting the buzzer

1. Select the “Buzzer" menu command.
2. Choose whether you wish to switch the buzzer on or off.
3. Apply and save the change by pressing the "Done" key.

   The system returns to the “Alarm” selection menu.
4. Press “Cancel” to return to the “Alarm” selection menu without any changes.

Reminder intervals

The reminder intervals are integral components of the reporting and monitoring system of the device control. For the two major device functions Steri-Run and Auto-Start, as well as for routine service work, the user can set times on which a message is triggered.
The count begins at 00:00 h of the day on which the preset reminder interval has elapsed.

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

- Steri-Run: Please carry out Steri-Run.
- Auto-start: Please run auto-start. Appears after successful completion of the Steri-Run sterilization cycle.
- Service interval: Please carry out service. The service message can be confirmed. The Request Service icon is then displayed.
- HEPA interval and reset

After the routines have been run successfully, the reminder messages fade out.

Default settings

Steri-Run sterilization cycle	90 days
Auto-start routine	Off
Service interval	Off
HEPA filter interval	365 days

Setting reminder intervals

1. Press the “Menu” key (Figure 6-2).
2. Select the “Settings” menu command
3. Select the “Reminder intervals” menu command.

   The selection menu shown in Figure 6-32 appears.

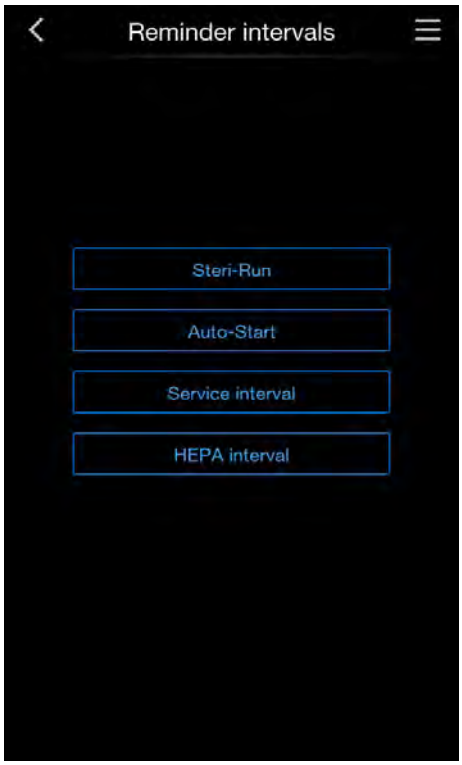

Figure 6-32. Reminder interval menu

4. Select the appropriate menu command, e.g. Steri-Run.

   The selection menu shown in Figure 6-33 appears:

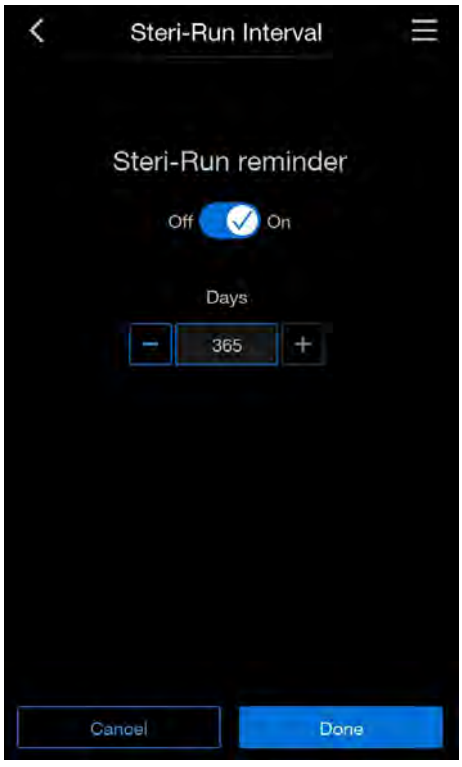

Figure 6-33. Setting the reminder interval for Steri-Run

1. Increase the number of days by pressing the + key.
2. Decrease the number of days by pressing the - key
3. Disable the reminder interval by setting the value to "Off".
4. Apply and save the change by pressing the "Done" key.
5. Press “Cancel” to return to the “Reminder intervals” selection menu without any changes.

   The system returns to the "Reminder intervals" selection menu.

Calibration

In the “Calibration” menu, you can calibrate the values for temperature and CO_2.

For more information on this, please read the chapter "Temperature calibration" on Page 9-3 and "CO2 calibration" on Page 9-7.

Logging cycle time

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

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.

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

Calling up logging cycle time

1. Press the "Menu" key.
2. Select the “Settings” menu command.
3. Select the “Logging cycle time” menu command.

   The selection menu shown in Figure 6-2 appears:

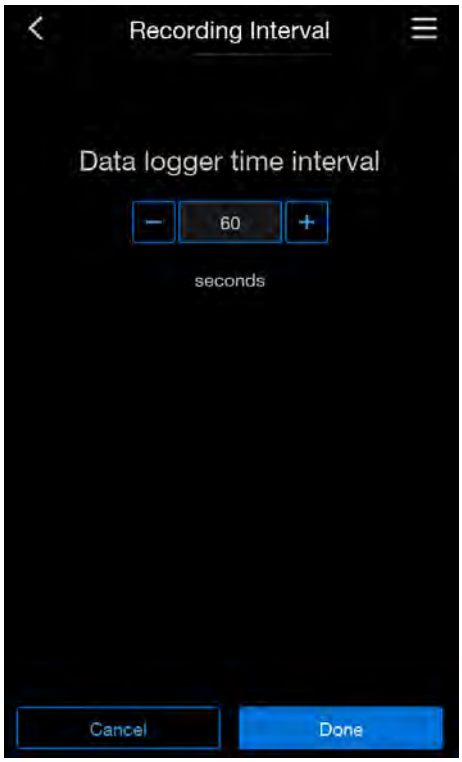

Figure 6-34. Logging cycle selection menu

Setting the logging cycle time

1. Increase the value by pressing the + key.
2. Decrease the value by pressing the - key.
3. Apply and save the change by pressing the "Done" key.

   The system returns to the “Settings” selection menu.
4. Press “Cancel” to return to the “Settings” selection menu without any changes.

   .

Note

Data logging cycles:

The logging cycle time does not affect the entries in the error table.

Keypad lock

Deactivate or activate the keypad lock here with the code you previously set ("Changing the keypad lock code" on Page 6-29).

1. Press the "Menu" key.
2. Select the “Keypad lock" menu command.
3. Select the “Logging cycle time” menu command.

   The input dialog shown in Figure 6-2 appears:

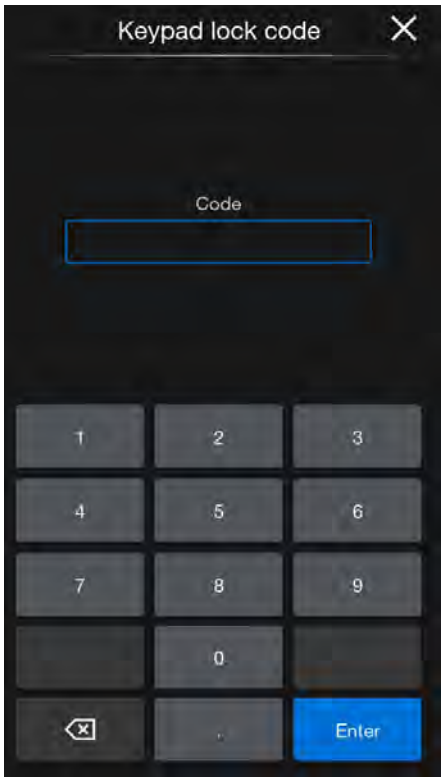

Figure 6-35. Keypad lock input dialog

1. Enter the applicable keypad lock code.
2. Apply and save the change by pressing the "Enter" key.

   You will be returned to the start screen.

A red lock at the lower edge of the display on the start screen indicates that the keypad lock is active.

- To override the keypad lock, repeat the above steps.

The lock symbol on the display will disappear again.

Software versions

The "Software versions" menu displays the versions of the software implemented to control the device.

1. Press the “Menu” key on the start screen (Figure 6-2).

2. Select the “Software versions” menu command.

   The “Software versions” menu appears:

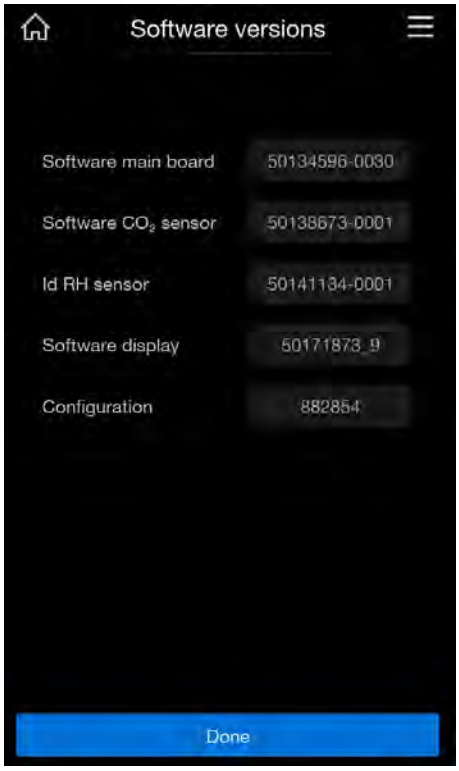

Figure 6-36. Software versions menu

3. Press “Done” to return to the start screen.

Error messages

Error detection is part of the device-internal control system. It monitors the control loops, including their sensors. If an error is detected in the system, the alarm relay is switched and issues the following signals and messages:

- An acoustic alarm is issued as a two-tone buzzer sound,
- In the event of a temperature, CO_2, O_2, or humidity error, the relevant value is displayed highlighted in red on the start screen (Figure 6-39). As long as the error exists, you can continue to read it out by touching this field.
- If the door is opened, an info screen appears on which no further interaction is possible until the door is closed again:

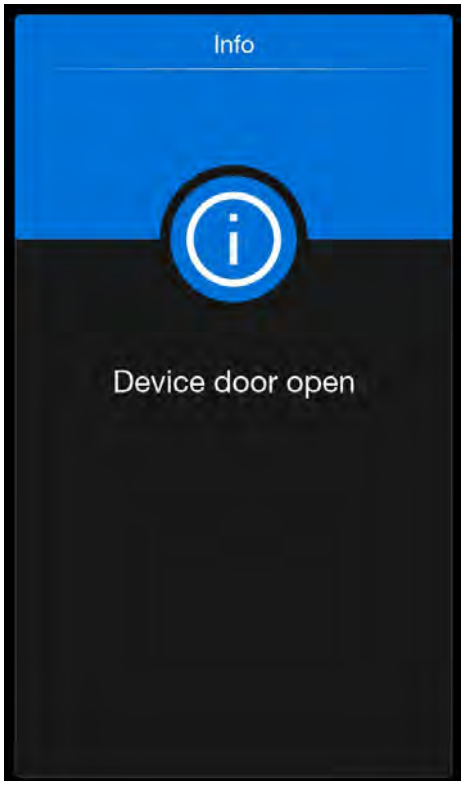

Figure 6-37. Device door open

- In the event of a system error or if the door is open too long, an alarm screen will appear on which the error is stated:

Figure 6-38. System error Door open too long

- the detected error is listed in the error table,
- the event is entered in the event display.

Response to an error message event

If the alarm relay was switched due to a user action, the switching status can be reset by confirming the error message (e.g. for the manual cancellation of the Steri-Run sterilization cycle).
If the alarm relay was switched due to a technical error, the switching status remains active until the error has been corrected (e.g. water level in workspace too low).

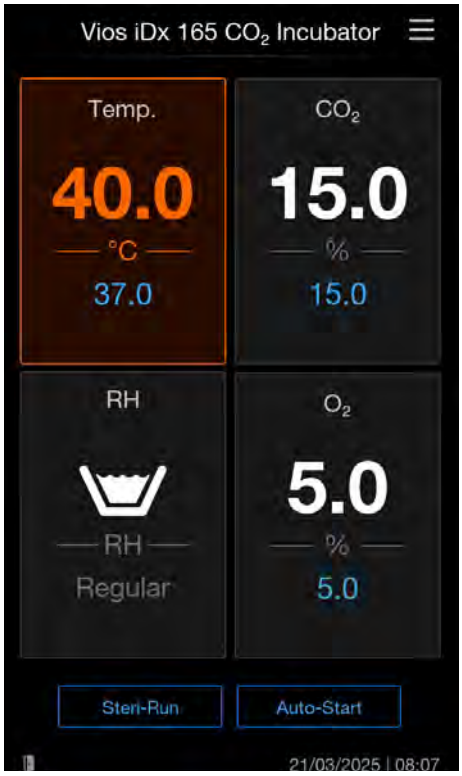

Figure 6-39. Example of temperature error message

1. Click on the temperature display field.

   The "Temp Alarm" screen appears.

Figure 6-40. Temp alarm screen

2. Acknowledge the error by pressing the “Achknowledge” key.

   The screen returns to the start screen.

Resetting overtemperature protection

CAUTION

If you do not restart the device after an overtemperature error, damage to internal components may occur after a while.

When the device control has activated overtemperature protection and switched over to emergency control mode, a flashing warning triangle and the icon are displayed in the main menu.

1. Press anywhere on the touchscreen to display the cause of the error.

   The Error dialog box appears and the detected cause of the error lights up.

   The acoustic signal is switched off.

2. Press the “Accept” key to close the error display.

   The error message fades out.

   The temperature display field is outlined in red.

3. Switch off the device to clear the error message.
4. Open the doors and allow the workspace to cool.
5. Switch the device on.

Take the device out of service and call the technical service if the overtemperature protection is activated again despite the elimination of the possible causes of the error (see error table).

Action after power failure

After a power failure, condensation of the moisture in the internal space can form on the sensors. This can impair their function to such an extent that incorrect measured values are displayed or the device even reports a defect (sensor breakage; see "Overview of causes of errors and troubleshooting" on Page 6-51).

The following action must be taken to ensure error-free operation:

1. Drain the water and allow the internal space to dry.
2. Without water, allow the instrument to heat up to 55°C (131 °F)for 1 hour.
3. Then allow the device to cool down with the doors open.
4. Then operate the device at incubation temperature as described in the chapter "Start-up" on Page 4-1.

Alternatively, or if the action described above does not have the desired result, a sterilization run can be started at 180°C (356 °F). For this, see section "Steri-Run sterilization cycle" on Page 8-5.

The sterilization process can be terminated after approximately 1 hour. The sensors should have dried by then.

Overview of causes of errors and troubleshooting

The error tables provide information on source of error, cause of error, and possible troubleshooting measures.
When communicating with the Thermo Fisher Scientific Technical Service team, please have the device data ready.

System control loop					
Error message	**Cause**	**Remedy**	**Alarm relay**	**Buzzer**	**Log**
Device door open too long	Device door is for more than 10 min	Close device door	X	X	X
Error: Display	Display not communicating with the main board *1)	Reset device. If the error occurs repeatedly, call Service	X	X	X
Error: EEPROM main board	EEPROM on main board is defective	Reset device. If the error occurs repeatedly, call Service	X	X	X
Error: Data logger	Error writing to the data logger memory. Incubator remains functional.	Reset device. If the error occurs repeatedly, call Service			
Error: Steri-Run	Error in Steri-Run routine	Reset device. If the error occurs repeatedly, call Service	X	X	X
Power-down during Steri-Run	Power failure during Steri-Run routine	Restart device 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 device. If the error occurs repeatedly, call Service.	X	X	X
Error: Fan	Actual value of the fan is out of tolerance.	Reset device. If the error occurs repeatedly, call Service.	X	X	X

Temperature control loop					
Error message	**Cause**	**Remedy**	**Alarm relay**	**Buzzer**	**Log**
Sensor breakage	Measured value outside the accepted limit	Call Service. Conduct drying process.	X	X	X

Temperature control loop					
Error message	**Cause**	**Remedy**	**Alarm relay**	**Buzzer**	**Log**
Actual value high	Actual value > Set value + 1°C (33.8 °F) *2) *4)	Do not exceed permissible ambient temperature / Call Service.	X	X	X
Actual value low	Actual value < Set value + 1°C (33.8 °F)*3) *4)	If the error does not reset automatically, call Service.	X	X	X
Actual value not plausible	Implausible temperature signal	Reset device. If the error occurs repeatedly, call Service.	X	X	X
Calibration values too high/low	Max. calibration value for temperature exceeded/not attained	Acknowledge alarm, enter different target value.			X

CO_2 **control loop**					
Error message	**Cause**	**Remedy**	**Alarm relay**	**Buzzer**	**Log**
Sensor breakage	Measured value outside the accepted limit	Run auto-start. If the error subsequently occurs again, resolve the error according to the section "Action after power failure" on Page 6-49. If the error persists, call Service.	X	X	X
Actual value high	Actual value > Set value + 1% *4)	automatic	X	X	X
Actual value low	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

Temperature control loop					
Error message	**Cause**	**Remedy**	**Alarm relay**	**Buzzer**	**Log**
Actual value high	Actual value > Set value + 1°C (33.8 °F) *2) *4)	Do not exceed permissible ambient temperature / Call Service.	X	X	X
Actual value low	Actual value < Set value + 1°C (33.8 °F)*3) *4)	If the error does not reset automatically, call Service.	X	X	X
Actual value not plausible	Implausible temperature signal	Reset device. If the error occurs repeatedly, call Service.	X	X	X
Calibration values too high/low	Max. calibration value for temperature exceeded/not attained	Acknowledge alarm, enter different target value.			X

CO_2 **control loop**					
Error message	**Cause**	**Remedy**	**Alarm relay**	**Buzzer**	**Log**
Sensor breakage	Measured value outside the accepted limit	Run auto-start. If the error subsequently occurs again, resolve the error according to the section "Action after power failure" on Page 6-49. If the error persists, call Service.	X	X	X
Actual value high	Actual value > Set value + 1% *4)	automatic	X	X	X
Actual value low	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

CO_2 **control loop**					
Error message	**Cause**	**Remedy**	**Alarm relay**	**Buzzer**	**Log**
Calibration values too high/low	Max. calibration value for CO_2 exceeded/not reached	Acknowledge alarm			X
Error communication	Sensor not communicating with the main board	automatic	X	X	X
No gas	The gas cylinder is empty or the gas supply is interrupted, or there is a malfunction.	Replace at least one CO_2 cylinder.	X	X	X
RH sensor breakage	Measured value outside the accepted limit	Call Service. See also the section "Action after power failure" on Page 6-49.	X	X	X

O_2 **control loop**					
Error message	**Cause**	**Remedy**	**Alarm relay**	**Buzzer**	**Log**
Sensor breakage	Measured value outside the accepted limit	Call Service	X	X	X
Actual value high	Actual value > Set value + 1% *4)	Check gas supply. Lower pre-pressure to max. 1 bar.	X	X	X

O_2 **control loop**					
Error message	**Cause**	**Remedy**	**Alarm relay**	**Buzzer**	**Log**
Actual value low	Actual value < Set value - 1% *4)	Check gas supply. Replace gas cylinder. Raise pre-pressure to max. 1 bar. Check feed pipe.	X	X	X
Error communication	Sensor not communicating with the main board	Call Service	X	X	X
No gas	The gas cylinder is empty or the gas supply is interrupted, or there is a malfunction.	Replace at least one O_2 cylinder.	X	X	X

RH control loop					
Error message	**Cause**	**Remedy**	**Alarm relay**	**Buzzer**	**Log**
No water	Not enough water in water reservoir.	Add water or select the “Dry Incubation” function. The water level sensor is automatically deactivated. If the error message recurs in spite of top-up, perform troubleshooting as per the chapter "Action after power failure" on Page 6-49 . If the error persists, call Service.	X	X	X

*1) This error appears on the display only and is not entered in the error table.

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

*3) Waiting times before error message:

Overtemperature

- 1 min after door opening
- 1 min after set value change

Low temperature

- 45 min after door opening
- 300 min after set value change

CO_2 too high/low

- 45 min after door opening
- 159 min after set value change

O2 too high/low

- 159 min after door opening
- 159 min after set value change

*4) This value can be changed by Service.

Shutdown

Contents

Shutting the device down

WARNING

Contamination hazard!

The surfaces of the workspace may be contaminated. There is a risk that germs could remain inside the chamber.

Decontaminate the device before shutting down!

1. Remove the culture containers with the cultures and all accessories from the workspace.
2. Provide a collection vessel with sufficient capacity.
3. Place the end of the tube in the collection vessel and securely engage the tube valve.

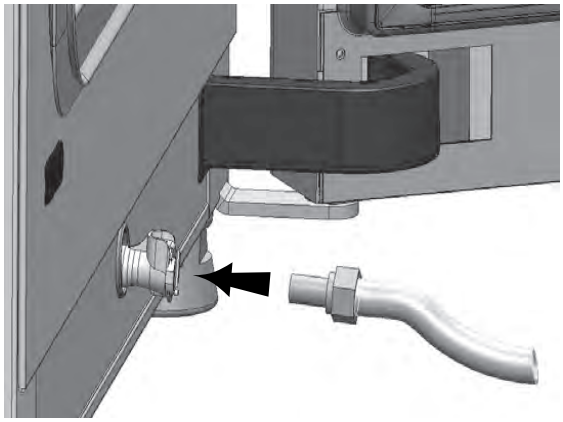

Figure 7-1. Fill and drain valve of the water reservoir

4. Completely empty the water reservoir into the collection vessel.

5. Remove the tube valve again.
6. Start the Steri-Run sterilization cycle ("Activate Steri-Run" on Page 8-10).
7. Use the power switch to switch off the device when the Steri-Run sterilization cycle is complete.
8. Disconnect the mains plug and secure it against reconnection.
9. Close the closing valves of the $CO_2/O_2/N_2$ supply system.
10. Disconnect the gas pressure tubes from the connection valve on the back of the device.
11. Open the glass door and the outer door slightly and secure them in the open position so that the workspace is continuously ventilated during the shutdown phase.

Cleaning and disinfection

Contents

Cleaning

CAUTION

Incompatible cleaning agents!

Some device components are made of plastic. Solvents can dissolve plastics. Strong acids or caustic solutions can cause plastics to become brittle.

- Do not use solvents that contain hydrocarbons, agents with an alcohol content of more than 10%, or strong acids or alkalis for cleaning plastic components and surfaces!

Moisture-sensitive components!

- Do not spray cleaning agent onto the display or the control box at the rear of the device.
- When wiping, be careful to prevent moisture from entering these components.

Cleaning exterior surfaces:

1. Remove dirt residues and deposits thoroughly using a solution of lukewarm water and commercially available dishwashing agent.
2. Wipe the surfaces clean using a clean cloth and clear water.
3. Finally, rub the surfaces dry with a clean cloth.

Cleaning the display:

CAUTION

Moisture-sensitive display!

- Do not wipe the display with a damp cloth or spray it with cleaning agents!

- Dry the display with a cloth made of 100% microfiber!

Decontamination procedures

Information on cleaning and disinfecting the Cell Locker is provided in the separate Cell Locker operating instructions (see Appendix).
To decontaminate the device, the operator must provide hygiene guidelines that coordinate the decontamination measures with the use of the device.
Wipe/spray disinfection and the Steri-Run sterilization cycle are suitable for the device.

Recommended disinfectants

Type	Concentration	Product (example)
Ethanol	70%	Any
Isopropanol	70%	Any
Quaternary ammonium	10% or less (optimal 2%)	Conflikt™, Lysol™, No Rinse™, Fermacidal D2™
Hydrogen peroxide	1-3%	Any
Hydrogen peroxide/peracetic acid/acetic acid	1%/0.8%/<10%	Spor-Klenz Ready-to-Use (RTU); Sterilant (Steris Life sciences)

Wipe/spray disinfection

Wipe/spray disinfection is used as the standard manual disinfection procedure for the device and for all accessories. It is carried out in three phases:

- Pre-disinfection
- Cleaning

– Final disinfection

WARNING

Alcoholic disinfectants!

Disinfectants with an alcohol content of more than 10% may form, in combination with air, readily inflammable and explosive gas mixtures.

- When using such disinfectants, avoid open flames or exposure to strong heat during the entire disinfection process!
- Use disinfectants only in well-ventilated rooms.
- After exposure to the disinfectant, wipe the cleaned device components thoroughly dry.
- Observe the safety rules for avoiding fire and explosion hazards caused by disinfectants containing alcohol.

WARNING

Chloride-containing disinfectants!

- Do not use disinfectants that contain chloride!

DANGER

Electric shock!

Contact with current-carrying components may cause a lethal electric shock.

- Disconnect the device from the power supply before beginning manual cleaning and disinfection.
  - Switch off the device at the power switch.
  - Pull out the mains plug and secure it against accidental reconnection.
  - Make sure the device is de-energized.

WARNING

Health hazard!

The surfaces of the workspace may be contaminated. Contact with contaminated cleaning liquids may cause infections. Disinfectants may contain substances that are harmful to health.

- Comply with the safety measures and hygiene rules during cleaning and disinfection!
  - Wear safety gloves.
  - Wear safety goggles.
  - Wear mouth and nose protection to protect your mucous membranes.
  - Observe the safety instructions of the disinfectant manufacturer and the hygiene supervisor.

Pre-disinfection

CAUTION

Moisture-sensitive components!

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

1. Apply disinfectant to the surfaces of the workspace and fixtures and wipe them down.
2. Allow the disinfectant to work in according to the manufacturer's instructions and let air dry. This will remove chemical residues that could otherwise collect over time and cause damage to the incubator components.

Remove components

1. Remove the insert shelves and then remove the entire shelf system from the workspace. Installation and removal of the shelf system are described in the section "Installing the shelf system" on Page 4-7.
2. Remove the airbox and HEPA filter. Installation and removal of the airbox and HEPA filter are described in the section "Replacing the HEPA filter" on Page 9-10.

Figure 8-1. HEPA filter and airbox

3. Pull the upper part of the air duct (Figure 8-1, 1) towards the front of the device and lift it down when the keyhole profiles on the front tabs release the holding pins in the workspace ceiling.
4. Unhook the top section from the back section of the air duct (Figure 8-2, 2) and remove it from the work space.

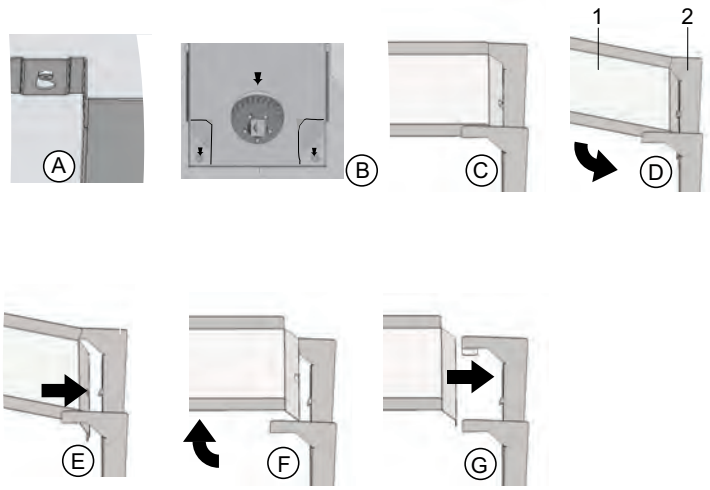

Figure 8-2. Air duct

5. Unhook the back part of the air duct (Figure 8-2, 2) from the rear panel and remove it.
6. Remove the pre-filter (Figure 3-1, 9).
   The pre-filter can be [1]autoclaved.
7. Remove the water reservoir cover.

Cleaning the workspace and removed parts

1. Remove dirt residues and deposits thoroughly using a solution of lukewarm water and commercially available dishwashing agent.
2. Wipe the surfaces clean using a clean cloth with plenty of clear water.
3. Then remove the cleaning water from the water reservoir and rub all surfaces of the workspace thoroughly dry.
4. Clean the removed parts and wipe them dry as well.

Final disinfection

1. Wipe the surfaces of the workspace, the shelf system, and the removed parts again with disinfectant or spray them with it.
2. Allow the disinfectant to work in according to the manufacturer's instructions.
3. Reassemble the shelf system and detachable parts.

Steri-Run sterilization cycle

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

Steri-Run is an automated sterilization cycle that works with a fixed nominal temperature (180°C (356 °F)) and a software-controlled routine for heating up, holding the nominal temperature, and cooling down.

[1] At 121°C (249.8 °F), 15 minutes, rapid pressure release

The entire program cycle of the sterilization routine takes under 12 hours.
During this routine, a hot atmosphere at 180°C (356 °F) with a demonstrated 12-log sterility assurance level is created in the workspace for 90 minutes. The effectiveness of the Steri-Run sterilization cycle has been certified by independent institutes. The germ reduction achieved is equal to 10^{12} (12-log reduction) as per the ISO 11138 standard. On request, Thermo Scientific will supply information on the pertinent tests.

The electromechanical door lock provides the Steri-Run sterilization cycle with additional protection against burns. It locks the outer door when the workspace temperature reaches 65°C (149 °F), then keeps it locked as long as hazardous temperatures prevail, and finally releases the door lock when the workspace temperature drops back below 65°C (149 °F).

Preparing for disinfection or Steri-Run

1. Remove all cultures from the culture chamber and store them safely.
2. Provide a collection vessel with sufficient capacity.
3. Place the end of the tube in the collection vessel and securely engage the tube valve.

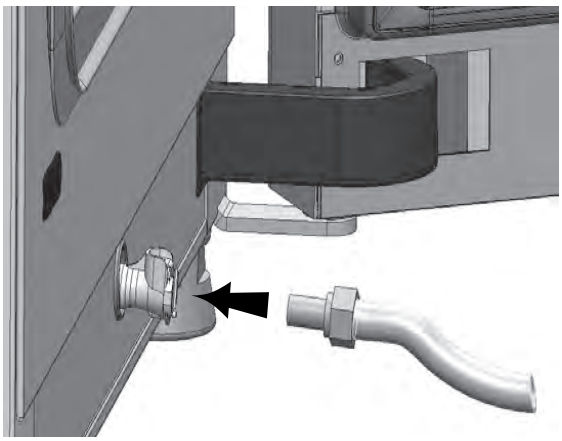

Figure 8-3. Fill and drain valve of the water reservoir

4. Completely empty the water reservoir into the collection vessel.
5. Wipe away the residual water with a cloth.
6. Pull the airbox (Figure 8-1, 1) from the base of the water reservoir cover and remove it.
7. Remove the HEPA filter (Figure 8-1, 2) from the airbox (Figure 8-1, 1) and install the airbox again.

Perform disinfection or Steri-Run (cycle)

WARNING

Hot surfaces!

The handle of the glass door, the inner panel of the outer door, and the surfaces of the shelf system and of the workspace become extremely hot during the Steri-Run sterilization cycle.

- During the cycle or immediately after completion of the cycle, always wear safety gloves when touching these surfaces!
  Incubators equipped with the door lock kit prevent access to the workspace while the interior surfaces are hot due to the Steri-Run sterilization cycle.

CAUTION Damage to the cultures!

During the Steri-Run sterilization cycle, the workspace is heated to 180°C (356 °F).

- Ensure that:
  - all cultures have been removed from the workspace,
  - all accessories have been removed from the workspace,
  - the HEPA filter and all Cell Lockers have been removed from the workspace.

CAUTION

Operating temperature limits for the Cell Locker!

- Remove the Cell Lockers prior to performing a Steri-Run sterilization cycle.

The maximum operating temperature for Cell Lockers is 121°C/250°F.

Cell Lockers melt in the incubator if exposed to the Steri-Run cycle.

Cell Lockers can be sterilized in an autoclave at 121°C (250 °F) for 15 minutes with rapid depressurization.

Cell Locker membrane filters may not be sterilized in an autoclave.

Note

Prevention of the start of the Steri-Run sterilization cycle

The Steri-run sterilization cycle cannot be started if any of the following faults is detected:

Temperature control loop

- Sensor breakage
- Outer and/or inner door (if the outer door is open, the "Door open“ error message appears)
- Actual value high (excessive deviation from set value)
- Actual value low (excessive deviation from set value)
- Actual value not plausible
- Error communication
- Water detected

Overtemperature protection

If the overtemperature protection has been activated on the device, the Steri-Run sterilization cycle cannot be started until the fault has been corrected or reset.

Note

Once the cycle has been completed, the device must be restarted by launching the auto-start routine

1. After cleaning, reinstall the shelf system components in the workspace.
2. Switch on the device using the power switch.
3. Activate and start the Steri-Run sterilization cycle.
4. Switch off the device after the Steri-Run sterilization cycle is completed.
5. Remove the airbox (Figure 8-1, 1) and reinstall the HEPA filter (Figure 8-1, 2).
6. Resume operation with auto-start as needed.

Operating phases of the Steri-Run sterilization cycle

The remaining run time of the Steri-Run sterilization cycle describes the time between the start or the current time status of the routine to the end of the "Cool-down" phase. The displayed remaining run times are not measured values but merely a guide.

The cycle is divided into three phases:

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

Heating phase

Approx. 2 h

The workspace is heated to 180°C (356 °F).
Incubators equipped with the electromagnetic door lock kit lock the door when the workspace temperature exceeds 65°C (149 °F).

Sterilization phase

Approx. 1.5 h

After the sterilization temperature has been generated, the sterilization phase is started and takes approximately 90 minutes. The temperature is maintained at180°C (356 °F).

Cool-down phase

Approx. 8 h

The device cools down until the original temperature set value is reached.
Incubators equipped with the electromagnetic door lock kit release the door lock when the workspace temperature drops below 65°C (149 °F).

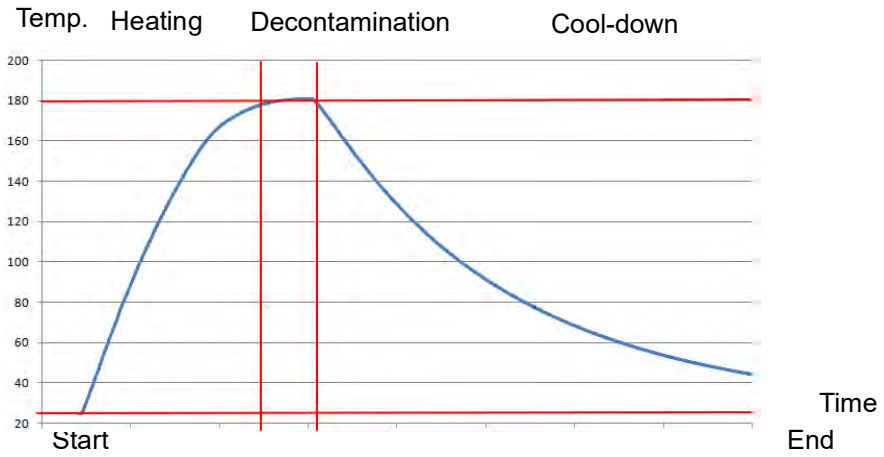

Figure 8-4. Phases of the Steri-Run sterilization cycle

Activate Steri-Run

1. On the display start screen, press the “Steri-Run” key.

   The Steri-Run menu is displayed:

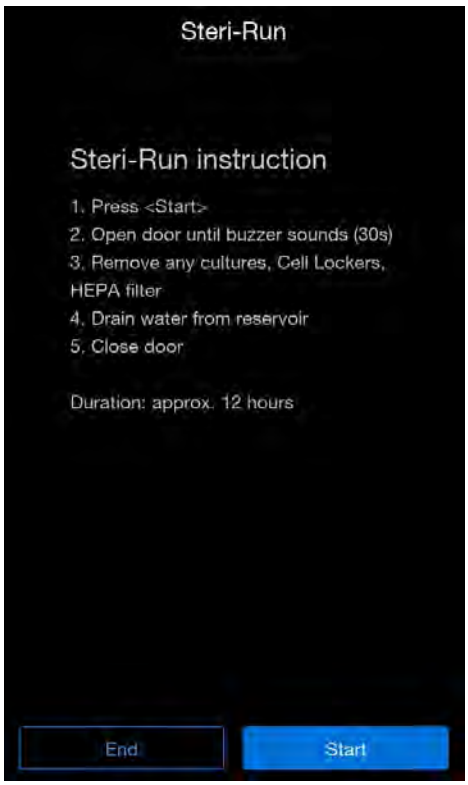

Figure 8-5. Steri-Run menu

2. Press the "Start" key.
3. Ventilate the work space by opening both device doors until the time signal sounds, after 30 seconds.
4. Remove all cultures from the workspace.
5. Drain the water out of the water reservoir and wipe up any residual water.
6. After the time signal sounds, close both device doors.
7. Start Steri-Run.

The Steri-Run sterilization cycle begins. The device heats up, and the electromechanical door lock engages at 65°C (149 °F).

While the Steri-Run sterilization cycle is running, the display shows the current status and additionally issues the following information:

- Temperature
- Start time
- Phase

– Remaining run time

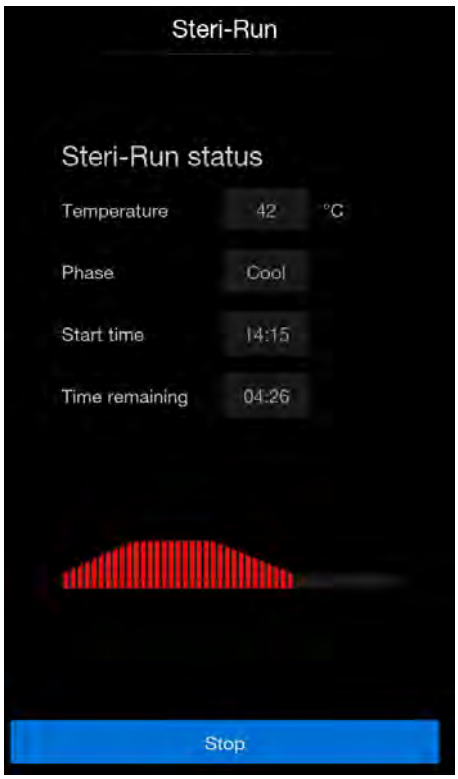

Figure 8-6. Steri-Run cycle

Canceling Steri-Run

The Steri-Run sterilization cycle can be stopped at any time:

1. Press the “Stop” key.

   The “Steri-Run Stop” dialog window appears as a security prompt. The routine can now be permanently canceled or resumed.

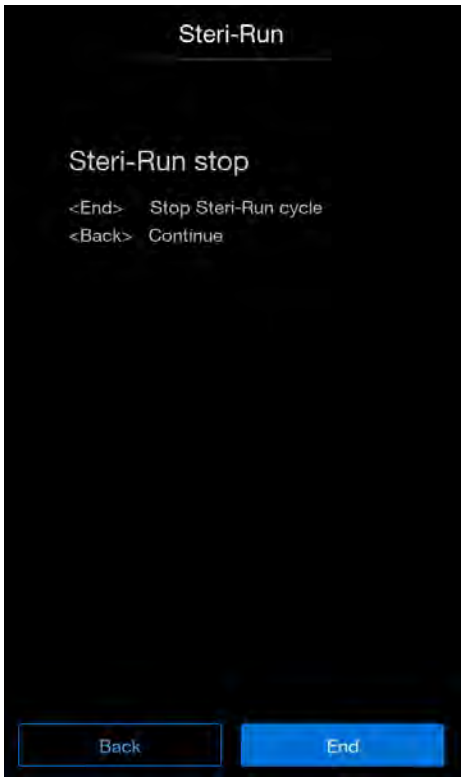

Figure 8-7. Steri-Run cancellation

Ending Steri-Run

1. Press the "End" key.

   The system returns to the main menu.

Resuming Steri-Run

1. Press the "Back" key.

   You will be returned to the status display, and the Steri-Run sterilization cycle will be continued.

Interrupting Steri-Run from the status display

1. Press the “Stop” key.

   The “Steri-Run Stop” dialog window appears as a security prompt. Proceed as described under “Ending Steri-Run.”

Steri-Run interruption due to error

If an error occurs while the sterilization cycle is running, an error message is issued and the following action is initiated:

- The Steri-Run sterilization cycle automatically changes to the cooling phase.
- The acoustic signal (buzzer) sounds.

1. Confirm the acoustic signal by touching the display in any place.

   The acoustic signal stops. The "End" key is displayed. If the Steri-Run sterilization cycle is not then manually canceled, the workspace is cooled to the set temperature and dried.

Completing Steri-Run

After all three phases have been completed, the “Steri-Run End” dialog window (Figure 8-8) is automatically displayed. The Steri-Run sterilization cycle must be ended manually.

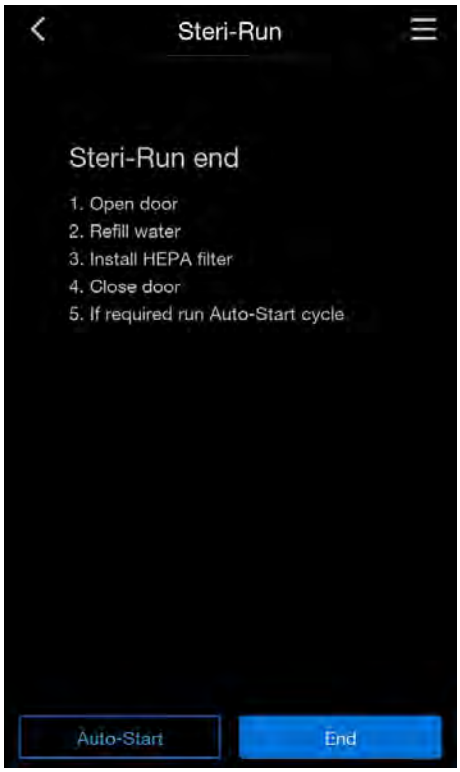

Figure 8-8. Ending Steri-Run

- Press the "End" key.

  The system returns to the main menu.

Opening the door after canceling the Steri-Run sterilization cycle

WARNING

Hot surfaces!

The handle of the glass door, the inner panel of the outer door, and the surfaces of the shelf system and of the workspace become extremely hot during the Steri-Run sterilization cycle.
During the cycle or immediately after cancellation of the routine, always wear safety gloves when touching these surfaces!

On devices with the electromechanical door lock kit, the door cannot be opened immediately after cancellation of the Steri-Run sterilization cycle by the user or due to a fault.

To release the outer door lock before the temperature has dropped to a non-hazardous level of 65°C (149 °F), you must actuate the emergency release lever (Figure 8-9, 1):

1. Determine the position of the emergency release lever (Figure 8-9, 1) on the underside of the incubator. It is located on the left side of the device, approximately 5 cm from/behind the power switch (Figure 8-9, 2).

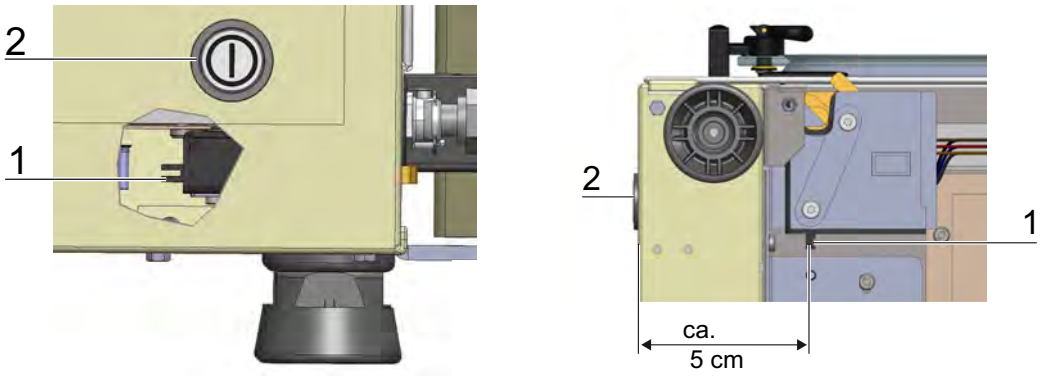

Figure 8-9. Emergency release on the underside of the incubator

2. Reach under the base panel and pull the emergency release lever (Figure 8-9, 1).

   The door lock disengages, and the outer door can be opened.

Maintenance

Contents

Inspections and checks

WARNING

Function test

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

To maintain the functionality and safety of the device, the functions and device components listed below must be tested at regular intervals.

Information on Cell Locker maintenance can be found in the separate Cell Locker operating instructions (see Appendix).

Daily check

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

Annual inspection

- Tightness of the glass door seal
- Permeability of the pressure compensation opening with filter
- Function test of the control panel and the device control
- Electrical safety check in accordance with the current national regulations (e.g. BGV 3)

Maintenance intervals

- Perform the following maintenance work during operation:

Monthly maintenance

- Manually clean and disinfect the device.
- Drain the sterilized distilled water and replace it with fresh sterilized distilled water.

Quarterly maintenance

- Run the Steri-Run sterilization cycle and auto-start routine.
- Perform temperature and CO_2/O_2 comparison measurement.

Semi-annual maintenance

Note

Information on Cell Locker seals and membrane filters can be found in the corresponding operating instructions (see Appendix).

- Every 6 months, inspect each door seal and replace as necessary.

Annual maintenance

Note

Maintenance contract

Thermo Scientific offer a device-specific maintenance contact that includes all necessary inspection and maintenance services.

- Change the gas intake filter.
- Change the HEPA filter
- Have a service check carried out by the Technical Service.

Temperature calibration

Preparing the temperature calibration

A temperature calibration measurement should be carried out on a quarterly basis to determine the exact measured value of the device-internal temperature sensor. If a major measurement deviation is determined, perform a temperature calibration:

- Set the temperature control of the device to the measured value of the comparison measurement. For the comparison measurement, use a calibrated measuring instrument with an accuracy of < ± 0.1°C (33.8 °F). The reference site of the comparison measurement is the middle of the workspace.

Note

Workspace temperature too high:

A possibly excessive workspace temperature after calibration can be remedied by opening the doors for approximately 30 seconds.

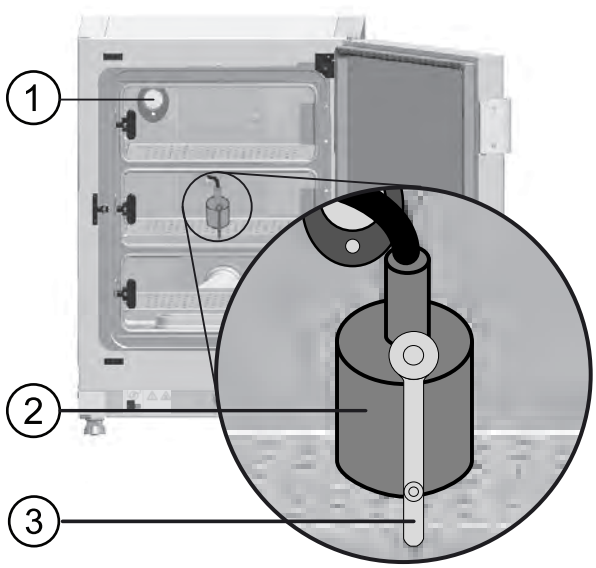

Figure 9-1. Preparing the temperature calibration

Conducting the comparison measurement

1. Switch on the device at the power switch.
2. Adjust the temperature set value and wait until the device has warmed up. This may take several hours.
3. Place the measuring instrument (2) in the middle of the shelf in the middle area of the workspace or, alternatively, position a temperature sensor in the same place.
4. Route the supply line either through the measurement opening in the glass door (3) or through the access port (1) on the back of the device.
5. Close the doors.
6. Wait until a constant temperature value can be read on the measuring instrument.
7. Perform the temperature calibration.

Performing the temperature calibration

Measurement example:

Target set value: 37°C (98.6 °F)
Measured comparison temperature: 36°C (96.8 °F)

1. Press the temperature display field on the start screen.

   The temperature menu (Figure 9-2) is displayed.

Figure 9-2. Temperature selection menu

2. Leave the temperature menu by pressing the “Done” key.
3. Call up the Calibration sub-menu:
   a. Press the “Menu” key on the start screen.
   b. Select the “Settings/setup” menu command.
   c. Select the “Calibration” menu command.
   d. Select the “Temperature” menu command.

   The “Temperature calibration” menu will open:

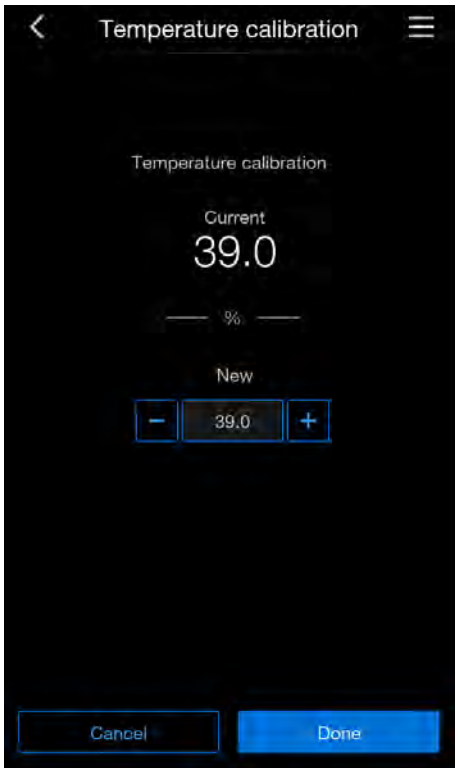

Figure 9-3. Performing the temperature calibration

4. Enter the measured value (target value).

Note

The target value may be increased or decreased in increments. Pressing and holding the respective - or + keys switches the function to fast forward. After approximately three seconds, the speed of the fast forward is additionally increased.

5. Press the “Done” key to apply and save the target value.
6. Press the “Cancel” key to abort the procedure.

   You will be returned to the “Calibration” menu. The temperature display shows the actual value currently measured in the workspace.

Note

Workspace temperature too high

A possibly excessive workspace temperature after calibration can be remedied by opening the doors for approximately 30 seconds.

If the value has not changed within 30 seconds, the system automatically exits the menu, and the most recently confirmed value is applied.

CO_2 calibration

Preparing CO_2 calibration

A CO_2 comparison measurement should be carried out quarterly to determine the exact measured value of the device-internal CO_2 sensor. If you notice a major measurement deviation, perform a CO_2calibration:

- Set the CO_2 control of the device to the measured value of the comparison measurement. For the comparison measurement, use a calibrated measuring instrument (hand-held IR measuring device) with an accuracy of < ± 0.3% CO_2.
- Remove the measurement culture through the closable measurement opening [1] of the glass door. Perform the comparison measurement on the warmed-up device.

Conducting the comparison measurement

1. Switch on the device at the power switch.
2. Set the CO_2 set value and wait until the appliance has warmed through and the humidity has built up.
3. Guide the measuring probe of the hand-held IR measuring device through the measurement opening into the workspace. Wait until a constant CO_2 value can be read on the measuring device.

Note

For devices equipped with the optional segmented inner door, the measurement opening is located:

- for Vios iDx 165 in the middle segment of the segmented inner door
- for Vios iDx 255 in the left or middle segment of the segmented inner door

4. Remove the measuring probe.
5. Close the measurement opening and the doors.
6. Calibrate the CO_2 control.

Note

IR measuring cell

For devices with an IR measuring cell, the CO_2 calibration can only be carried out at a set CO_2 concentration of 4.0% CO_2 or higher.

Calibration should be performed at the CO_2 set value designated for the work process (prospective work process value).

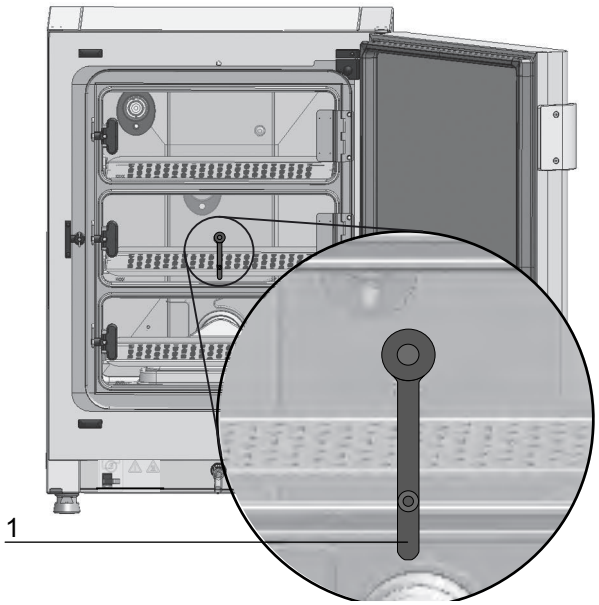

Figure 9-4. Measurement opening in a segmented inner door

Performing CO_2 calibration

Measurement example:

CO_2 set value: 5%
Reference value: 6%

1. Press the CO_2 display field on the start screen.

   The CO_2 menu is displayed.

Figure 9-5. CO_2 selection menu

2. Press the “Done” key to leave the CO_2 menu
3. Call up the Calibration sub-menu:
   a. Press the “Menu” key on the start screen.
   b. Select the “Settings/setup” menu command.
   c. Select the “Calibration” menu command.
   d. Select the “CO_2” menu command.

   The “CO_2 calibration” menu opens:

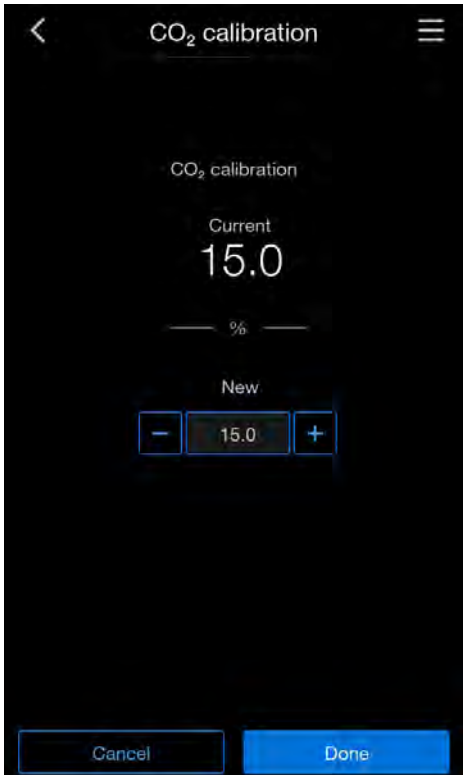

Figure 9-6. Performing CO_2 calibration

4. Enter the measured value (target value).

Note

The target value may be increased or decreased in increments. Pressing and holding the respective - or + keys switches the function to fast forward. After approximately three seconds, the speed of the fast forward is additionally increased.

5. Press the “Done” key to apply and save the target value.
6. You will be returned to the “Calibration” menu. The CO_2 display field shows the actual value currently measured in the workspace.

Note

Excessive CO_2 content

A possibly excessive CO_2 level after calibration can be remedied by opening the doors for approximately 30 seconds.

If the value has not changed within 30 seconds, the system automatically exits the menu, and the most recently confirmed value is applied.

Replacing the HEPA filter

The HEPA filter is located under a plastic hood (airbox) on the floor in front of the rear wall of the workspace.

1. Switch off the device.

2. Turn off the gas supply.
3. Allow the gas to dissipate from the workspace.
4. Take the middle and lower shelves out of the workspace.
5. Lift the water reservoir cover at the front. (Figure 9-7, 1)

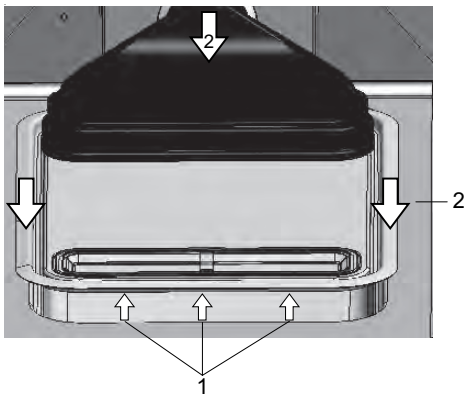

Figure 9-7. Removing the airbox

6. Pull the water reservoir cover forward and out. (Figure 9-7, 2).
7. Remove the airbox with the HEPA filter.
8. Turn the airbox over and unhook the tabs (Figure 9-8, 5) on the left side of the airbox from the catches (Figure 9-8, 6) of the HEPA filter.
9. Remove the tabs on the right side (Figure 9-8, 3) of the air box (Figure 9-8, 1) from the corresponding grooves in the HEPA filter (Figure 9-8, 4).

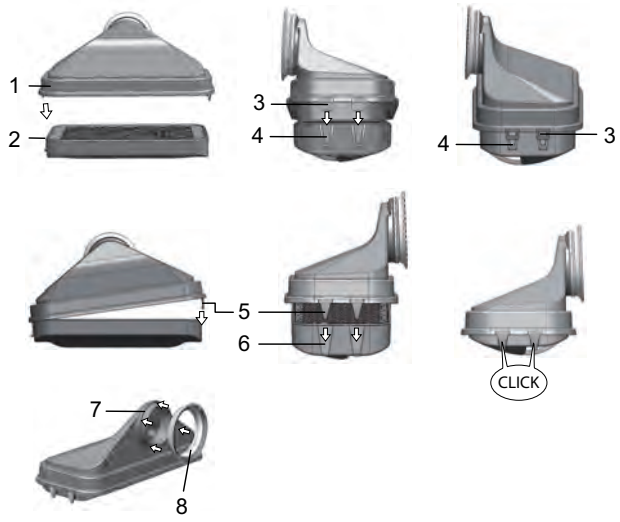

Figure 9-8. Installing the HEPA filter

10. Place the new HEPA filter in the airbox (Figure 9-8, 1) and lock it in place.
11. Place the airbox on the base of the water reservoir cover.
12. Activate the HEPA filter according to the instructions "HEPA configuration" on Page 6-19 in the user configuration if the device was previously operated without the HEPA filter.

13. If necessary, set the reminder interval for replacing the HEPA filter according to the instructions "Reminder intervals" on Page 6-39 in the user configuration.

Replacing the gas intake filter

The gas intake filter (CO_2/O_2/N_2supply) has a plastic thread and is screwed by hand into the threaded socket at the control box.

Gas intake filter of the gas supply

1. Make sure that the gas supply is shut off.
2. Release the hose clamp (Figure 9-9, 4).
3. Disconnect the gas hose (Figure 9-9, 5) from the connector of the gas intake filter.
4. Unscrew the locking plate (Figure 9-9, 1).
5. Unscrew the gas intake filter (Figure 9-9, 2) from the threaded socket (Figure 9-9, 3).
6. When screwing in the new gas intake filter, make sure that the plastic thread is not tilted. Carefully screw in the gas intake filter.
7. Screw on the locking plate.
8. Mount the gas hose on the connector of the filter and fasten it with the hose clamp. Check that the gas hose is tightly seated on the connector.

All gas intake filters

1. Make sure that the gas supply is shut off.
2. Unscrew the locking plate (Figure 9-9, 1).
3. Unscrew the gas intake filter (Figure 9-9, 2) from the threaded socket (Figure 9-9, 3).
4. When screwing in the new gas inlet filter, make sure that the plastic thread is not tilted. Carefully screw in the gas intake filter.
5. Screw on the locking plate.

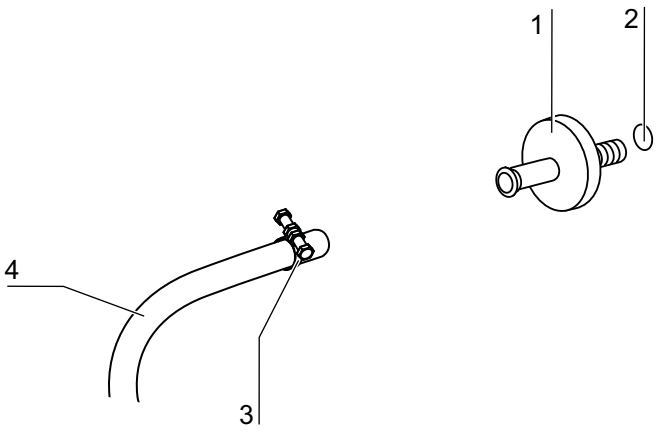

Figure 9-9. Gas intake filter installation

Replacing the device fuses

The device fuses cannot be replaced by the user. If the device fails due to an electrical fault, call Technical Service.

Replacing the door seal

Note

We recommend having the door seal replaced by a service technician or by qualified specialist staff.

Disposal

Contents

WEEE compliance:

This product has to comply with EC Directive 2012/19/EU on waste electrical and electronic equipment (WEEE). 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!

- Thoroughly clean the components of the device and then disinfect or sterilize them, depending on their intended use.
- Provide the goods for disposal with a declaration of harmlessness with precise information about the implementation of disinfection measures.

All components of the device can be sent for regulated disposed n accordance with the nationally applicable guidelines after appropriate decontamination.

HEPA filters must be disposed of in accordance with the applicable national directives on the handling of hazardous waste.

Note

Recycling service:

Thermo Fisher Scientific offers an environmentally sound recycling service for used devices.

Note

Before the device is disposed of, all stored personal data must be completely and irreversibly deleted in order to comply with international and national data protection laws and regulations.

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 containing various plastics, mounted on circuit boards containing epoxy resin bonder.
Plastic parts, general	ABS and PPS GF40, note material identification
Outer housing	Galvanized and painted steel sheet, Stainless steel 1.4016
Incubator rear wall	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 film	Polyethylene
Heaters	Silicone-sheathed resistance heating wires
Workspace containers, installed components, and shelves	Electropolished stainless steel 1.4301, 100% natural copper
Insert for pressure compensation opening	Stainless steel 1.4301 (base), 1.4404 (sintered filter)
Glass pane	Sodium silicate glass
Sensor block (WLD)	Stainless steel 1.4301
Piping	Plastics- and silicon-sheathed copper stranded wire
Elastomers, general	Silicone
Filters	HEPA filter, micro-fine glass, Cell Locker: membrane filter with ABS and silicone Gas filter with polypropylene housing and GF/PTFE membrane, Pre-filter, stainless steel 1.4401 wire mesh
Packaging	Corrugated cardboard, polyethylene film styrofoam molded parts, and polypropylene
Door seal magnet	Permanent magnet
Cell Locker	Polycarbonate Makrolon 2528
Device feet	Polyamide

Specifications

Contents

Vios iDx 165

Description	Unit	Value
Mechanical		
Outer dimensions (W x H x D)	mm / inch	637 x 900 x 880 (25.08 x 35.43 x 34.65)
Inner dimensions (W x H x D)	mm / inch	470 x 607 x 576 (18.50 x 23.89 x 22.68)
Inner space volume, of which usable volume	L L	approx. 165 approx. 100
Insert shelves (W x D) Quantity, scope of delivery Quantity, maximum Surface loading capacity, maximum	mm / inch pcs. pcs. kg / lbs	423 x 465 (16.65 x 18.31) 3 11 10 per insert shelf
Overall device loading capacity, maximum	kg / lbs	30 / 66.14
Weight	kg / lbs	82 /180.78
Thermal		
Thermal safety features in accordance with DIN 12880:2007-05		Class 3.1 (Overtemperature controller, providing alarming function upon excessive temperature condition)
Ambient temperature range	°C / °F	+18...34 (+64.4...93.2)
Ambient temperature for stacked devices	°C / °F	+18...28 (+64.4...82.4)
Temperature control range, incubation		RT + 3...55
Temperature deviation, temporal (DIN 12880, part 2) at 37 °C (98.6 °F)		± 0.1
Temperature deviation, spatial (DIN 12880, part 2) at 37 °C (98.6 °F)[a*]		≤ ± 0.3
Duration of the auto-start routine: up to 37 °C (98.6 °F) Ambient temperature 20 °C (68 °F)	h	5...10
Heat transfer to environment:		
at 37 °C (98.6 °F)	kWh/h	0.06
During Steri-Run sterilization cycle	kWh/h	0.59

Description	Unit	Value
Humidity		
Sterile distilled water qualities		Resistivity: 50 KΩcm to 1 MΩcm Conductivity: 1 to 20 µS/cm
Fill quantities: Incubation operation	L	max. 3 / min 0.5
Constant humidity at 37 °C (98.6 °F) (high humidity mode) Constant humidity at 37 °C (98.6 °F) (low humidity mode)	% RH % RH	approx. 93[b] approx. 90
Other		
Noise level (DIN 45 635, part 1)	dB(A)	< 50
Relative ambient humidity	% RH	max. 80
Altitude of installation site	meters above sea level	max. 2000

[a]Values determined on the basis of DIN 12880 for standard devices. Consult the calibration instructions for further information.

[b] The specifications are met under standard laboratory conditions at sea level, at an ambient temperature of + 22 °C 71.6 °F) and rated operating voltage. Other process conditions or ambient temperatures or altitudes may affect performance by up to ± 2.5%. For example, a 2 °C (35.6 °F) change in ambient temperature can affect relative humidity by 1% RH.

Vios iDx 165

Description	Unit	Value
CO_2 gas supply system		
Gas purity	%	min. 99.5 or med. quality
Preset pressure	bar / psi	min. 0.8 - max. 1 (11.6 - 14.5)
Instrumentation and control range	vol -%	0...20
Control deviation, temporal	vol -%	± 0.1
CO_2 measurement cell		
Accuracy at 37°C (98.6 °F) and 5% CO_2	%CO_2	± 0.3
O_2/N_2 gas supply system		
Gas purity	%	min. 99.5 or med. quality
Preset pressure	bar / psi	min. 0.8 - max. 1 (11.6 - 14.5)
Instrumentation and control range	vol -%	1... 21 or 5...90
Control deviation, temporal	vol -%	± 0.2
O_2 measurement cell		
Accuracy at 37°C (98.6 °F) and 21% O_2	%O_2	± 0.5 (Option: 1.....21% O_2) ± 2.0 (Option: 5.....90% O_2)
Electric		
Rated voltage	V	1/N/PE 230 V, AC (± 10%) 1/N/PE 220 V, AC (± 10%) 1/N/PE 120 V, AC (± 10%) 1/N/PE 100 V, AC (± 10%)
Rated frequency	Hz	50/60
Degree of protection (IEC 60529)		IP 20
Protection class		I
Overvoltage category (EN 61010)		II
Degree of pollution (EN 61010)		2

Description	Unit	Value
Rated current	A	**230 V:** Sterilization: 4.6 Incubation: 2.4 **220 V:** Sterilization: 4.4 Incubation: 2.3 **120 V:** Sterilization: 8.3; Incubation: 4.6 **100 V:** Sterilization: 7.2; Incubation: 3.9
Circuit breaker		16 A
Rated consumption	kW	**230 V:** Sterilization: 1.10 Incubation: 0.56 **220 V:** Sterilization: 0.97 Incubation: 0.51 **120 V:** Sterilization: 1.01 Incubation: 0.55 **100 V:** Sterilization: 0.72 Incubation: 0.39

Vios iDx 255

Description	Unit	Value
Mechanical		
Outer dimensions (W x H x D)	mm / inch	774 x 969 x 934 (30.47 x 38.15 x 36.77)
Inner dimensions (W x H x D)	mm / inch	607 x 670 x 629 (23.90 x 26.38 x 24.76)
Inner space volume, of which usable volume	L L	approx. 255 approx. 162
Insert shelves (W x D) Quantity, scope of delivery Quantity, maximum Surface loading capacity, maximum	mm / inch pcs. pcs. kg / lbs	560 x 500 (22.05 x 19.68) 3 12 10 (22.05) per insert shelf (copper) 14 (30.86) per insert shelf (stainless steel)
Overall device loading capacity, maximum	kg	30 insert shelf (copper) 42 insert shelf (stainless steel)
Weight	kg / lbs	105 / 231
Thermal		
Thermal safety features in accordance with DIN 12880:2007-05		Class 3.1 (Overtemperature controller, providing alarming function upon excessive temperature condition)
Ambient temperature range	°C / °F	+18...34 (+64.4...93.2)
Ambient temperature for stacked devices	°C / °F	+18...28 (+64.4...82.4)
Temperature control range, incubation		RT + 3...55
Temperature deviation, temporal (DIN 12880, part 2) at 37°C (98.6 °F))		± 0.1
Temperature deviation, spatial (DIN 12880, part 2) at 37°C (98.6 °F)[a])		± 0.3
Duration of the auto-start routine: up to 37°C (98.6 °F) Ambient temperature 20°C (68 kg)	h	5...10
Heat transfer to environment		
at 37°C (98.6 °F)	kWh/h	0.07
During Steri-Run sterilization cycle	kWh/h	0.75

Description	Unit	Value
Humidity		
Sterile distilled water qualities		Resistivity: 50 KΩ cm to 1 MΩ cm Conductivity: 1 to 20 µS/cm
Fill quantities: Incubation operation	L	max. 3 / min 0.5
Constant humidity at 37°C (98.6 °F) (high humidity mode) Constant humidity at 37°C (98.6 °F) (low humidity mode)	% RH % RH	approx. 93[b] approx. 90
Other		
Noise level (DIN 45 635, part 1)	dB(A)	< 50
Relative ambient humidity	% RH	max. 80
Altitude of installation site	meters above sea level	max. 2000

[a] Values determined on the basis of DIN 12880 for standard devices. Consult the calibration instructions for further information.

[b] The specifications are met under standard laboratory conditions at sea level, at an ambient temperature of + 22°C and rated operating voltage. Other process conditions or ambient temperatures or altitudes may affect performance by up to ± 2.5%. For example, a 2°C change in ambient temperature can affect relative humidity by 1% RH.

Vios iDx 255

Description	Unit	Value
CO_2 gas technology		
Gas purity	%	min. 99.5 or med. quality
Preset pressure	bar / psi	min. 0.8 - max. 1 (11.6 - 14.5)
Instrumentation and control range	vol -%	0...20
Control deviation, temporal	vol -%	± 0.1
CO_2 measurement cell		
Accuracy at 37°C (98.6 °F) and 5% CO_2	%CO_2	± 0.3
O_2/N_2 gas technology		
Gas purity	%	min. 99.5 or med. quality
Preset pressure	bar	min. 0.8 - max. 1
Instrumentation and control range	vol -%	1... 21 or 5...90
Control deviation, temporal	vol -%	± 0.2
O_2 measurement cell		
Accuracy at 37°C (98.6 °F) and 21% O_2	%O_2	± 0.5 (Option: 1.....21% O_2) ± 2.0 (Option: 5.....90% O_2)
Electric		
Rated voltage	V	1/N/PE 230 V, AC (± 10%) 1/N/PE 220 V, AC (± 10%) 1/N/PE 120 V, AC (± 10%) 1/N/PE 100 V, AC (± 10%)
Rated frequency	Hz	50/60
Degree of protection (IEC 60529)		IP 20
Protection class		I
Overvoltage category (EN 61010)		II
Degree of pollution (EN 61010)		2

Description	Unit	Value
Rated current	A	**230 V:** Sterilization: 5.5 Incubation: 3.3 **220 V:** Sterilization: 5.3 Incubation: 3.2 **120 V:** Sterilization: 10.4; Incubation: 6.3 **100 V:** Sterilization: 8.9; Incubation: 5.3
Circuit breaker		16 A
Rated consumption	kW	**230 V:** Sterilization: 1.26 Incubation: 0.76 **220 V:** Sterilization: 1.16 Incubation: 0.69 **120 V:** Sterilization: 1.25 Incubation: 0.75 **100 V:** Sterilization: 0.89 Incubation: 0.53

*1) Values determined on the basis of DIN 12880 for standard devices. Consult the calibration instructions for further information.

Data communication

Contents

USB interface

The devices are 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. Data exchange is accomplished via a defined command sequence structure. The command sequences correspond to the structure diagram of the RS 232 interface.

Note

Installing the USB port with the virtual COM port

- If the USB interface is to be used for data exchange between PC and incubator, the USB port is installed as a virtual COM port (USB serial port) using the driver supplied.
- Determine the assigned COM port in the Windows Device Manager/ports dialog window: e.g. USB Serial Port (COM5) and then define it in the Vios iDx 165/255 program as the communications interface (see "Vios iDx 165/255 program" on Page 12-22).

Figure 12-41. Device manager

The driver can be run with the following operating systems:
Windows 7, Windows 8, Windows 2000, Windows XP, Windows Vista.

Installing the USB interface driver

1. Connect the USB cable to the USB interface (optional) on the control box of the Vios iDx 165/255 and connect it to a PC.

   As soon as the Windows Hardware Detector has identified the USB port, the FIND NEW HARDWARE wizard dialog window opens.

2. Select the option DO NOT SEARCH FOR SOFTWARE.

Figure 12-42. Installing the USB interface driver - 1

3. Select the option INSTALL SOFTWARE FROM A CERTAIN SOURCE.

Figure 12-43. Installing the USB interface driver - 2

4. Select the data CD as the source.

Figure 12-44. Installing the USB interface driver - 3

5. On the data CD, select the subdirectory DRIVER.

Figure 12-45. Installing the USB interface driver - 4

The installation routine installs the driver: EVAL22 Board USB.

6. End the routine after a successful installation with FINISH.

Structure of the command sequences for data communication

All characters sent and received in the data exchange between a PC and the Vios iDx 165/255 incubator 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 the 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>
with:	aaaa = parameter address
	bb = quantity of payload in this telegram (00 – ff)
	cc = checksum: CRC8-CCITT: x8 + x2 + x1 + 1 = 0x07
	without cc and <CR>
	XXXX = bb-bytes payload

Description of the response elements:

aaaa	parameter address
bb	quantity 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>
with: aaaa = parameter address
bb = quantity of payload in this telegram (00 – ff)
cc = checksum: CRC8-CCITT: x8 + x2 + x1 + 1 = 0x07
without cc and <CR>
XXXX = bb-bytes payload

Response with an error message:
Answer: !:aaaa:bb:XX:cc<CR>

Description of the response elements:
aaaa parameter address,
Bb quantity 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>

Meaning of the two bytes in the error message:

Error message	Description
?0	Error in telegram structure or checksum
?1	Unknown command or unknown parameter
?2	Internal memory error
?3	Data error (value not within its limits)

Overview of general parameters (Addresses 0xxx)

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

Reading general parameters

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

Overview of incubator parameters (Addresses 2xxx)

Incubator parameters are divided into:

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

Reading basic parameters

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

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

*2) All values have two decimal places

Reading internal function parameters

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

*1) See table for notes on disinfection and auto-start 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) Further information on the error log in section 13.5.
*5) Set the read pointer to the first entry, read max. 7 entries.

*6) Send the next 7 entries. Set the read pointer automatically to the nearest newer entry, read max. 7 entries.
*7) Send entries from the last telegram again. Can be used when a 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 door opens	Wait until door opens
0x03	Wait until door closes	Wait until door closes
0x04	Start	Start
0x05	Heating	Heating
0x06	Holding	Perform reverse voltage calibration
0x07	Condensation	Waiting period 1
0x08	Cool-down	Set tolerance band
0x09	Dry	Establish stable humidity
0x0A	Wait for release	Perform reverse voltage calibration
0x0B	Abort	Waiting period 2
0x0C	-	Determine offset
0x0D	-	Read out and test offset
0x0E	-	Release
0x0F	-	Abort

Error memory structure

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

Query: ?:2300:00::cc<CR>
Read the last 11 error memory entries.

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

These data sets consist of 11 bytes 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 character,
- 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

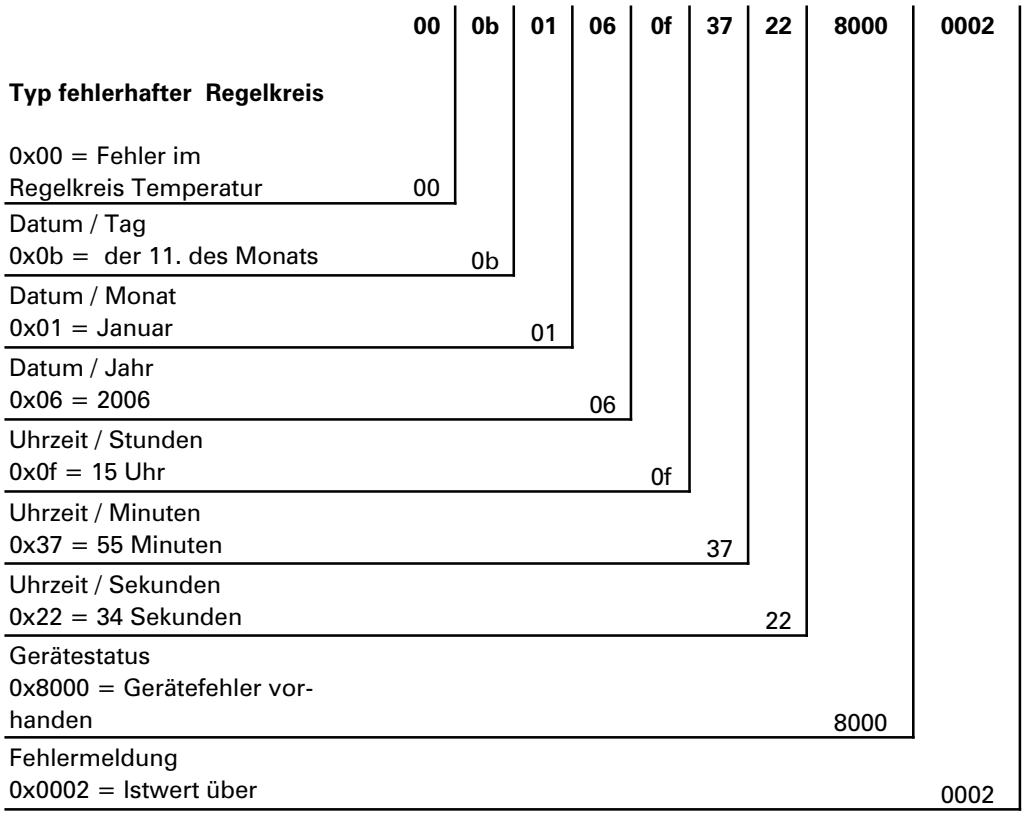

Figure 12-46. Error memory data set structure

The following information is transmitted in this data set:

- Created on 11 January 2006 at 15:55:34.
- A device error has occurred and the actual temperature is too high.

Overview of the possible error messages in hex coding

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

Overview of the possible error messages in bit coding General device Status, temperature and CO_2 control loop

Bit	General device status
0x0002	Device door open too long
0x0004	Display not communicating
0x0008	Mainboard parameter implausible (EEPROM faulty)
0x0010	Data logger defective (device remains functional)
0x0020	Error in disinfection / Steri-Run
0x0040	No power supply during Steri-Run
0x0080	Error in 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	Temperature control loop error status
0x0001	Sensor breakage
0x0002	Actual value high
0x0004	Actual value low
0x0008	Actual value not plausible
0x0010	Calibration values too high/low

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

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

O_2 and water level control loop:

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 not communicating
0x0080	No gas available, cylinders A and B empty
0x0200	Gas cylinder A empty
0x0400	Gas cylinder B empty

Bit	Water level error status
0x0001	No water

Data logger structure

The data logger stores up to 10,000 entries. 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 logged.
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 read pointer to the oldest entry and output of the first data sets.
Query: ?:2401:00::cc<CR>
Output of the subsequent data sets; the read 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 read pointer.

This command can be used to avoid data loss after a communication error.

Each query command is answered 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 (bytes 0-7, and ASCII characters 0-15).
Also, depending on the entry, the current actual or set values of the control loops or other parameters can be entered (bytes 8-15 or ASCII characters 16-31).

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

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

Data logger data set structure scheme

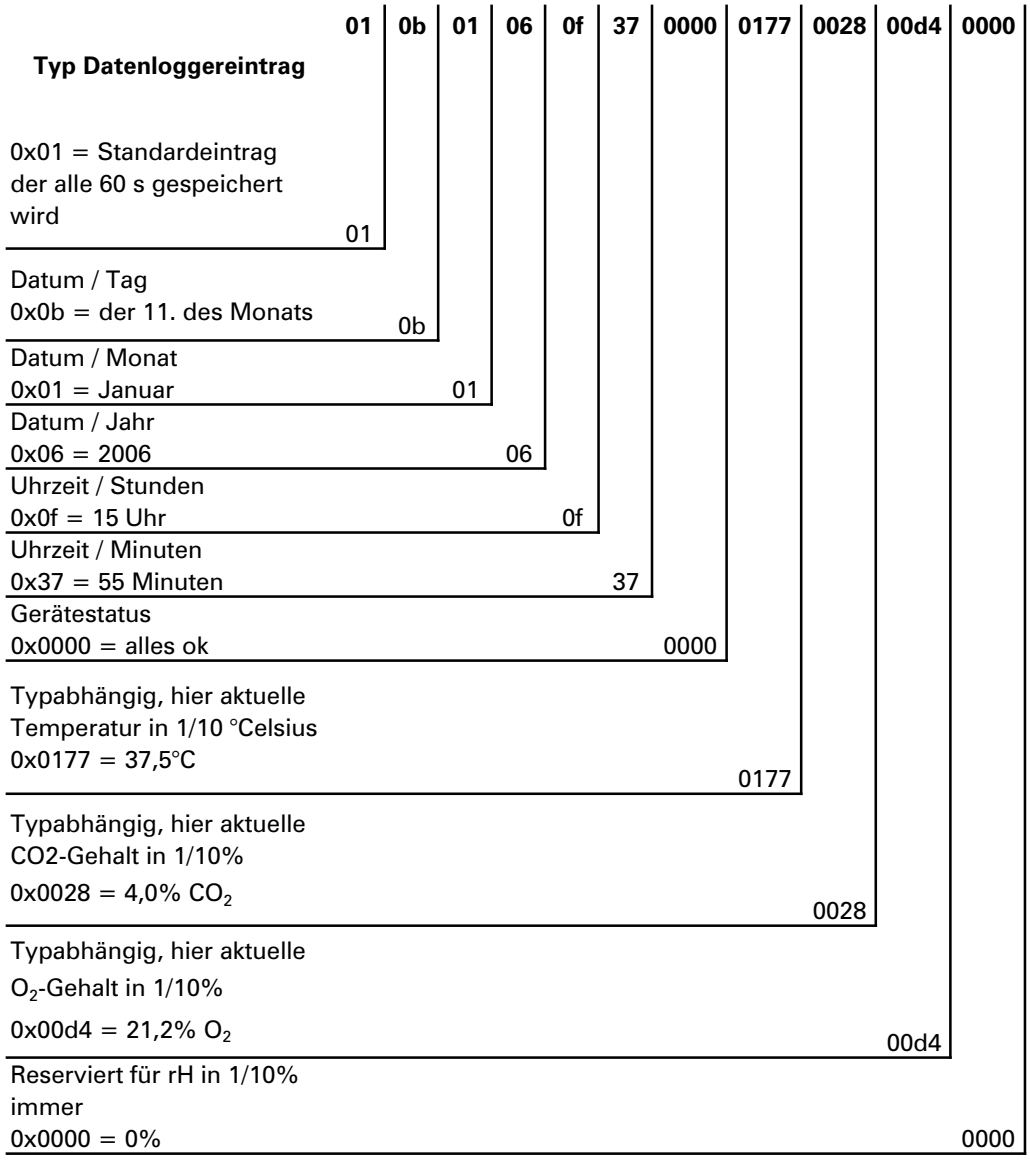

Figure 12-47. Data logger data set structure

The following information is transmitted in this data set:

- Created on 11 January 2006 at 15:55.
- The device status reports no anomalies.
- The temperature is 37.5°C.
- Gas concentration 4.0% CO_2, 21.2% O_2.

Note

Code example

You will find an example of a code at the end of this chapter.

Overview of possible event entries in bit coding
Overview of event entries, part I:

Code	Event	Information (byte 8-15)
0x01	Set values from all control loops (periodically in one-minute cycles)	Current values for temperature, CO_2, O_2, and RH
0x02	Set value change (at the beginning of a new section)	Set value for temperature, CO_2, O_2, and RH
0x10	Temp set value changed	Set value for temperature, CO_2, O_2, and RH
0x11	CO_2 set value changed	Set value for temperature, CO_2, O_2, and RH
0x12	O_2 set value changed	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	Lid 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	Customer temperature calibration	Calibration level (2 bytes), old temperature, new temperature (2 bytes each)
0x41	Customer CO_2 calibration	Calibration level (2 bytes), old CO_2 value, new CO_2 value (2 bytes each)
0x42	Customer O_2 calibration	Calibration level (2 bytes), old O_2 value, new O_2 value (2 bytes each)
0x50	Start of auto-start	Status/error registration for temperature, CO_2, O_2, and RH
0x51	Auto-start successfully completed	Current actual values for temperature, CO_2, O_2, and RH

Overview of event entries, part II:

Code	Event	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 of 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
0x90	Low humidity start	Current actual values for temperature, CO_2, O_2, and RH
0x91	Low humidity stop	Current actual values for temperature, CO_2, O_2, and RH
0xe0	Deletion of 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 in size and has the following structure:

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

Functions for data logger query

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 from 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
  // processes 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_telegram

```
void send_telegram(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_telegram

```
int get_telegram(char *p)
    {
    int reading_count = 0;
// reading the telegram character by character
    do
        ComRd(COM_NR, &p[reading_count], 1);
// until receipt 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;
// issue 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;
    }
// save 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[I++] = a[i];
// calculate and copy number after decimal separator
    b[I++] = ‘,’;
// calculate value
    b[I++] = rest%10+0x30;
    return (I);
    }
```

read_datalogger

```
int read_datalogger ()
{
#define SIZE_DATA2 16
#define EVENT_STATUS 0x01
unsigned char buffer[300], string [300];
unsigned char numberstring [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_telegram ("2400");
    }
    else{
// read additional data sets
    send_telegram ("2401");
    }
    len = get_telegram (buffer);
// no telegram received
    if (!len) {
        GetError ++;
// requery
    send_telegram ("2402");
    len = get_telegram (buffer);
// no telegram received again
    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 number string
    for (i = 0; i < (string); i++)
    number string [i] = (ahex(buffer[10 + (2*i)]) * 0x10 +
    ahex(buffer[11 + (2*i)]));
// calculation of the sent data packets
    data = ((len) / SIZE_DATA2);
// evaluation of all data packets
    for (i = 0; i < data; i++)9{
    len = 0;
// write time and date into file
    len += time_2_str (number string[1+i*SIZE_DATA2],
    &excelstring[len]);
    excelstring[len ++] = '.';
    len += time_2_str (numberstring[2+i*SIZE_DATA2],
    &excelstring[len]);
    excelstring[len ++] = '.';
    len += time_2_str (numberstring[3+i*SIZE_DATA2],
    &excelstring[len]);
    excelstring[len ++] = ';';
    len += time_2_str (numberstring[4+i*SIZE_DATA2],
    &excelstring[len]);
    excelstring[len ++] = ':';
    len += time_2_str (numberstring[5+i*SIZE_DATA2],
    &excelstring[len]);
    excelstring[len ++] = ':';
    len += time_2_str (0, &excelstring[len]);
    excelstring[len ++] = ';';

    switch (numberstring[i*SIZE_DATA2]){
        case EVENT_STATUS:
//check cyclic entries for device errors
    status = numberstring[6+i*SIZE_DATA2]*0x100+
    numberstring[7+i*SIZE_DATA2];
        if (status & INFO_ERROR){
            str_cpy (&excelstring[len], "Error active;", 13);
            len += 13;
        }
        else{
// query all device errors (see "Overview of possible event entries in bit coding Overview
of event entries, part I:" on Page 12-15)
            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 actual value entry without device errors
//query

else{
                str_cpy (&string[string], "ok;", 3);
                string += 3;
            }
        }
// copy actual values from number string to excel string
    len += num_2_str ((numberstring[8+i*SIZE_DATA2]*0x100+
    numberstring[9+i*SIZE_DATA2]), &excelstring[len]);
    excelstring[len ++] = ';';
    len += num_2_str ((numberstring[10+i*SIZE_DATA2]*0x100+
    numberstring[11+i*SIZE_DATA2]), &excelstring[len]);
    excelstring[len ++] = ';';
    len += num_2_str ((numberstring[12+i*SIZE_DATA2]*0x100+
    numberstring[13+i*SIZE_DATA2]), &excelstring[len]);
    excelstring[len ++] = ';';
    len += num_2_str ((numberstring[14+i*SIZE_DATA2]*0x100+
    numberstring[15+i*SIZE_DATA2]), &excelstring[len]);
    excelstring[len ++] = ';';
// enter set values from here
    len += num_2_str (SetTemp, &excelstring[len]);
    excelstring[len ++] = ';';
    len += num_2_str (SetCO2, &excelstring[len]);
    excelstring[len ++] = ';';
    len += num_2_str (SetO2, &excelstring[len]);
    excelstring[len ++] = ';';
    len += num_2_str (SetRH, &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 = numberstring [8+i*SIZE_DATA2]*0x100+
        numberstring[9+i*SIZE_DATA2];
        SetCO2 = numberstring[10+i*SIZE_DATA2]*0x100+
        numberstring[11+i*SIZE_DATA2];
        SetO2 = numberstring[12+i*SIZE_DATA2]*0x100+
        numberstring[13+i*SIZE_DATA2];
        SetRH = numberstring[14+i*SIZE_DATA2]*0x100+
        numberstring[15+i*SIZE_DATA2];
        WriteFile (FileHandle, excelstring, len);
        WriteFile (FileHandle, "Power on;\n", 10);
```

```
            break;
        case..
// query all events here (see "Overview of possible event entries in bit coding Overview of event entries, part I:" on Page 12-15)
// cancel 0xFF indicates the end of the data logger
        case 0xFF:
        WriteFile (FileHandle, "End;\n",5);
        }
}
return 0;
}
```

Vios iDx 165/255 program

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

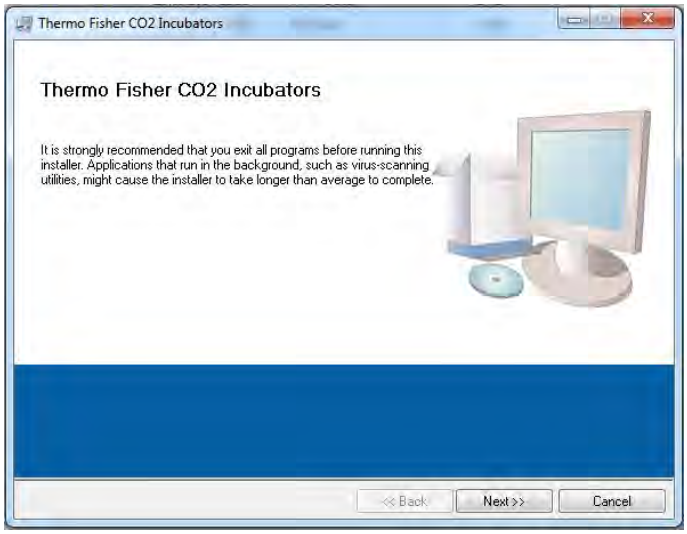

Figure 12-48. Vios iDx 165/255 program

This program is used for:

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

Installing Vios iDx 165/255

1. On the data CD in the subdirectory PROGRAMS, double click on the file SETUP.EXE to start the installation routine.

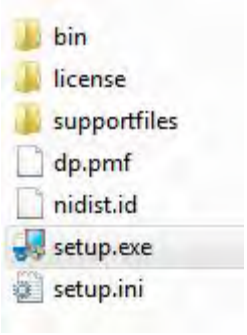

Figure 12-49. Installing Vios iDx 165/255 program - 1

2. Define the installation directory for the program.

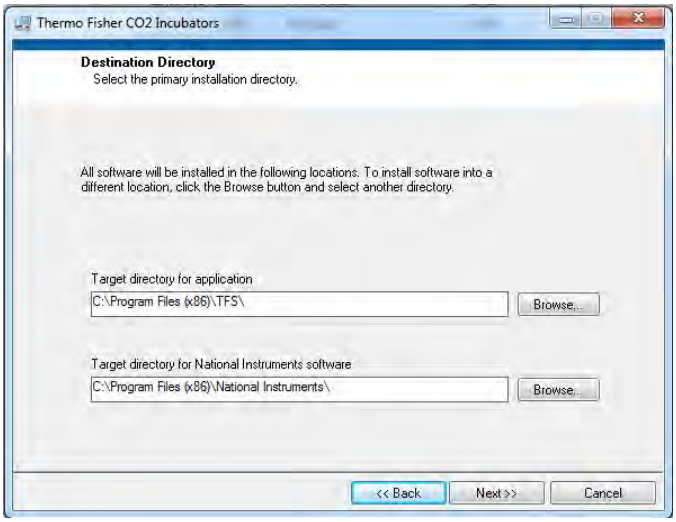

Figure 12-50. Installing Vios iDx 165/255 program - 2

3. Perform the following steps in sequence:
   a. Confirm the license agreement
   b. Confirm the scope of installation
   c. After the "installation complete" message has been issued, close the installation interface and restart the computer.

Using Vios iDx 165/255

Layout of the user Interface

The user interface is organized into two main menus:

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

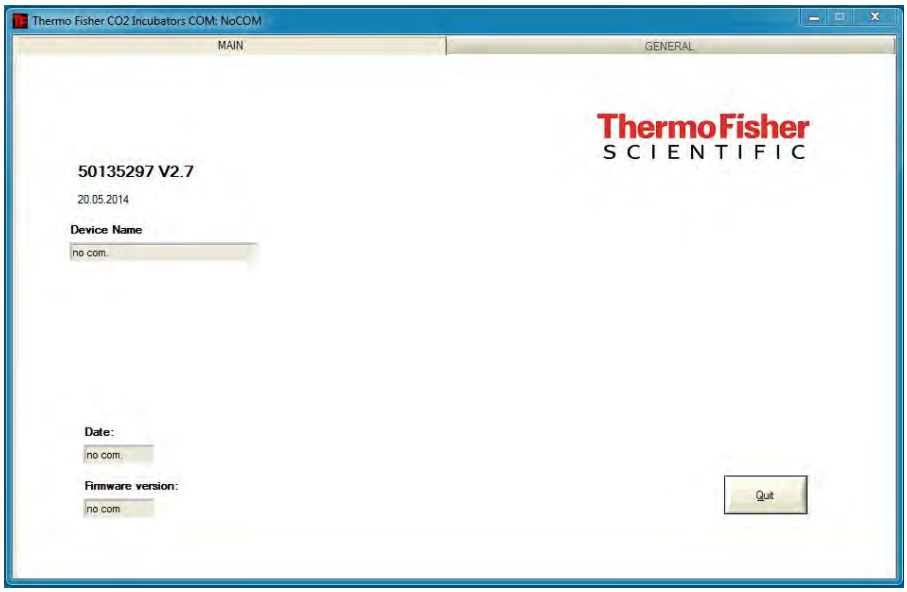

Figure 12-51. Vios iDx 165/255 user interface - 1

- 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 setting 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 block access to the device parameters of the incubator.

User menu function

PRESETTING

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

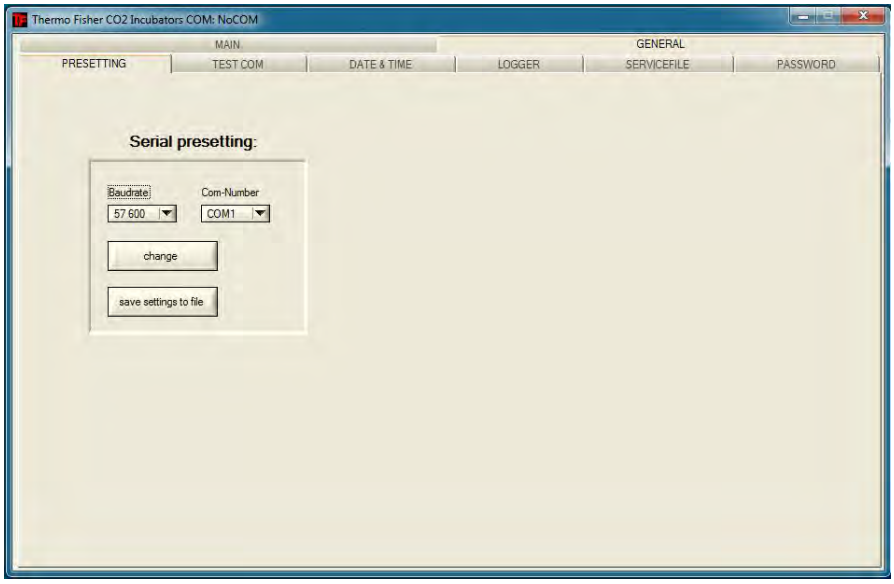

Figure 12-52. Vios iDx 165/255 user interface - 2

4. Select the PC serial port. Once the USB driver is installed, you can select the (virtual) COM port assigned to the USB connection (see"USB interface" on Page 12-1).
5. Apply the settings by pressing the “Change” key.
6. Save the settings in an .ini file by pressing the “SAVE TO FILE” key.

Note

Transmission speeds

The transmission speed settings in the PRESETTING user menu must be identical to those of the device.

TEST COM

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

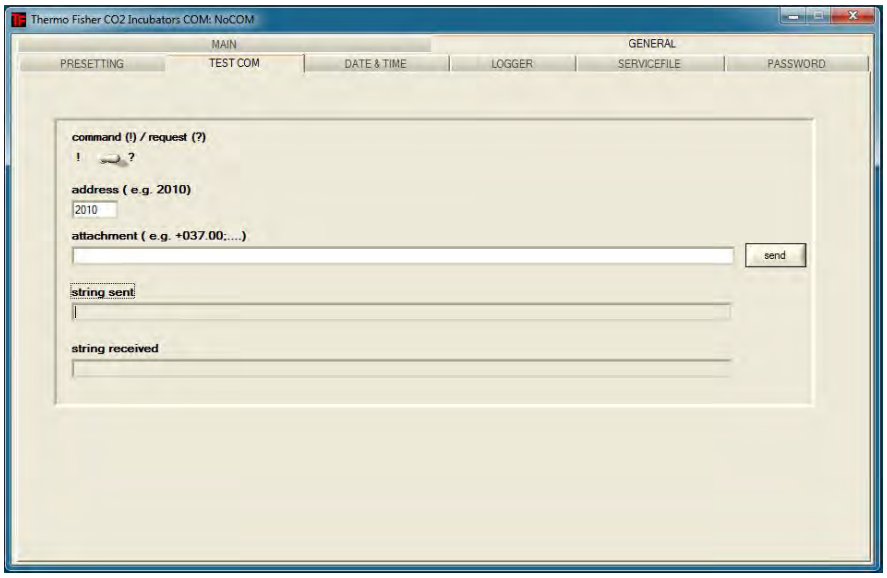

Figure 12-53. Vios iDx 165/255 user interface - 3

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)

1. Send the query to the incubator:
   a. 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:

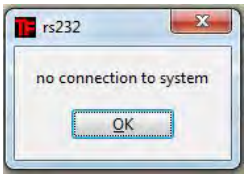

Figure 12-54. Vios iDx 165/255 user interface - 4

   b. Close the error dialogue by pressing the “OK” key.

DATE & TIME

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

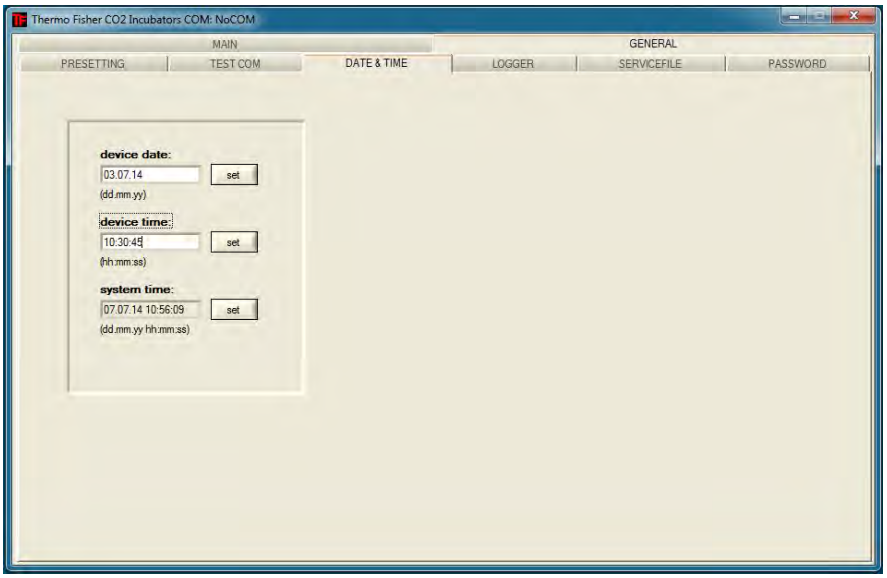

Figure 12-55. Vios iDx 165/255 user interface - 5

Data in the two text boxes must be entered in the format DD.MM.YY (day, month, year).

- Apply the entry by pressing the “Set” key.

ERROR LOGGER

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

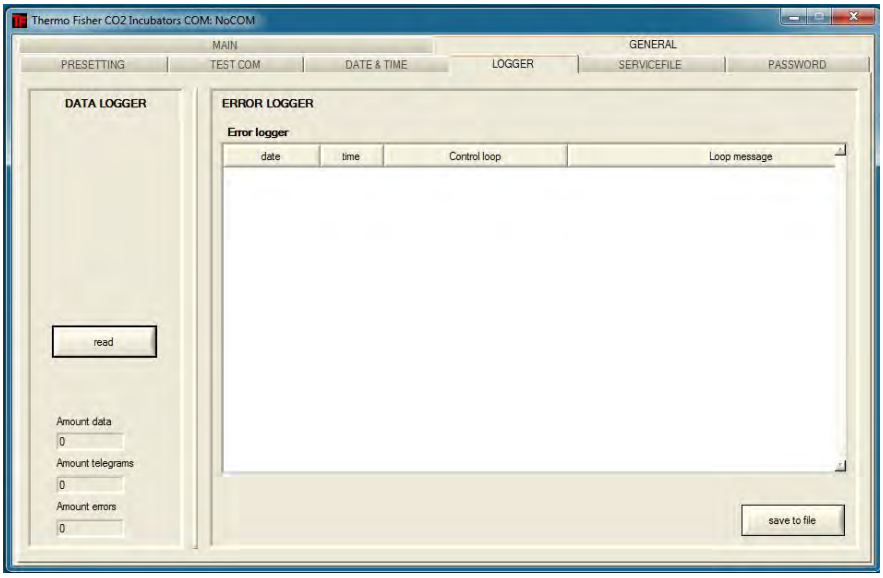

Figure 12-56. Vios iDx 165/255 user interface - 6

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

- Save the data records as a file by pressing the “SAVE TO FILE” key.

DATA LOGGER

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

The data sets are saved in the *.CSV metaformat.

- Import the data sets by pressing 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 TELEGRAM: Number of telegrams transmitted.
- AMOUNT ERRORS: Number of error messages transmitted.

Note

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

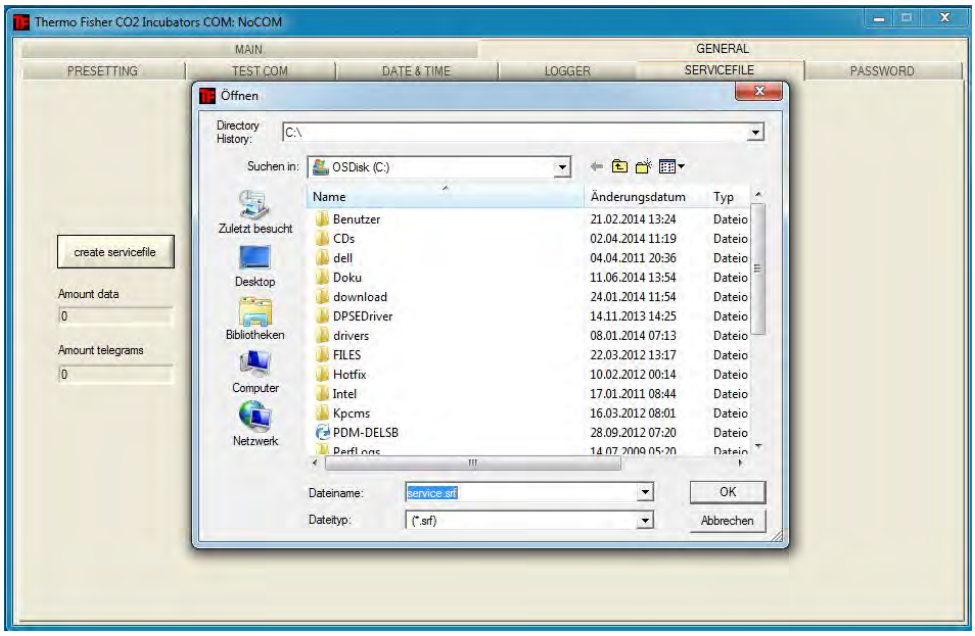

Figure 12-57. Vios iDx 165/255 user interface - 7

1. Create a service file by pressing the “CREATE SERVICEFILE” key.
2. Define the file name and save directory in the Windows dialog window.

3. Start the save process by pressing the “OK” key.

Note

Duration of creation

The compilation of device information and the creation of the service file may take some time.

PASSWORD

The PASSWORD submenu can only be accessed by the service personnel of Thermo Fisher Scientific.

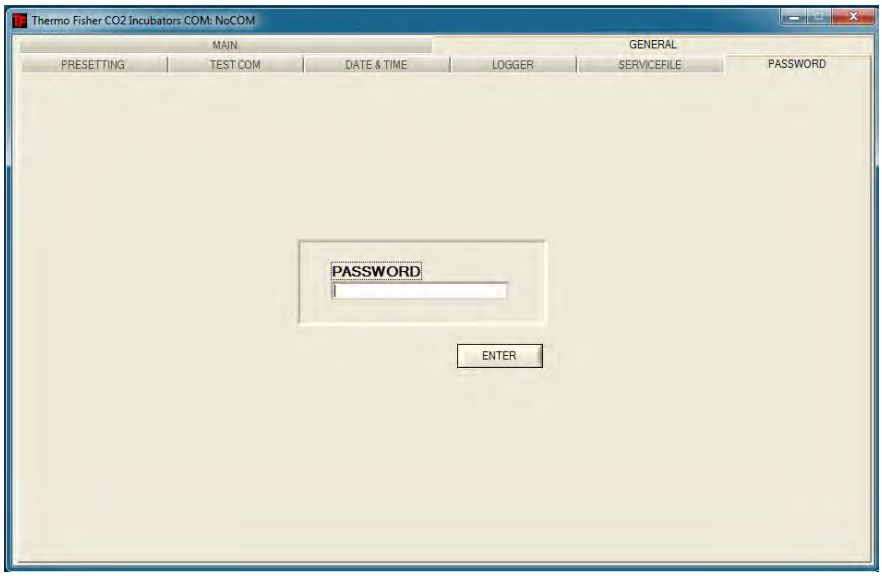

Figure 12-58. Vios iDx 165/255 user interface - 8

Device Log

Please enter work carried out here:

Device type:		Order No.:	
Works number:		Service number:	
Location:		Operator note:	

Work carried out:	Comments:	Date	Signature

Thermo Scientific Contact Information

Overview of the international Thermo Fisher sales organizations

Mailing address in Germany:
Thermo Electron LED GmbH
Robert-Bosch-Straße 1
D-63505 Langenselbold

Inquiries from Germany:
Phone Sales 0800 1 536376
Phone Service 0800 1 112110
Fax Sales/Service 0800 1 112114
Email info.labequipment.de@thermofisher.com
Helpdesk email: service.lpg.germany.de@ThermoFisher.com

Inquiries from Europe, Middle East and Africa:
Tel. +49 (0)6184 / 90-6940
Fax: +49 (0)6184 / 90-7474
Email info.labequipment.de@thermofisher.com

Mailing address USA:
Thermo Scientific
275 Aiken Road
Asheville, NC 28804
USA

Inquiries from North America:
Phone +1 800-879 7767 +1 800-879 7767
Fax +1 828-658 0363
Email: info.labequipment@thermofisher.com

Inquiries from Latin America:
Phone +1 828-658 2711
Fax +1 828-645 9466
Email: info.labequipment@thermofisher.com

Inquiries from Asia Pacific:
Phone +852-2711 3910
Fax +852-2711 3858
Email: info.labequipment@thermofisher.com

Written inquiries from USA:
Thermo Scientific
275 Aiken Road
Asheville, NC 28804
USA

Inquiries from USA/Canada
Sales:+1 866 984 3766
Service+1 800 438 4851

Inquiries from Latin America
Sales:+1 866 984 3766
Service:+1 866 984 3766

Inquiries from Asia:
China
Sales:+86 10 8419 3588
Service: Toll-free 8008105118
Support Mobile 4006505118 or +86 10 8419 3588

India
Sales:+91 22 6716 2200
Service: Toll-free 1 800 22 8374 or +91 22 6716 2200

Japan
Sales:+81 45 453 9220
Service:+81 45 453 9224

Inquiries from the rest of Asia/Australia/New Zealand
Sales:+852 2885 4613
Service:+65 6872 9720

Inquiries from countries not listed / rest of EMEA
Sales:+49 6184 90 6940 or +33 2 2803 2000
Service:+49 6184 90 6940

Inquiries from Europe:
Austria
Sales:+43 1 801 40 0
Service:+43 1 801 40 0

Belgium
Sales:+32 53 73 4241
Service:+32 53 73 4241

Finland/Nordic/Baltic countries
Sales:+358 9 329 100
Service:+358 9 329 100

France
Sales:+33 2 2803 2180
Service:+33 825 800 119

Germany:
Mailing address in Germany:
Thermo Electron LED GmbH
Robert-Bosch-Straße 1
D-63505 Langenselbold

Phone
Sales Toll-free 0800 1 536 376
or +49 6184 90 6940
Service Toll-free 0800 1 112110
or +49 6184 90 6940
Email info.labequipment.de@thermofisher.com

Italy
Sales +39 02 95059 341
Service+39 02 95059 250

Netherlands
Sales +31 76 579 5555
Service+31 76 579 5639

Russia/CIS
Sales +7 812 703 4215
Service+7 812 703 4215

Spain/Portugal
Sales +34 93 223 0918
Service+34 93 223 0918

Switzerland
Sales +41 61 716 7755
Service+41 61 716 7755

England/Ireland
Service+44 870 609 9203
Sales +44 870 609 9203

Appendix

Sixfold segmented inner door for Cell Locker

The six-segment inner door for Cell Locker divides the existing interior of the CO_2 incubator into six individual workspaces (Cell Locker). Glass doors (access openings) are embedded in the front section for the removal of cultures. These can be opened and closed separately.

Figure 14-1. Sixfold segmented inner door for *CELL LOCKER*

Note

Device performance change

Due to the design of the sixfold segmented inner door, the performance data of the incubator change (see„Specifications" on page 11-1).

Installing the insert shelves

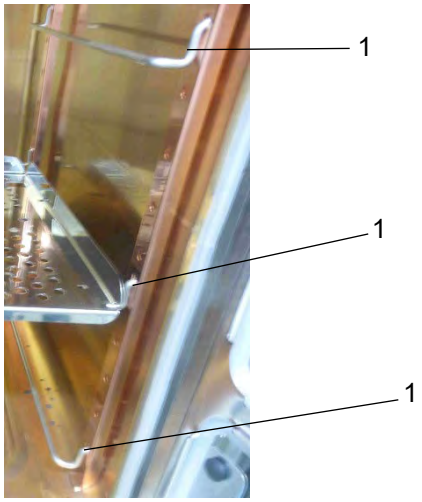

Figure 14-2. Inserting the support brackets

1. Insert the support brackets (1) in the lower, middle and upper rectangular holes of the support rails.
2. Insert the perforated shelves at the top and in the middle with continuous guide rails.

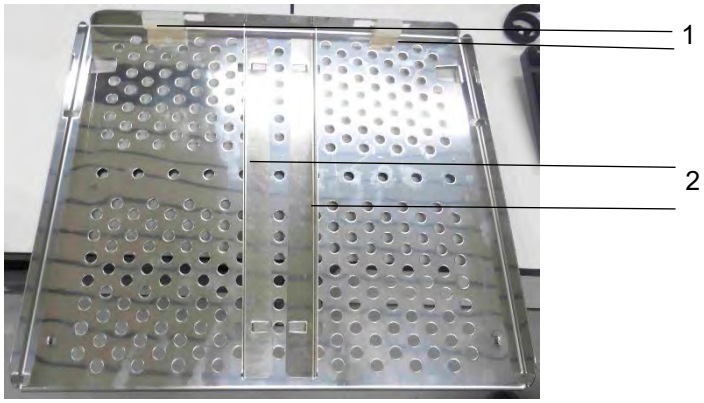

Figure 14-3. Perforated shelf with continuous guide rails

Note

Do not remove the silicone plugs (1).

3. Insert the guide rails (2).

Note

The guide rails can be removed if necessary.

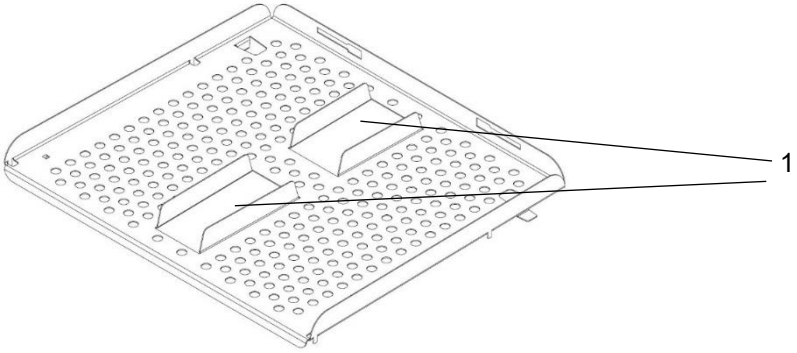

Figure 14-4. Perforated shelf with divided guide rails (below)

4. Insert the perforated shelf with the divided guide rails (Fig. 14-4, 1) and central openings at the bottom.

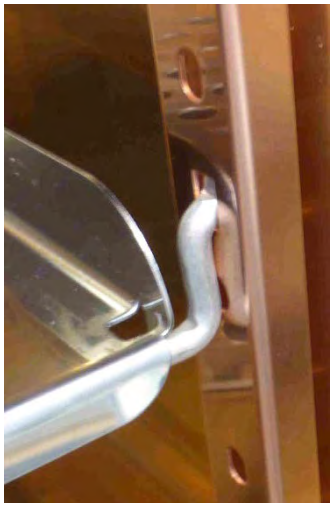

Figure 14-5. Installing the perforated metal shelf

5. Make sure that the perforated metal shelves lock in place behind the rail. The metal tab underneath the shelf needs to be fixed behind the rail so that the door closes.

Note

These guide rails cannot be removed.

6. Close the sixfold segmented inner door.