



User Manual

# VWR CO2 Incubator Basic

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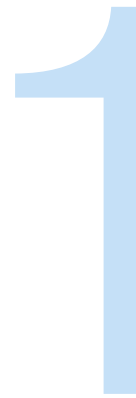
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# Important safety information

## Instruction of the operating personnel

These operating instructions describe the CO<sub>2</sub> incubator

- Model VWR Air Jacketed CO<sub>2</sub> Incubator Basic

The CO<sub>2</sub> incubator has been manufactured in keeping with the latest technological developments and has been tested before delivery for its correct function. It may, however, present potential hazards if it is not used according to the intended purpose or outside of operating parameters. Therefore, the following procedures must always be observed to prevent accidents:

- The CO<sub>2</sub> incubator must be operated only by trained and authorized personnel.
- For any operation of this device, the operator must prepare clear and concise written instructions in the language of the operating and cleaning personnel based on these operating instructions, applicable safety data sheets, plant hygiene guidelines, and technical regulations, in particular:
  - Which decontamination measures are to be applied for the CO<sub>2</sub> incubator and accessories
  - Which protective measures are to be applied while specific agents are used
  - Which measures are to be taken in the case of an accident
- Repairs to the device must be carried out only by trained and authorized expert personnel.

## Applicability of the instructions

The contents of the operating instructions are subject to change without further notice.

- Concerning translations into foreign languages, the English version of these operating instructions is binding.
- Keep these operating instructions close to the device so that safety instructions and important information are always accessible.
- Should you encounter problems that are not detailed adequately in these operating instructions, please contact VWR immediately for your own safety.

## Warranty

VWR warrants the operational safety and functions of the CO<sub>2</sub> incubator only under the condition that:

- The device is operated and serviced exclusively in accordance with its intended use and as described in these operating instructions
- The device is not modified
- Only original spare parts and accessories that have been approved by VWR are used
- Inspections and maintenance are performed at the specified intervals

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

## Explanation of Signs

### Symbols and signal words used in the operating instructions



#### WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury!



#### CAUTION

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

#### NOTICE

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

#### NOTE

Is used for applicational hints and useful information.

## Pictographs used in the operating instructions

Pictographs point to concrete facts of a safety message or a property damage message.



Electric shock!



Suffocation hazard!



Hot surfaces!



Wear safety gloves!



Wear safety goggles!



Harmful liquids!



Electrical hazard!

## Signs on the device

Safety signs, test marks and marks of conformity placed on the device.



Observe operating instructions!



CSA test mark:

Test certificate for USA/Canada, indicates that the product has met the requirements of nationally recognized product safety standards.

## Overview safety information

Overview of the most important safety information used in this operating instructions.

### Carbon dioxide (CO<sub>2</sub>):

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

### NOTE!

#### Personnel instruction:

Personnel operating devices with CO<sub>2</sub> supply must be instructed about the particularities in the handling of CO<sub>2</sub> before starting their work:

- Correct operation of pressurized gas containers and gas supply systems
- Obligation to report damages and shortcomings in CO<sub>2</sub> supply lines
- Measures to be taken in case of accidents or failures
- These instructions must be repeated in appropriate intervals and must comprise the particular operating instructions of the gas supplier



### WARNING

#### Suffocation hazard:

CO<sub>2</sub> released in large amounts into the room atmosphere may cause suffocation.



If CO<sub>2</sub> is released, initiate safety measures immediately!

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

### NOTICE!

#### Overpressure:

The operating pressure of the gas applied 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!

- Set the gas supply to a range between 0.8 bar min. and 1.0 bar max. and make sure that this pressure setting cannot be changed!

#### 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!

#### Access port:

- If the access port is not used, it must be capped during operation!



Gas quality:

CO<sub>2</sub> must be of the following qualities:

- Purity 99.5% min

or

- Medical grade



**CAUTION**

**Electric shock:**



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



**CAUTION**

**Electrical hazard:**



The power supply in the lab should have a residual current circuit breaker installed.

**Health hazard:**



The surfaces of the work space may be contaminated. Contact with contaminated cleaning liquids may cause infections. Disinfectants may contain harmful substances.



When cleaning and disinfecting, always observe the safety instructions and hygiene regulations!

- Wear safety gloves
- Wear safety glasses
- Wear mouth and respiratory system protection gear to protect the mucous membranes
- Observe the safety instructions of the manufacturer of the disinfectant and of the hygiene experts!

**Contamination hazard:**

The device can be used for preparing and processing infectious substances so that the device or device components may become contaminated.

- In case of a shut-down, the device must be decontaminated!

Before device components are discarded, they must be decontaminated!

- The device components must be cleaned thoroughly; after the cleaning, they must be disinfected or sterilized, as required by the application.
- Discarded devices or device components must be provided with an appropriate certificate showing the decontamination measures performed!

### Hygiene regulations:

Prior to any operation, the user must clean and disinfect the work space in accordance with the hygiene regulations set forth by the operator to protect the cultures.

### NOTICE!

#### Incompatible cleaning agents:



Some device components are made of plastic. Solvents may dissolve plastics. Powerful acids or bases may cause embrittlement of the plastics.

For cleaning the plastic components and surfaces, do not use hydrocarbon-containing solvents, detergents with an alcohol content of more than 10% or powerful acids and bases!

#### Chloride-containing disinfectants:



Chloride-containing disinfectants may corrode stainless steel.

Use only disinfectants that do not affect stainless steel!

- Do not use sodiumhypochlorite solutions such as Purex and Clorox. These can cause corrosion and pitting of stainless steel.
- Do not use steel wood pads such as Brillo. These pads deposit carbon particles in the work space.

#### Alcoholic disinfectants:



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

When using such disinfectants, avoid open flames or exposure to excessive heat during the entire disinfection process!

- Use such disinfectants only in adequately ventilated rooms.
- After the disinfectant has been allowed to react, wipe the cleaned device components thoroughly dry!
- Observe safety regulations to avoid fire and/or explosion hazard caused by alcohol-containing disinfectants!

#### Water supply:

The water tray of the work space can hold up to 3.0 l of processed water. When the running operation, always keep a sufficient quantity of processed water of the following quality available:

- Demineralized and distilled or autoclaved for sterilization

or

- Completely deionized and distilled or autoclaved for sterilization
- When the water level falls below the lower limit, refill water!

## Intended purpose of the device

### Intended use

The CO<sub>2</sub> incubator is a laboratory device for preparing and cultivating cell and tissue cultures. The device allows the simulation of the special physiological ambient conditions for these cultures due to the exact control of:

- Temperature
- CO<sub>2</sub> content
- An increased relative humidity

The device has been designed for installation and operation in the following fields of application:

- Laboratories for cytobiological and biotechnological experiments of safety levels L1, L2, and L3
- Medical-microbiological laboratories in accordance with DIN 58 956
- Laboratories in the central area of clinics and hospitals

The CO<sub>2</sub> required for the incubator is supplied to the device from a separate gas supply system, either from gas cylinders or from a central pressurized gas container.

The layout of the gas supply system must ensure that the operating pressure of the gas supply lines can be set to a range between 0.8 bar (min.) to 1 bar (max.) and that the pressure cannot be changed.

Depending on the capability of the gas supply system, several devices may be connected to one gas cylinder.

The CO<sub>2</sub> incubator is suited for continuous operation.

### Unintended use

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

Do not use tissues, substances or liquids that:

- Are easily ignitable or explosive
- Release vapors that form combustible or explosive mixtures when exposed to air
- Release poisons

## Standards and directives

The device is in accordance with the following standards and guidelines: CAN/

- CSA – C22.2 No. 61010-4-04
- UL Std. No. 61010 (2nd Edition)

Safety specifications:

- Indoor Use Only
- Altitude – Up to 2.000 meters
- Temperature – +5 °C to 40 °C
- Humidity – Maximum RH 80% for temperatures up to 31 °C, decreasing linearly to 50% RH at 40 °C
- Mains Supply Fluctuations – Mains supply voltage fluctuations not to exceed  $\pm 10\%$  of the nominal voltage
- Installation Category II<sup>1</sup>
- Pollution Degree 2<sup>2</sup>
- Class of Equipment I

<sup>1</sup>Installation category (overvoltage category) defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and is overvoltage protection means. For example, in Cat II which is the category used for instruments in installations supplied from a supply comparable to public mains such a hospital and research laboratories and most industrial laboratories, the expected transient over voltage is 2500 V for a 230 V supply and 1500 V for a 120 V supply.

<sup>2</sup>Pollution degree describes the amount of conductive pollution present in the operating environment. Pollution degree 2 assumes that normally only non-conductive pollution such a dust occurs with the exception of occasional conductivity caused by condensation.

# 2

## Delivery

### Packaging

The CO<sub>2</sub> incubator Helix is delivered in a stable packaging box. All packaging materials can be separated and are reusable:

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

### Components standard equipment

Delivery	CO <sub>2</sub> incubator with single glass door and with continuous shelves (standard version)
Shelf	3
Shelf support post	4
Shelf support rail	6
Insert for pressure compensation opening	1
Plug for pipe channel	1
Power supply cable	1
Connector, potential-free contact	1
Spare caps, set	1
CO <sub>2</sub> connecting hose set	1
Immersion water pump	1
Open-end wrench, 24 mm	1
Allen wrench 2 mm for blower wheel	1
Allen wrench 3 mm for blower wheel cover	1
Operating instructions	1
Pump for water draining	1



## Acceptance inspection

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

- Completeness
- Possible damages

If damages are detected or if components are missing, please contact the carrier and vendor immediately.

# 3

## Installation of the device

### Ambient conditions

The device must only be operated in locations that meet the particular ambient conditions listed below.

#### Requirements:

- Draft-free and dry location.
- The minimal distance to adjacent surfaces must be observed on all sides (see Section “Space requirements”).
- The operating room must be equipped with appropriate room ventilation.
- Solid, level, fire-proof surface.
- Vibration-proof substructure (floor stand, lab table) capable of bearing the weight of the device and accessories (particularly if several devices are stacked).
- To ensure a constant incubation temperature of 37 °C, the ambient temperature must be within a range of +18 °C to +33 °C.
- Relative humidity up to 80% (max.).
- Avoid direct exposure to sunlight.
- Devices that produce excessive heat should not be used near the location of the CO<sub>2</sub> incubator.

### Room ventilation

When CO<sub>2</sub> is supplied, the work space of the incubator is slightly pressurized. The pressure is released through the pressure compensation opening into the operating room.

As the pressure compensation and any opening of the glass door/gas tight screen during the operation of the device will release very small quantities of CO<sub>2</sub> into the operating room, the room ventilation must be capable of carrying the released gas safely off into the open.

In addition, heat dissipating from the device during permanent operation may cause a change in the room climate.

- Therefore, the incubator must only be installed in rooms with sufficient ventilation.
- Do not install the device in room recesses without ventilation.
- The room ventilation should be a technical ventilation that is in accordance with the requirements of DGV Information 213-850 (Guidelines for laboratories) or some other suitable ventilation system with appropriate capacity.

## Space requirements

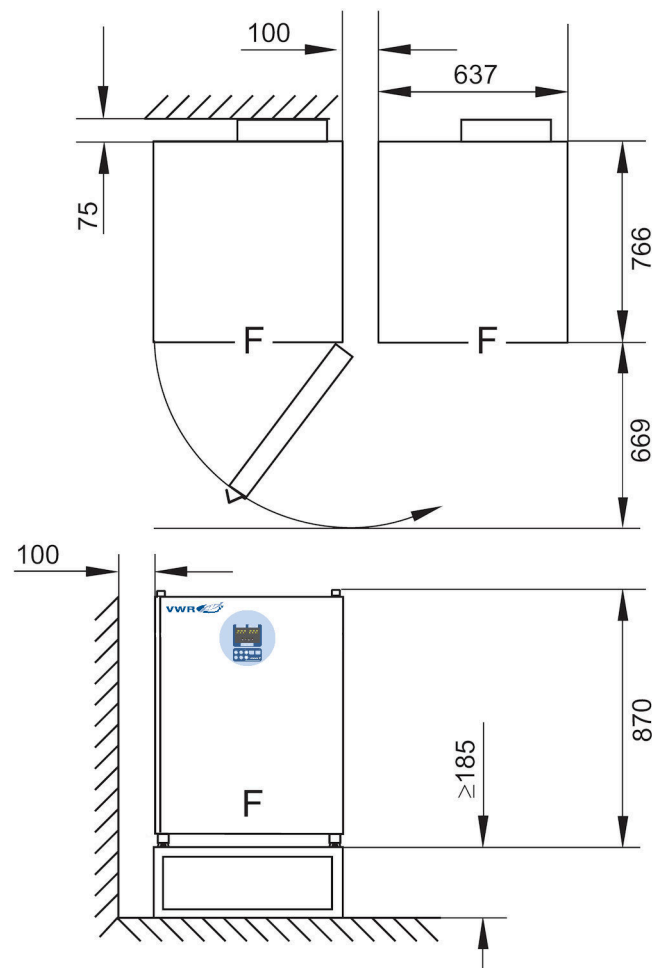


Figure 1 – Device dimensions

When installing the device, make sure that the installation and supply connections are freely accessible.

The control box at the rear panel of the device may serve as a spacer to adjacent objects. The side distances given are minimal distances.

To protect the CO<sub>2</sub> incubator against contamination, use a floor stand even if the device is installed near the floor. The height of the floor stand should not be less than 200 mm.

Several floor stands and carriers are available as options from VWR (Part no. see Chapter 11 “Parts and accessories”).



**NOTE!**

**Accessibility of the devices:**

To ensure the accessibility for care and maintenance works, keep larger side and rear distances!

## Transport

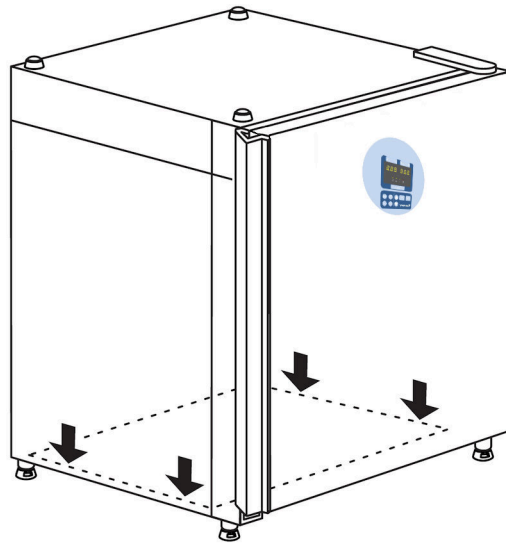


Figure 2 – Lift point

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

**NOTE!**

**Lift points:**

Lift the device only using the lift points shown in Figure 2.

## Electrical Installation



**CAUTION**

**Electrical hazard:**



The power supply in the lab should have a residual current circuit breaker installed.

## Stacking

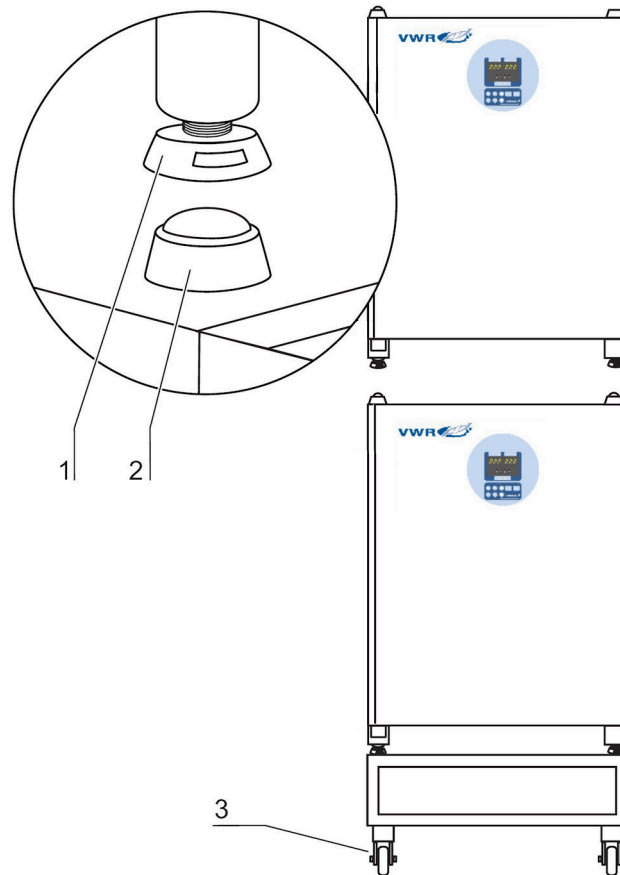


Figure 3 – Stacking

Two Helix devices can be stacked on top of each other. The stacking elements [1] and [2] secure the devices on top of each other.

If the devices are placed onto mobile racks, ensure that the rollers [3] are secured by an arresting device during operation. For reasons of stability, the rollers should be oriented to the front.

### NOTE!

#### Transporting stacked devices:

The stacking elements are not connecting elements. Therefore, the transport of stacked devices on sloped surfaces is not allowed!

## Modifications

### NOTE!

#### Modifications:

Retrofits and modifications must only be performed by the Technical Service of VWR!

# 4

## Description of the device

### Safety devices

The device is equipped with the following safety devices:

- A door switch interrupts the CO<sub>2</sub> supply and the work space heating when the glass door is opened
- An independent thermal protection protects the samples from harmful overheating in the event of a failure
- A pressure compensation opening ensures pressure compensation in the device work space
- Audible and visual alarms indicate failures during operation

## Views of device

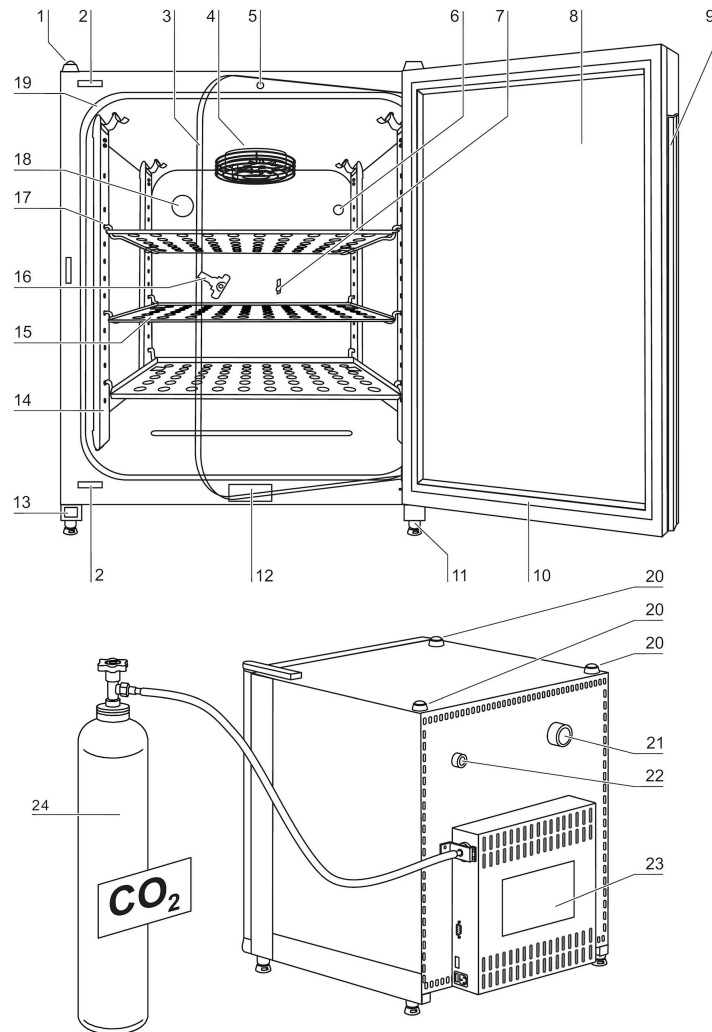


Figure 4 – General views of device

### Front view:

- [1] Stacking elements
- [2] Plug caps
- [3] Glass door
- [4] Measuring cell with blower wheel and sensors
- [5] Door switch
- [6] Pressure compensation opening with insert
- [7] Measuring opening

- [8] Outer door
- [9] Door handle
- [10] Outer door seal, replaceable
- [11] Stand, height-adjustable
- [12] Nameplate
- [13] Power switch
- [14] Support rail
- [15] Shelf
- [16] Latch, glass door
- [17] Support hook for shelf
- [18] Access port with plug
- [19] Glass door seal, replaceable

#### **Rear view**

- [20] Stacking elements
- [21] Access port, Ø 42 mm
- [22] Pressure compensation opening
- [23] Switchbox with supply interfaces
- [24] CO<sub>2</sub> gas container

## Work space atmosphere

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

- Temperature
- Relative humidity
- CO<sub>2</sub> concentration

### Temperature:

To ensure undisturbed operation, the temperature in the operating room must be at least 18 °C and the incubation temperature must be at least 3 °C higher than the room temperature. The heating system controls the incubation temperature from this temperature threshold up to 55 °C. The principle of air jacket heating and the additional, separate heating of the outer door minimize the risk of condensate formation on the side walls, at the ceiling of the work space, and at the glass door.

### Relative humidity:

The water tray of the work space can hold 4.5 liters of processed water. The heating of the work space causes evaporation of the water, thereby ensuring a constant humidity within the work space. Under normal operating conditions and at the usual incubation temperature of 37 °C, a constant relative humidity of approx. 95% is achieved in the work space. If heated containers are removed and put back into the work space, the elevated humidity and the cooling may cause condensate to form on the outer sides of the container.

For humidification, processed water of the following quality is required:

- Demineralized and either distilled or autoclaved for sterilization

or

- Completely deionized and either distilled or autoclaved for sterilization

### CO<sub>2</sub> supply:

To ensure correct growth conditions for the cell and tissue cultures, the work space is supplied with CO<sub>2</sub>. The pH of the bicarbonate-buffered culture media largely depends on the CO<sub>2</sub> content of the work space atmosphere. The CO<sub>2</sub> content of the work space atmosphere can be controlled within a range of 0 - 20%.

The CO<sub>2</sub> must be of the following quality:

- Purity 99.5% min

or

- Medical grade

## Sensor system

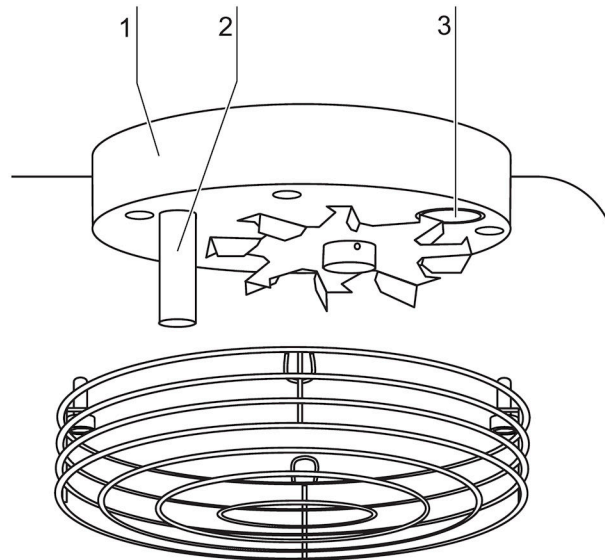


Figure 5 – Temperature sensor

The blower wheel and two sensor modules are integrated in the baseplate [1] of the measuring cell:

- Sensor [2] for the measurement of the work space temperature and of the thermal protection
- CO<sub>2</sub> sensor [3] for the measurement of the CO<sub>2</sub> content in the work space atmosphere

The sensor for the measurement of the work space temperature as well as the CO<sub>2</sub> sensor form part of the control system of the device. Their measured values are compared to the set nominal values. Based upon this data, the control system controls heating and CO<sub>2</sub> supply. The blower intermixes the supplied gases and ensure uniform temperature distribution within the work space.

The thermal protection has been preprogrammed at the factory and cannot be changed. It protects the stored cultures from overheating. If the temperature is exceeded by more than 1 °C, the thermal protection responds and the work space temperature is automatically reduced to the set nominal value so that the incubation process can be continued even in case of a failure. Any response of the thermal protection will simultaneously trigger an audible and visual alarm.

## Door switch

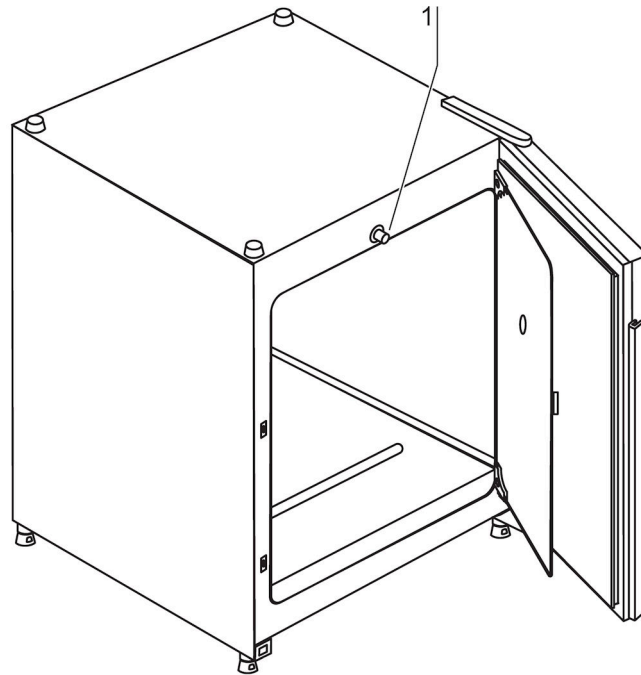


Figure 6 – Door switch

A door switch [1] is installed in the upper edge of the work space opening. If the door switch is activated by opening the glass door, the gas supply and the heating of the work space are interrupted and the display text will flash.

If the door remains open for more than 30 seconds, a short acoustic alarm sounds. If the door remains open for more than 10 minutes, the acoustic alarm sounds continuously.

The outer door can only be closed after the glass door has been latched properly.



## Switchbox with supply interface

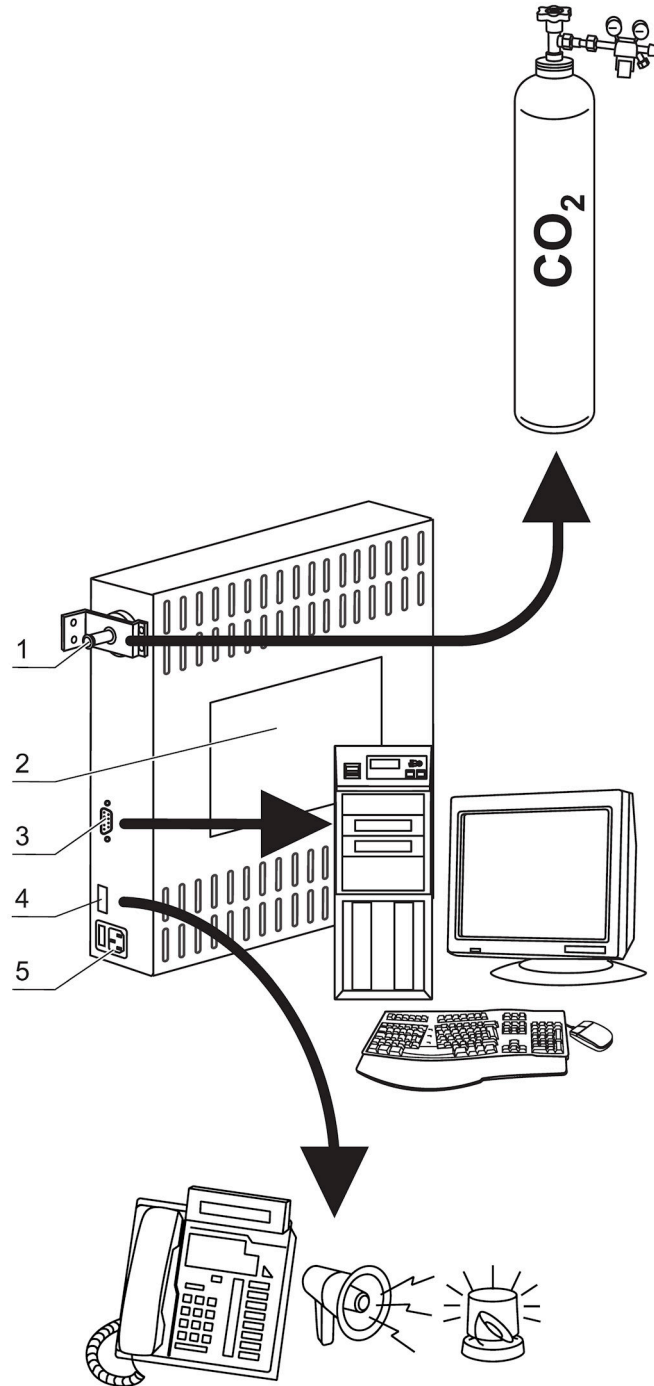


Figure 7 – Supply interfaces



All supply connections are installed in the switchbox at the rear of the device.

**Gas connection:**

The gas supply line between the device and the gas supply system is connected using the supplied connecting hoses.

CO<sub>2</sub> is supplied to the device through a separate connecting sleeve [1].

The process gas must be supplied to the device at a fixed pressure that has been preset within a range of 0.8 - 1.0 bar, this must remain unchanged.

Before the gas is fed into the work space, it flows through a sterile filter with a separation rate of 99.97% for a particle size of 0.3 µm (HEPA filter quality).

**Label:**

The label [2] contains information about gas supply, an alarm contact terminal legend, and notes about the electrical fusing of the device.

**RS 232 interface:**

Via the RS 232 interface [3], the incubator can be connected to the serial interface of a PC. This connection allows the computer-aided acquisition and documentation of the major operating parameters (temperature, CO<sub>2</sub> concentration, failure codes, etc.).

**Alarm contact:**

The device can be connected to an on-site, external alarm system (e.g. telephone system, building monitoring system, visual or acoustic alarm system). For this purpose, a potential-free alarm contact [4] is preinstalled in the device.

**NOTE!**

**Alarm contact:**

The alarm contact receives only messages caused by work space atmosphere conditions (temperature or gas)!

**Power supply connection:**

The power supply connection [5] of the device is established via a cable with a connector for non heating appliances. The holder for the two device fuses is integral to the power supply socket.

# Work space components

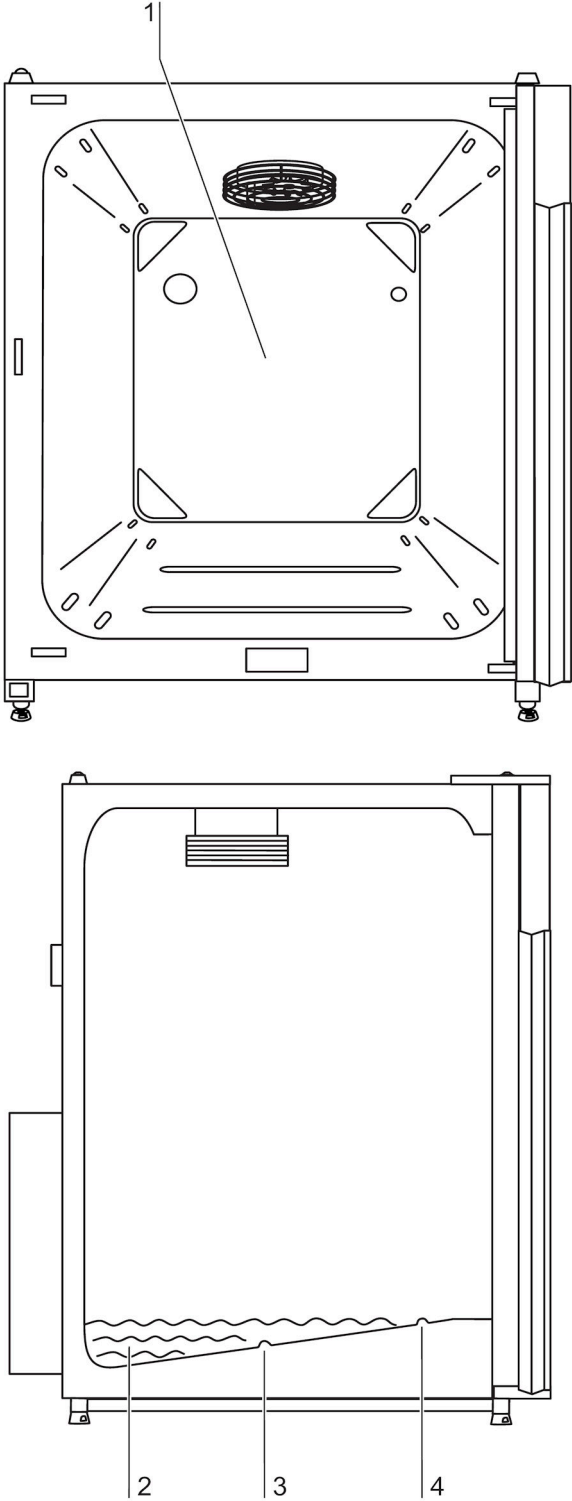


Figure 8 – Water space layout / Water reservoir



The working surface of the incubator has been designed to minimize the surface area. This helps to reduce contamination and promotes easy of cleaning.

#### **Internal chamber:**

All components of the work space are made of stainless steel and have a burnished, absolutely smooth and easy-to-clean surface. Any embossings have a large radius.

The components of the shelf system can be removed easily so that only the easily treatable, surface-reduced internal chamber [1] remains in the work space for cleaning and manual disinfection works.

#### **Water reservoir:**

The water reservoir [2] is integral to the internal chamber floor and inclines toward the rear. The embossing in the water tray is used to indicate minimum level [3] and the maximum level [4].

#### **Heating system:**

An air jacket heating is used for heating the work space. The arrangement of the heating elements ensures that condensate formation above the water reservoir is prevented as fast as possible. The outer door of the device is also heated. The heat radiated onto the interior glass door prevents condensate formation. The work space of the device always remains visible, despite high humidity.

#### **Shelf system:**

The support rails [1] of the shelf system are perforated every 42 mm so that the support hooks [8] can be inserted variably for any culture container size required. The shelves [2] have an integrated tilt protection and withdrawal stop. For details of the shelf system, see Chapter 5 "Start-up".

### Rear panel openings:

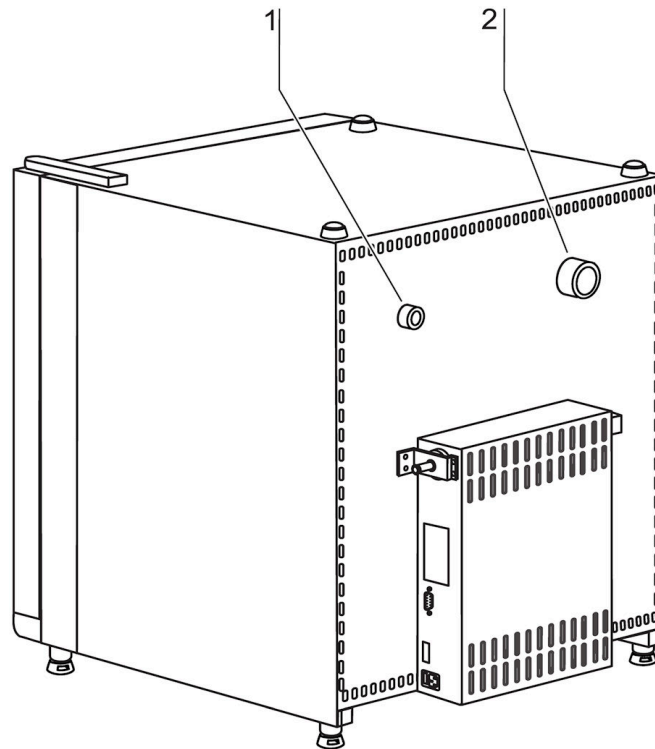


Figure 9 – Rear panel openings

A seal-able access port [1] allows cables, hoses or additional sensors to be routed into the work space of the device. A pressure compensation opening with insert [2] at the rear panel of the device allows a compensation between the pressures in the work space and in the operating room.

### NOTE!

#### Operating conditions:

When accessories are to be operated in the work space of the CO<sub>2</sub> incubator, the ambient condition requirements must be observed (see table below). The energy introduced into the work space affects the beginning of the temperature control range. When additional heating sources are introduced into the work space, condensation (e.g. at the glass door) may occur.

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



## 90 °C decontamination routine

The 90 °C decontamination routine is used to decontaminate the complete work space including all installed components and sensors. During this routine, a moist and wet atmosphere with highly decontaminating effect is created for 9 hours at a temperature of 90° C.

The effectiveness of the decontamination routine has been tested and certified by independent institutes. Information about these tests is available at request from VWR.

The entire program run of the decontamination routine will take approx. 25 hours.

After the run has been completed, the device must be reactivated using the autostart routine.

### NOTE!

#### Thermal protection:

If the thermal protection for the device responds, the 90 °C decontamination routine can only be started after the cause of the failure has been repaired or reset.

# 5

## Start-up

### Preparing the work space

The incubator is not delivered in a sterile state. Before the initial start-up, the device must be decontaminated.

Before the decontamination is performed, the following work space components must be cleaned:

- Support rails
- Support hooks
- Shelves
- Work space surfaces
- Work space seals
- Glass door

#### NOTE!

#### Decontamination:

For details about the cleaning and disinfection of the device, see Chapter 9 "Cleaning and disinfection".

### Installing the shelf system

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

Support rail installation/removal:

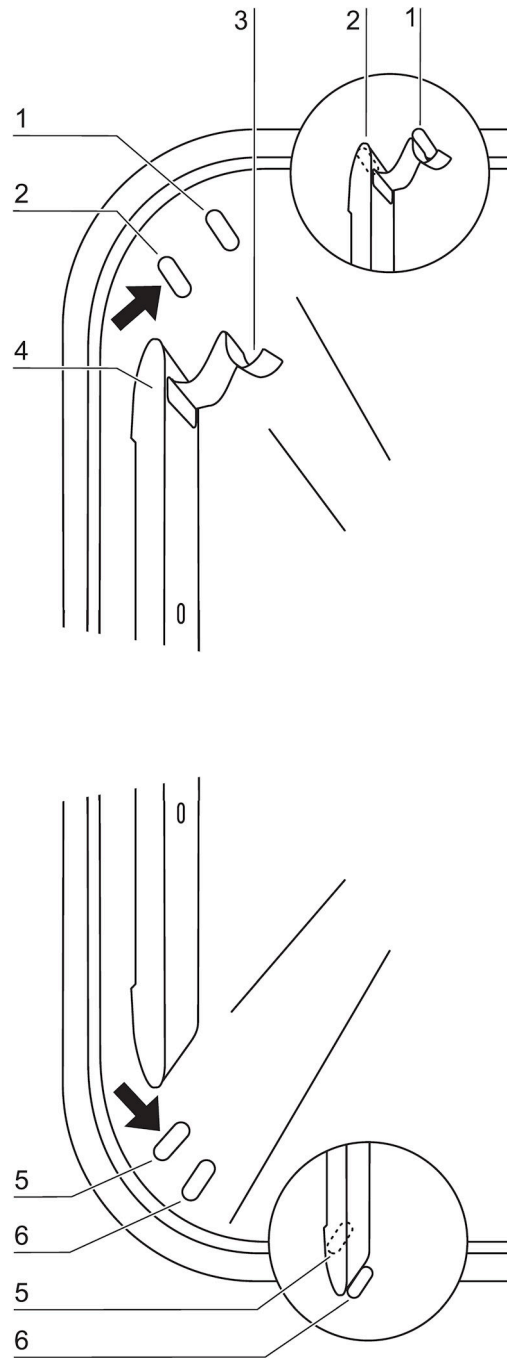


Figure 10 – Support rail installation/removal

The support rails are held at the sides by embossing [2] and [5] and secured by the embossing [1] and [6]. The support rails marked with (◆) are inserted at the rear panel of the device with the locksprings [3] facing upward.



1. Position support rail [4] onto the lower embossing [6] and tilt toward the work space side wall so that the rail is positioned over the two embossings [5] and [2].
2. Clamp lockspring [3] behind upper embossing [1].
3. To remove the support rails, pull lockspring tab down and out of the embossing to remove rail.

#### Installing the shelf supports:

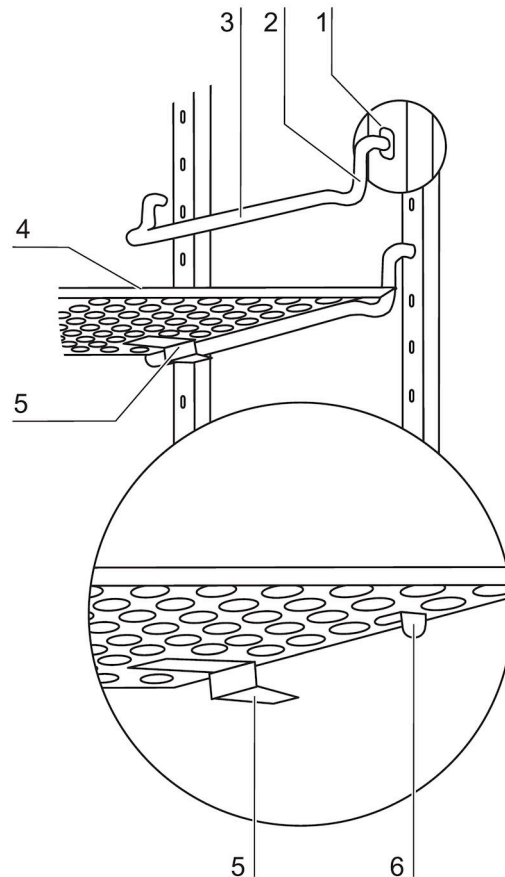


Figure 11 – Shelf support/sheet insert installation

1. Insert the shelf supports [3] into the perforations [1] of the support rail with the bar facing down.
2. Make sure that the two vertical elements [2] of the shelf support are flush with the support rail.

#### Installing the shelves:

1. Push the shelf [4] onto the shelf supports with the tilt protection [5] facing the rear panel of the device. The tilt protection [5] is also used as a guide for the shelf.
2. Slightly raise shelf so that the withdrawal stop [6] can be routed over the shelf supports.
3. Make sure that the shelf supports are positioned in the two tilt protectors in a way that it can move freely.

**Levelling the device:**

1. Position a bubble level on the center shelf.
2. Rotate the adjustable device stands using the supplied 24 mm wrench until the shelf is positioned horizontally in all directions. Perform the adjustment of the device stands from left to right and from rear to front.

**Gas connection****NOTICE!****Gas quality:****CO<sub>2</sub> must be of the following qualities:**

- Purity 99.5% min

or

- Medical grade

**CAUTION****Overpressure:**

The operating pressure of the gas applied 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!

Set the gas supply to a range between 0.8 bar min. and 1.0 bar max. and make sure that this pressure setting cannot be changed!

**NOTE!****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!

**Access port:**

If the access port is not used, it must be capped during operation!

### CO<sub>2</sub> connection:

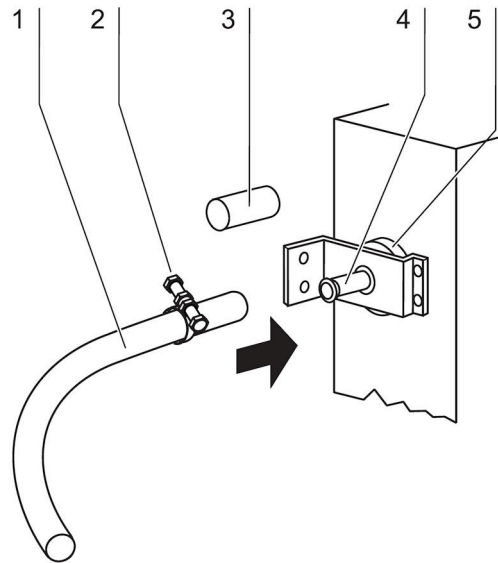


Figure 12 – Gas pressure hose installation

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

1. Connect gas pressure hose [1] to the sleeve of the gas supply system.
2. Remove protective cap [3] from sterile filter.
3. Slide hose clamp [2] onto gas pressure hose and connect hose to the sleeve [4] of the sterile filter [5].
4. Secure gas pressure hose to the sleeve of the sterile filter using the hose clamp.

## Power supply connection



### WARNING

Electric shock:



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

The device must be connected only to a correctly installed ground fault circuit interrupter and grounded power supply source:

- Fusing: T 16 A
- Circuit breaker: G 16

### Connection to the power supply system:

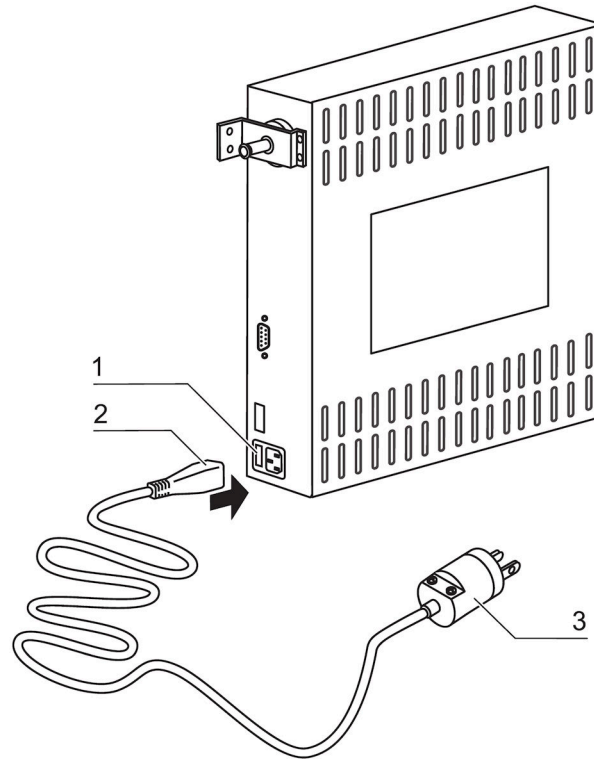


Figure 13 – Power supply connection

1. Before connecting the device to the power supply, check to see if the voltage of the power supply corresponds with the specifications on the nameplate at the front of the device. If the ratings given for voltage (V) and current (A) are not correct, the device must not be connected to the power supply.
2. Connect the connector for non-heating appliances [2] to the socket [1] at the control box of the device.
3. Connect the grounding plug [3] of the power supply cable to a correctly grounded and fused socket.
4. Make sure the power supply cable is not subjected to tensile or compressive force.

## RS 232 interface connection

The RS 232 interface has been designed for a cable connection with 9-pin connectors and a contact assignment of 1:1.

### Connection of the device:

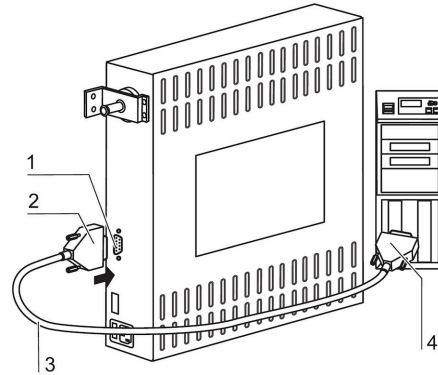


Figure 14 – RS 232 interface

1. Turn PC off.
2. Connect the connector [2] of the serial interface cable [3] (not comprised in the scope of delivery) to the socket [1] at the supply interface at the rear of the device.
3. Connect the remaining other connector [4] to an unassigned slot COM 1/COM 2 etc. at the PC.
4. Turn PC on.

### Transfer protocol:

The interface must be configured as follows:  
9600 baud, 8 data bits, 1 stop bit, no parity.

### Command sequences:

Data communication is achieved with a defined structure of command sequences (frames).

### Frame structure:

<STX | command | data | BCC | ETX>

### Command:

Bit 0 - 3 = data field length in byte

Bit 4 - 7 = command

### Check sum:

BCC = 1 - complement

(command XOR data XOR ... XOR data N XOR FF<sub>H</sub>)

### Command list - Reading control loop data

0110 0001 (61<sub>H</sub>)

Data:

0001 0000 (10<sub>H</sub>) for temperature during incubation operation

0001 0001 (11<sub>H</sub>) for CO<sub>2</sub>

### Device response for temperature and CO<sub>2</sub>

Data:

Nominal value x 10, (2 bytes, integer)

Nominal value, (4 bytes, floating point number)

Internal use, (5 bytes for CO<sub>2</sub>, otherwise 7 Bytes)

### Command list - Requesting failure codes

Command:

1001 0000 (90<sub>H</sub>)

Data:

none

### Response - Reading failure codes

The microprocessor returns a total of 10 bytes (5 integer values). Each integer value represents a current failure code in the assigned control loop (incubation temperature, CO<sub>2</sub> content, general). The failure code General failure belongs to a superior failure that is shown simultaneously in all displays (e.g. failure code 99).

The failure codes for incubation temperature and decontamination temperature are shown in the temperature display, the codes for CO<sub>2</sub> are shown in the CO<sub>2</sub> display. Value "---" shows that there is no current failure.

### Faulty response from control unit:

If a returned response is incomplete or faulty, the CPU responds with a NAK (15<sub>H</sub>, only 1 byte, without frame). Otherwise, the command code (with pertaining length information) is regarded as a response and the data that may be required is transmitted.

### Particularities during data communication:

For the data communication between PC and microcontroller, the following particularities must be observed:

The microprocessor stores an int or unsigned int value with the sequence <Highbyte>, <Lowbyte> in the memory. For the PC, this sequence is reversed. The microcontroller transmits these values in its format, i.e. the PC must reverse the sequence of the bytes. For floats, there is no difference.

### Example: Temperature data request and response

Request:

02<sub>H</sub> 61<sub>H</sub> 10<sub>H</sub> 8E<sub>H</sub> 03<sub>H</sub>

Response:

02<sub>H</sub> 6D<sub>H</sub> 01<sub>H</sub> 72<sub>H</sub> 38<sub>H</sub> 91<sub>H</sub> C7<sub>H</sub> 41<sub>H</sub> F5<sub>H</sub> 6B<sub>H</sub> F4<sub>H</sub> 43<sub>H</sub> 9E<sub>H</sub> 00<sub>H</sub> 32<sub>H</sub> 4B<sub>H</sub> 03<sub>H</sub>  
*integer*                      *float*                      *intern*  
 (37.0)                      (24.946)

## Connecting the alarm contact

### NOTICE!

#### Expert work:

VWR warrants the operational safety and the operativeness of the device only if installation and repairs are performed properly.

The connection of the device to an external alarm system must only be carried out by adequately trained and authorized expert electrical/telecommunication personnel!

#### Function:

When failures occur in the temperature or gas control circuits, an alarm message is issued to the connected alarm/monitoring system. The potential-free contacts (1 changeover contact) have been laid out for the following circuits:

Circuit	Voltage	External fusing
Circuits with system 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

#### Alarm relay

Operating state	Contact 4 - 1	Contact 4 - 3
No failure, power off	X	0
No failure, power on	0	X
Failure	X	0
X: Contact closed / 0: Contact open		

### NOTE!

#### Switching structure:

For all failures reported by the device (sensor circuit open, deviation from the nominal value and door open for more than 10 minutes), the alarm relay changes state!

## Connection example:

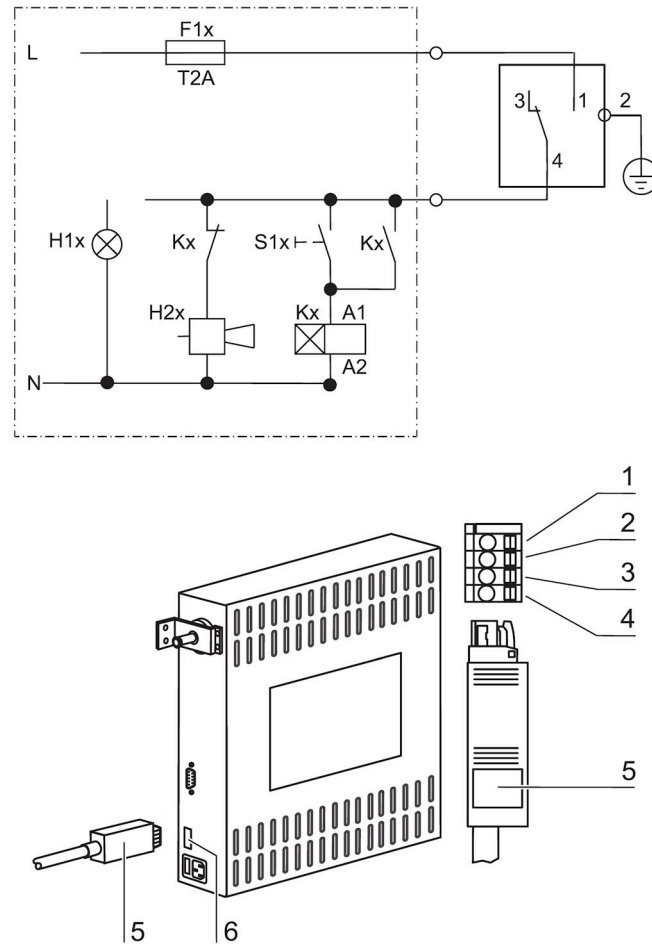


Figure 15 – Example of a connection scheme

The connector [5] for the connecting cable is comprised in the scope of delivery. The values for the operating voltage of the external circuits and of the fusing of the alarm system are given in the table above.

1. Connect the individual conductors [1] to [4] of the connecting cable as shown in the wiring diagram.
2. Connect the connector [5] of the alarm system connecting cable to the interface [6] at the control box at the rear panel of the device.



# 6

## Operation

### Preparing the device

The device must only be released for operation after all major measures for the start-up have been taken (see Chapter 5 “Start-up”).

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

- Gas hoses must be seated tight on the connecting filter and must be secured using a hose clamp.
- The access port must be capped.
- The pressure compensation opening must be permeable, its insert must be installed in the work space.
- The glass door seal must not be damaged.
- The glass door measurement opening must be capped.
- The shelf system components must be installed safely.

#### NOTE!

#### Hygiene regulations:

Prior to any operation, the user must clean and disinfect the work space in accordance with the hygiene regulations set forth by the operator to protect the cultures.

#### Water supply:

The water tray of the work space can hold up to 3.0 l of processed water. When the running operation, always keep a sufficient quantity of processed water of the following quality available:

- Demineralized and distilled or autoclaved for sterilization

or

- Completely deionized and distilled or autoclaved for sterilization

When the water level falls below the lower limit, refill water!

## Starting operation

Starting and loading the device:

1. Fill the water tray with up to max. 3.0 l of processed water. Do not exceed the upper level mark.
2. Make sure that the CO<sub>2</sub> supply system valve is open.
3. Turn the device on using the power switch.
4. Set nominal values for temperature and CO<sub>2</sub> content on the operating panel.
5. Ventilate work space by leaving both device doors open until acoustic alarm sounds.
6. Start device using auto-start routine.
7. Close device doors.
8. The temperature control adjusts the temperature to the set nominal value, the humidity rises.
9. When the temperature and relative humidity are constant, automatic adjustment of the CO<sub>2</sub> measuring system is performed.
10. The “auto-start” indicator goes off.
11. The CO<sub>2</sub> control supplies the set amount of CO<sub>2</sub>.
12. The device is ready for operation.
13. Load work space with cultures.

### NOTE!

#### Duration of the auto-start routine:

When the device is cold and when the ambient temperature is low, the auto-start routine may take up to 10 hours!

#### Loading:

To ensure sufficient air circulation and even heating of the samples, the loading surface within the work space should be used up to max. 70%. Large objects in the work space that dissipate heat may impair heat distribution!

## Handling and control

### Power switch

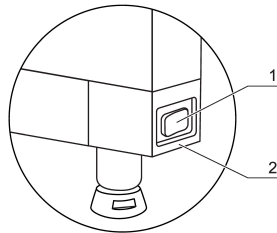


Figure 16 – Power switch

Depending on which side the door hinges are installed, the power switch is integral to the front cover of one of the front device stands.

[1] Power Switch

[2] Front cover

**To turn the device on:**

- Press the power switch [1]; the switch illumination comes on.

**To turn the device off:**

- Press the power switch; the switch illumination goes off.

## Operating panel

The operating panel is divided into three functional areas:

- 2 displays that show numeric values for temperature and CO<sub>2</sub> content
- 8 keys for selecting functions and for entering data
- 6 LEDs that show functions or operating states

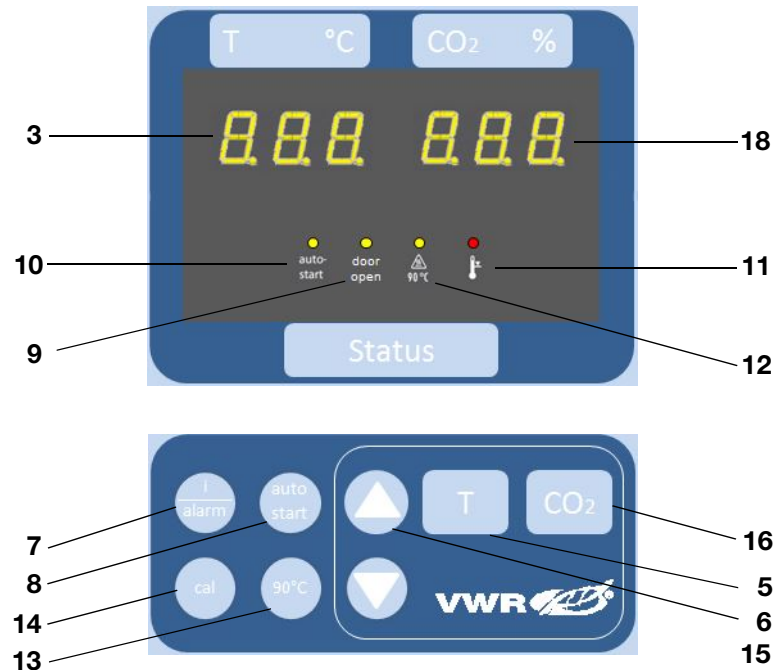


Figure 17 – Operating panel

- [3] Temperature display
- [5] Key for setting temperature nominal value
- [6] Key for increasing value
- [7] Key for reading failure codes / stopping acoustic alarm
- [8] Key for activating auto-start
- [9] LED for indicating door (open door)
- [10] LED for indicating active auto-start
- [11] LED for indicating active over-temperature protection
- [12] LED for indicating active optional 90 °C decontamination routine
- [13] Key for starting optional decontamination routine
- [14] Key for starting cal function
- [15] Key for reducing value
- [16] Key for setting CO<sub>2</sub> nominal value
- [18] CO<sub>2</sub> display

## Control self-test

After the device has been turned on, the control goes through a test routine.

### 1. Turn the device on

- ▶ Press power switch.
- ↪ All indicators on the operating panel come on, all displays show the numeric value 8 to indicate that the test routine is being run



- ↪ The temperature display shows a three-digit number for the corresponding assembly/parameter set:

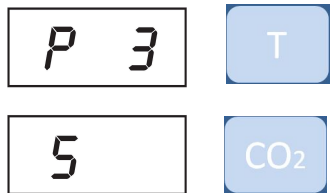
P 1: Operating and display board

P 2: Measuring cell

P 3: Main board

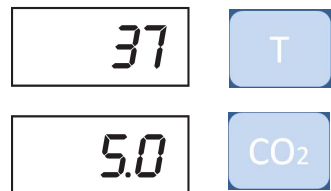
P n: Parameter number

The CO<sub>2</sub> display shows the software version/device version.



### 2. Test routine completed

- ↪ The temperature display shows the current temperature value, the CO<sub>2</sub> display shows the current CO<sub>2</sub> value.



### NOTE!


Factory pre-settings:

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

- Temperature: 37 °C
- CO<sub>2</sub> content: 0.0%

## Setting the nominal temperature value

1. Indicate the nominal value:

- ▶ Press the  key.
- ↪ The temperature display shows the current nominal value.

2. Enter the nominal value:

The nominal value can be increased or reduced in increments; if you keep the key depressed, the UP/DOWN function switches to a rapid increase/reduction; after approx. 3 seconds, another increase/reduction occurs.

To increase the nominal value:

- ▶ Press the  +  keys.

To reduce the nominal value:


- ▶ Press the  +  keys.

3. Accept and store the nominal value:

- ▶ Release both keys.
- ↪ The temperature display shows the current actual value measured in the work space.

## Setting the CO<sub>2</sub> nominal value

1. Indicate the nominal value:

- ▶ Press the  key.
- ↪ The CO<sub>2</sub> display shows the current nominal value.

2. Enter the nominal value:

The nominal value can be increased or reduced in increments; if you keep the key depressed, the UP/DOWN function switches to a rapid increase/reduction; after approx. 3 seconds, another increase/reduction occurs.

- ▶ Press the  +  keys.

↪ To reduce the nominal value:

- ▶ Press the  +  keys.

3. Accept and store the nominal value:

- ▶ Release both keys.
- ↪ The CO<sub>2</sub> display shows the current nominal value measured in the work space.

## Activating the auto-start routine

The auto-start function is an automated routine for the start and the subsequent adjustment of the CO<sub>2</sub> measuring system. After the start, the device control adjusts the temperature to the set nominal value while humidity is generated. When temperature and relative humidity have reached constant values, the CO<sub>2</sub> measuring system is automatically adjusted to these values, and the work space is supplied with the preset quantity of CO<sub>2</sub>.

### NOTE!

#### Application of the routine:

To ensure that the specified accuracy of the CO<sub>2</sub> measuring system is maintained, the device should always be started using the auto-start routine after the nominal temperature setting has been changed by more than 1 °C or after extended interruptions of the operation of the device. The auto-start routine should be run at least every three months on the occasion of cleaning and maintenance works.

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

At the start of the auto-start routine, the work space atmosphere must consist only of ambient air. The floorpan must be filled with a sufficient quantity of water!

1. Open both doors until the acoustic alarm sounds after 30 seconds:

- All current actual values flash on the displays, the “door” LED illuminates, after 30 seconds the acoustic alarm sounds.

2. Enter nominal values:

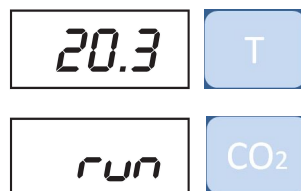
- ▶ See Sections “Setting the nominal temperature value” and “Setting the CO<sub>2</sub> nominal value”.

3. Activate the auto-start routine:


- ▶ Keep the key  depressed for 5 seconds.
- The auto-start LED flashes.

4. Close all device doors:

- The temperature display shows the actual value, the CO<sub>2</sub> display shows “run”, the “door” LED goes off.



5. Cancel the auto-start routine:

- ▶ Keep the  depressed for 5 seconds.
- ➔ The displays returns to normal operation (incubation operation).

**NOTE!**

**Canceling the routine:**

The auto-start routine can be canceled any time!

**Failure code:**

The canceling of the routine is indicated by a corresponding failure code. For a list and for a description of the codes, please refer to Section “Failure code list”.

## Reading failure codes

The device is equipped with a failure diagnostic system. This system recognizes failures during the operation and allows the allocation of failure causes by numeric codes. Failure recognition is displayed by an acoustic and a visual alarm at the operating panel. The diagnostic system stores the last 10 failures in the sequence of their occurrence. The failure table can be requested and read.

If the cause of a failure cannot be repaired, please have the fault code and the serial number of the device available when contacting Technical Service.

**NOTE!**

**Response delay:**

To prevent short term changes of the operating conditions from resulting in repeated failure messages during the operation of the incubator, the diagnostic system has a response delay:

- After changes to nominal values: max. 152 min
- After the glass door has been opened: max. 45 min
- Other failure causes: max. 1 min!

**Delay time reset:**

If the set nominal value is reached during the specified period, the delay time is reset to 1 min!



### Failure cause:


When the temperature nominal value and/or the CO<sub>2</sub> nominal value is reduced, a failure message (code 101/201) may appear due to the slow reaction time of the atmosphere within the work space. Therefore, the device doors should be opened for some time if the nominal values are reduced

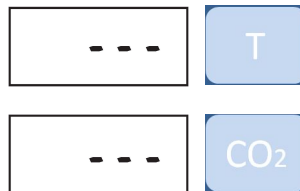
1. The audible alarm sounds:

2. Silence the audible alarm:

- ▶ Press any key.
- ↪ The audible alarm is silenced.

3. Read codes:

- ▶ Keep the  key depressed.
- ↪ If no failure is detected, each display shows three hyphens.



- ↪ If the system detects a failure, the display that is assigned to the corresponding control circuit shows a failure code. Example: If the temperature display shows failure code 101, a failure in the temperature control circuit was detected.






### NOTE!

#### Failure codes:

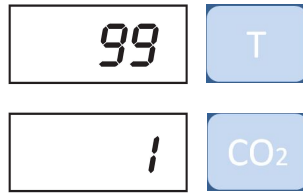
For a list and a description of the failure codes, please refer to failure code list in this section!

4. Scroll through the failure code table:


To read stored failure codes from the failure code table.

- ▶ Keep the  key depressed.
- ▶ To scroll, keep the  or  key depressed.



↪ The temperature display shows the last 10 failure codes that had been registered. The CO<sub>2</sub> display shows the number of the individual failure code within the table.



5. Exit the failure code table:

- ▶ Release the  key.
- ↪ The temperature and CO<sub>2</sub> displays show the current actual values.

6. Erase the failure code table:

- ▶ Keep the  +  depressed for 5 seconds.
- ↪ The temperature and CO<sub>2</sub> displays flash to indicate that the failure table has been erased.

## Failure code list

Code	Description	Cause	Repair
≡≡≡	No values displayed	Communication between display and CPU- main board faulty	Contact Service
42	NV RAM read failure	NV RAM faulty, default values loaded	Contact Service
43	NV RAM read failure	NV RAM faulty, mirrored values loaded	Contact Service
44	NV RAM faulty	CO <sub>2</sub> measuring cell values not overwritten, device works with default values	Contact Service
54	Manipulated variable failure	Calculation error, device performed RESET	Contact Service
55	I <sup>2</sup> C bus failure	Data transfer faulty, measured value quality dropped below 50%	Eliminate source of interference, e.g. cellular phone
66	Deviation of temperature sensors from one another	Temperature signal plausibility doubtful	Contact Service
77	CO <sub>2</sub> cal range exceeded	Max. adjustment value exceeded	Contact Service
88	Failure upon auto-start	Total time elapsed or max. adjustment value exceeded	Repeat auto-start
99	Device doors open	Doors open for more than 10 minutes, door switch	Close device doors, test door switch for correct function
100	Temperature below nominal value	Actual value < nominal value -1 °C	Contact Service
101	Temperature above nominal value	Actual value > nominal value +1 °C	Do not exceed ambient temperature limit
104	Temperature sensor faulty	Sensor circuit open/shorted	Contact Service
200	CO <sub>2</sub> below nominal value	Act. val. < nom. val. -1% <ul style="list-style-type: none"> <li>• No CO<sub>2</sub></li> <li>• Prepressure low</li> <li>• Supply line blocked</li> </ul>	Check gas supply: <ul style="list-style-type: none"> <li>• Connect new gas cylinder</li> <li>• Raise prepressure to 1 bar</li> <li>• Check supply line to device</li> </ul>
201	CO <sub>2</sub> above nominal value	Act. val. > nom. val. +1% <ul style="list-style-type: none"> <li>• Prepressure high</li> </ul>	Check gas supply: <ul style="list-style-type: none"> <li>• Reduce prepressure to 1 bar</li> </ul>
204	CO <sub>2</sub> measuring cell faulty	Sensor circuit open/shorted	Contact Service
500	Temperature 90°C routine below nominal value	Actual value < 85°C	Repeat decontamination routine, contact service as required
501	Temperature 90°C routine above nominal value	Actual value > 85°C	Contact service
502	Failure in 90°C routine	Power failure during heating or holding phase	Silence alarm by pressing key 90°C (2 times 5 sec.), then restart routine

## Resetting the thermal protection

1. The Thermal Protection Active LED illuminates:
2. Turn the device off:
  - ▶ Press the power switch.
  - ↪ All indicators come off.
3. Turn the device back on:
  - ▶ Press the power switch.

### NOTICE!

#### Thermal protection:

When the cause of the failure (e.g. excessive temperature in the operating room) has been repaired, the device is set to normal incubation operation after it has been turned on again. If the cause of the failure cannot be repaired with simple measures (e.g. by ventilating the room or by reducing the temperature in the operating room), the thermal protection will respond again immediately; in this case, contact Technical Service!

## Shut-down

### Shutting the device down



#### WARNING

#### Contamination hazard:

If the work space surfaces are contaminated, germs may be transferred to the environment of the device.

In case of a shut-down, the device must be decontaminated!

1. Remove culture containers and all accessories from the work space.
2. Pump water out of the water reservoir.
3. Clean and decontaminate the work space and wipe device dry.

### Turn device off using the power switch

4. Unplug power connector and protect it against accidental reconnection.
5. Close the CO<sub>2</sub> supply system shut-off valves.
6. Disconnect gas pressure hoses from sleeve at the rear of the device.
7. Until the device is shut down, the work space must be continuously ventilated: Leave the glass door and the outer door open and secure them in this state.



## Cleaning and disinfection

### Decontamination procedures

The operator must prepare hygiene regulations for the decontamination of the device in accordance with the application of the device.

**Wipe/spray disinfection:** is used as the standardized manual disinfection procedure for the device and for all accessories.

### Wipe/Spray disinfection

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

- Predisinfection
- Cleaning
- Final disinfection

Recommended cleaning and disinfection agents:

#### NOTICE!

#### Incompatible cleaning agents:



Some device components are made of plastic. Solvents may dissolve plastics. Powerful acids or bases may cause embrittlement of the plastics.

For cleaning the plastic components and surfaces, do not use hydrocarbon-containing solvents, detergents with an alcohol content of more than 10% or powerful acids and bases!

#### Chloride-containing disinfectants:



Chloride-containing disinfectants may corrode stainless steel.

Use only disinfectants that do not affect stainless steel!

- Do not use sodiumhypochlorite solutions such as Purex and Clorox. These can cause corrosion and pitting of stainless steel.
- Do not use steel wood pads such as Brillo. These pads deposit carbon particles in the work space.

### Alcoholic disinfectants:



Disinfectants with an alcohol content of more than 10% may form, in combination with air, easily combustible and explosive gas mixtures. When using such disinfectants, avoid open flames or exposure to excessive heat during the entire disinfection process!

- Use such disinfectants only in adequately ventilated rooms.
- After the disinfectant has been allowed to react, wipe the cleaned device components thoroughly dry!
- Observe safety regulations to avoid fire and/or explosion hazard caused by alcohol-containing disinfectants!

### Recommended disinfectant:

A surface disinfectant recommended by VWR can be ordered under following part numbers:

- Spray bottle, 250 ml: Part No.: 50052425
- Refill bottle, 500 ml: Part No.: 50051939

### NOTE!

#### Description disinfectant:

Details for efficiency and approvals are available on request!

#### Preparing the manual wipe/spray disinfection:



### WARNING!

#### Electric shock:



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

- Turn the device off using the power switch.
- Unplug power connector and protect it against accidental reconnection.
- Check to see if the device is de-energized!



### CAUTION!

#### Health hazard:



The surfaces of the work space may be contaminated. Contact with contaminated cleaning liquids may cause infections. Disinfectants may contain harmful substances.

When cleaning and disinfecting, always observe the safety instructions and hygiene regulations!

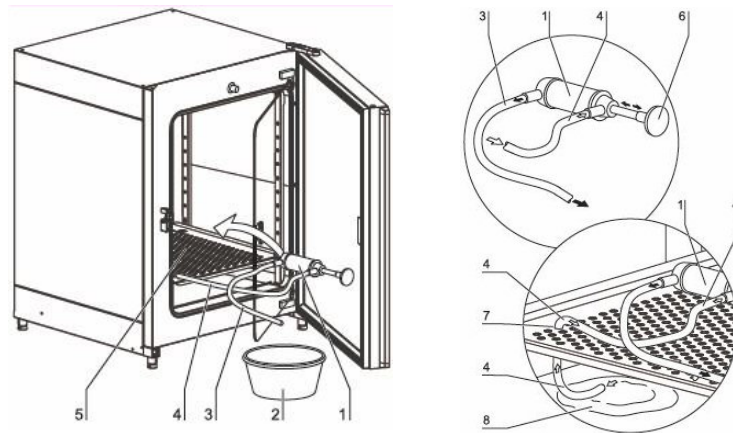


- Wear safety gloves.
- Wear safety glasses.
- Wear mouth and respiratory system protection gear to protect the mucous membranes.
- Observe the safety instructions of the manufacturer of the disinfectant and of the hygiene experts!



### Pumping water out of the water tray:

The standard equipment of the device comprises a mechanical suction pump for removing the water from the water tray. The water drain works through gravity.



1. Place the water pump [1] on the lowest shelf [5].
2. Feed the inlet hose [4] through a hole [7] of the lowest shelf to the water reservoir [8].
3. Prepare a bucket [2].
4. Suck the water, therefore pump the water pump using the hand grip [6] about four times until water flows in the outlet hose.
5. Let the water run into the bucket [2] through gravity.
6. Wipe remaining water off from the floor plate of the water reservoir using a cloth.

### Predisinfection:

1. Remove all samples from the work space and store them in a safe place.
2. Spray disinfectant onto the surfaces of the work space and of the accessories or wipe the surfaces clean using disinfectant.
3. Allow disinfectant to react as specified by the manufacturer.

### NOTE!

#### CO<sub>2</sub> sensor:

Do not spray disinfectant onto the CO<sub>2</sub> sensor in the baseplate of the measuring cell!

#### Removing accessories and shelf system:

1. Remove all shelves, then remove the entire shelf system from the work space.  
For removal and installation of the shelf system, please refer to Chapter 5, "Start-up".
2. If required, remove the blower wheel and its cover from the baseplate of the measuring cell.  
The wheel and the cover can be autoclaved.

### Removing blower wheel and cover:

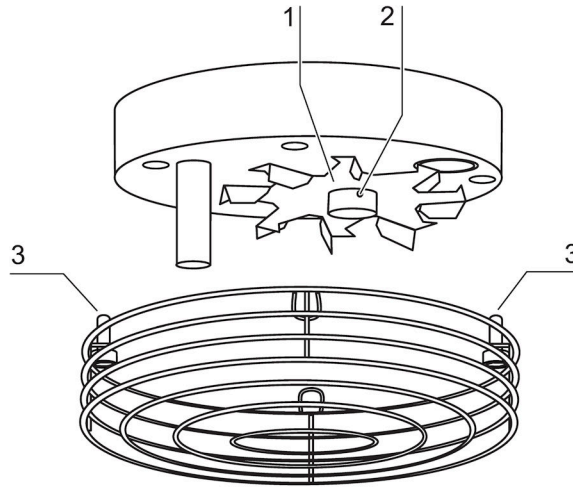


Figure 18 – Removing blower wheel and cover

1. Remove the two retaining screws [3] of the cover using the supplied Allen wrench (3 mm) and remove the cover.
2. The blower wheel [1] is secured to the axle by a set screw [2]. Remove set screw using the Allen wrench (2 mm) and pull blower wheel off.

#### NOTE!

#### Functional check:

After the installation, check to see if the blower wheel is securely attached to the axle and if it can rotate freely, then secure cover using the screws!

#### Cleaning the work space and accessories:

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

#### Final disinfection:

1. Install shelf system and accessories.
2. Again, spray disinfectant onto the surfaces of the work space and of the accessories or wipe the surfaces clean using disinfectant.
3. Allow disinfectant to react as specified by manufacturer.

## 90 °C decontamination routine

The entire program run of the decontamination routine takes approx. 25 hours.



### CAUTION

Hot surface:



The surfaces of the exterior door handle, work space, particularly the glass door armatures and the interior sheet of the outer door, are heated during the decontamination routine. During the routine run or immediately after completion of the run, always wear safety gloves when touching these surfaces; observe the warning indicator at the operating panel!

1. After the cleaning, reinstall the shelf system components into the work space.
2. Fill the water tray with 350 ml of processed water.
3. Turn the device on using the power switch.
4. Activate decontamination routine.
5. After the decontamination routine has been completed, remove the remaining water using a sterile cloth.
6. Turn the device off or restart the device operation using auto-start routine.

### 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.

## 90 °C decontamination routine procedure

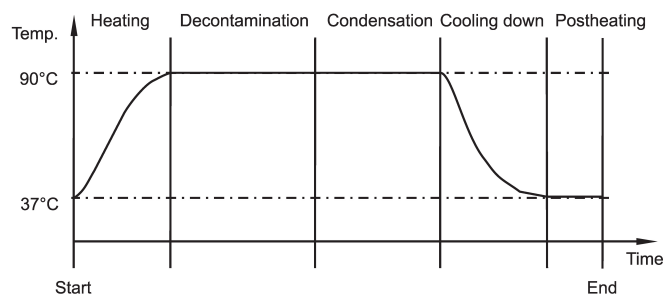


Figure 19 – 90 °C decontamination routine procedure

The routine is divided into four phases. Each individual phase or several phases can be canceled (i.e. skipped). If the operating step “Cancel decontamination routine” is executed, the routine moves to the next program phase. To cancel the routine completely, the operating step must be executed repeatedly until the remaining run time display shows the value 0. When the glass door is opened, this operating step cancels the routine completely.

The remaining run time of the decontamination routine designates the period between the start of the current routine time state and the cooling down to the preset temperature nominal value ( $\pm 2^\circ \text{C}$ ).

**Heating phase:** Remaining run time approx. 25 hours. A The work space is heated to a temperature of  $90^\circ \text{C}$  while an elevated relative humidity is created. The current decontamination temperature is shown at the temperature display.

**Decontamination phase:** Remaining run time approx. 23 hours. After the decontamination atmosphere has been created, the decontamination phase with a run time of 9 hours is started. If the door is opened during this time, the decontamination routine is restarted automatically as soon as the door has been closed.

**Cool-down phase:** Remaining run time approx. 14 hours. The device cools down until the originally set temperature nominal value is reached.

**Postheating phase:** Remaining run time approx. 3 hours. During the postheating phase, condensate within the device is eliminated as far as possible; remaining condensate accumulates at the bottom of the work space.

## Activating the $90^\circ \text{C}$ decontamination routine

Before running the decontamination routine, fill the water tray with 300 ml of water.


1. Turn the device on:

- ▶ Press power switch.
- ↪ All indicators on the control panel illuminate. The software version is shown at the temperature display and at the  $\text{CO}_2$  display.

2. Ventilate work space:


- ↪ Open both doors until the acoustic alarm sounds after 30 seconds.  
The current actual values flash at the displays, the door LED illuminates, the acoustic alarm sounds after 30 seconds.

3. Start the routine:

- ▶ Keep the  key depressed for 5 seconds.
- ↪ The  $90^\circ \text{C}$  LED flashes.
- ▶ Close the device doors:
- ↪ The actual value is shown at the temperature display. The remaining run time is shown at the  $\text{CO}_2$  display. The door LED goes off.




4. Complete the routine:

- ▶ Keep the  key depressed for 5 seconds.
- ↪ The display returns to the normal operating state (incubation operation).

## Cancelling the 90 °C decontamination routine

1. Cancel a routine phase:

- ▶ Keep the  key depressed for 5 seconds.
- ↪ The routine advances to the next phase.

2. Cancel the routine completely:

- ▶ To completely cancel the routine, each phase must be skipped individually by pressing the key until a remaining run time of 0 hours is displayed.
- ↪ When the last phase (postheating phase) has been skipped, the routine is completely cancelled.



## Maintenance

### Inspections and checks

To ensure the operativeness and the operational safety of the device, the functions and device components listed below must be checked at different intervals.

#### Daily check:

- Gas supply of the CO<sub>2</sub> supply system

#### Annual inspection:

- Tightness of the glass door seal
- Permeability of the pressure compensation opening with insert
- Functional check of the operating panel and of the device control
- Electrical safety check in accordance with the relevant national regulations (e.g. VBG 4)

#### NOTE!

#### Functional check:

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

### Service intervals

During normal operation, the following service routine must be performed:

#### Weekly service:

- Refill the work space water tray with fresh processed water

#### 3-month service:

- Run auto-start routine
- Perform temperature and CO<sub>2</sub> calibration

**Annual service:**

- Replace sterile filter

**NOTE!****Service contract:**

VWR offer a device-specific service contract that comprises all test and service works required!

## Preparing the temperature calibration

To determine the exact measured value of the integrated temperature sensor, a temperature comparison measurement has to be performed every three months.

If a major temperature deviation is found during this check, a temperature calibration is required. During this process, the temperature control of the device is set to the value measured during the temperature comparison measurement.

Use a calibrated measuring instrument with an accuracy of  $\leq \pm 0.1$  °C for this test. To minimize temporary temperature fluctuations during the measurement, the measuring instrument is placed into the work space in an isothermal container (e.g. a bowl filled with glycerol). The center of the work space is the reference location for the comparison measurement.

**NOTE!****Isothermal container:**

Do not use a container filled with water as an isothermal container as the evaporation of water will result in a lower temperature reading!



### Comparison measurement procedure:

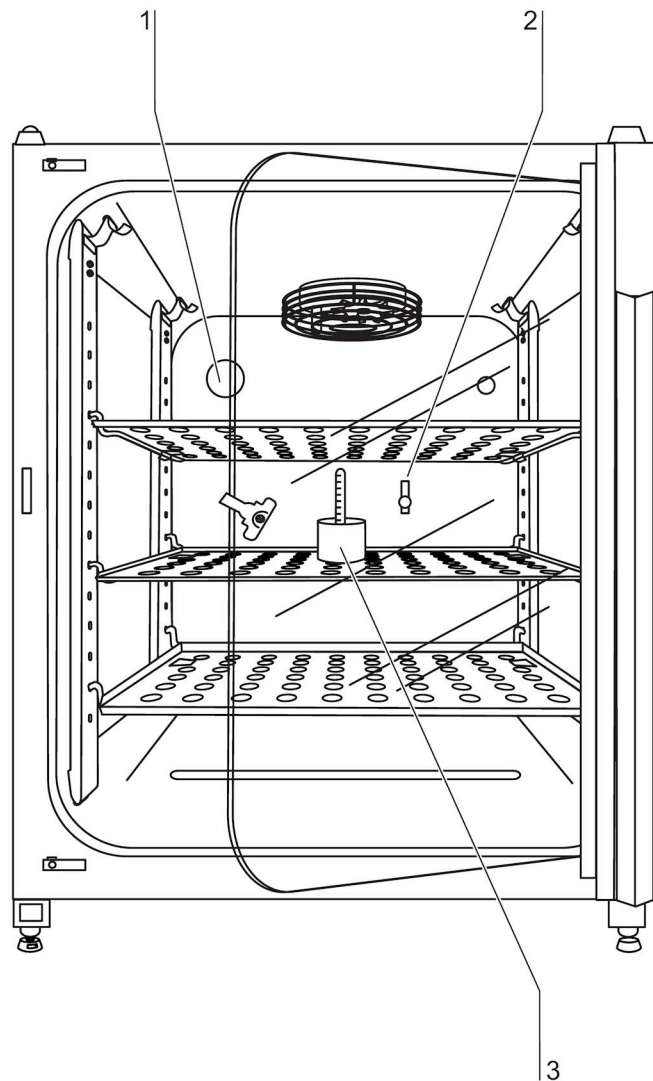


Figure 20 – Temperature calibration

1. Turn device on using power switch.
2. Set temperature nominal value and allow device to be heated. This may take up to several hours.
3. Place measuring instrument [3] onto the A center area of the work space.  
Alternatively, a temperature sensor may be positioned in this location. Route the connecting cable either through the measurement opening [2] in the glass door or through the access port [1] at the rear panel of the device.
4. Close doors.
5. Wait until the temperature value displayed on the measuring instrument has stabilized.
6. Calibrate temperature control as described in Section “Temperature calibration procedure”.

### Measurement example:

- Temperature nominal value: 37 °C
- Reference temperature: 36.4 °C


### NOTE!

#### Excessive work space temperature:


Excessive work space temperature after the calibration can be reduced by leaving the doors open for approx. 30 seconds!

## Temperature calibration procedure

### 1. Activate calibration:

- ▶ Keep the  key depressed for 5 seconds.
- ↪ All operating panel indicators flash.

### 2. Indicate the nominal value:

- ▶ Press the  key.
- ↪ The preset value of 37 °C is displayed.



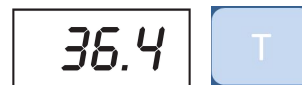
### 3. Enter the measured value (destination value):

- ▶ Press the  keys.


or

- ▶ Press the  keys.

- ↪ Destination value e.g. 36.4 °C

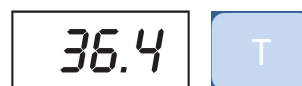


### 4. Accept the destination value:

- ▶ Press the  key.
- ↪ The temperature display momentarily shows "CAL",



- ↪ Then the corrected actual value (measured destination value 36.4 °C) is displayed.



5. Cancel the calibration process:

- ▶ Press any key.
- ↪ The temperature display and the CO<sub>2</sub> display show the actual values.

## Preparing the CO<sub>2</sub> calibration

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

If a major deviation is found during this check, a CO<sub>2</sub> calibration is required. During this process, the CO<sub>2</sub> control of the device is set to the value measured during the comparison measurement.

Use a calibrated measuring instrument with an accuracy of  $\leq \pm 0.3\%$  CO<sub>2</sub> for this test.

**Suitable instrument:**

- Portable IR readout instrument. (Part no. see Chapter 11 “Parts and accessories”).

The measuring sample is withdrawn through the seal-able measurement opening of the glass door or through the access port at the rear panel of the device. The comparison measurement must be performed when the device is completely stable.

### Comparison measurement procedure:

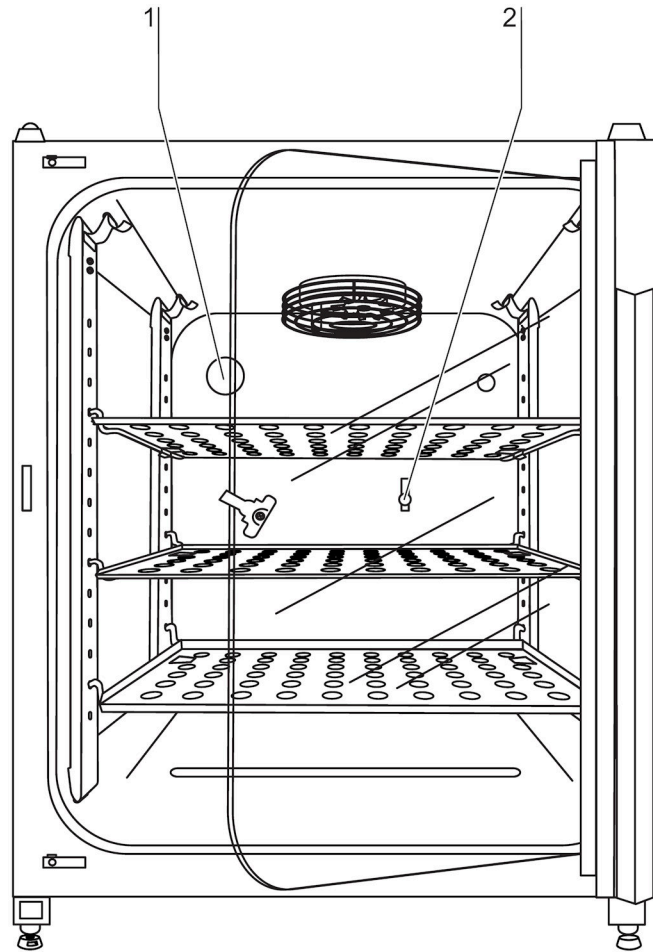


Figure 21 – CO<sub>2</sub> calibration

1. Turn device on using power switch.
2. Set CO<sub>2</sub> nominal value and allow device to heat up completely and to create humidity. This process may take several hours.
3. Route the measuring instrument either through the measurement opening [2] in the glass door or through the access port [1] at the rear panel of the device. Wait until the CO<sub>2</sub> value displayed by the instrument has stabilized.
4. Remove measuring probe, plug measurement opening and close doors.
5. Calibrate CO<sub>2</sub> control as described in Section “CO<sub>2</sub> calibration procedure”.

#### Measurement example:

- CO<sub>2</sub> nominal value: 5%
- Measured value: 5.6%


**NOTE!**

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


Excessive CO<sub>2</sub> content after the calibration can be reduced by leaving the device doors open for approx. 30 seconds!

## CO<sub>2</sub> calibration procedure

1. Activate the calibration:

- ▶ Keep the  key depressed for 5 seconds.
- ↪ All operating panel indicators flash.

2. Indicate the nominal value:

- ▶ Press the  key.
- ↪ The set nominal value of 5% is displayed.



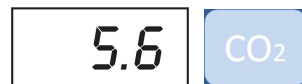
3. Enter the measured value (destination value):

- ▶ Press the  +  keys.

or

- ▶ Press the  +  keys.

- ↪ Destination value e.g. 5.6%.

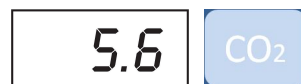


4. Accept the destination value:

- ▶ Press the  key.
- ↪ The CO<sub>2</sub> display momentarily shows "CAL",



- ↪ then the corrected actual value (measured destination value 5.6%) is displayed.



5. Cancel the calibration process:

- ▶ Press any key.
- ↪ The temperature display and the CO<sub>2</sub> display show the actual values.

## Replacing the particle filters

The particle filters have plastic threads and are screwed by hand into the threaded hole on the control box.

Procedure for gas supply particle filter:

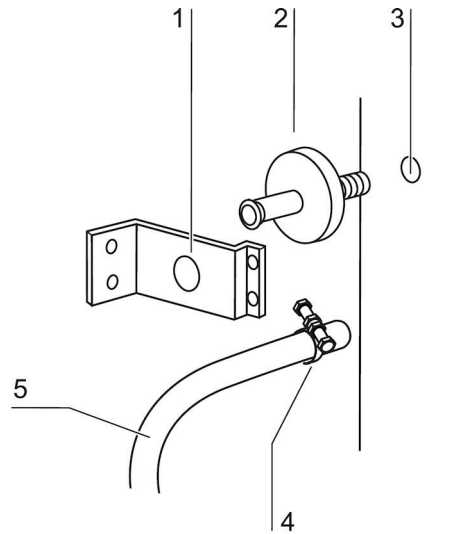


Figure 22 – Particle filter replacement

1. Make sure that the gas supply is shut off.
2. Loosen hose clamp [4].
3. Remove gas hose [5] from sterile filter sleeve [2].
4. Remove retainer [1].
5. Unscrew the particle filter [2] from the threaded hole [3].
6. When installing the new particle filter, make sure that the plastic thread is not canted. Screw filter in carefully all the way to the stop.
7. Install retainer [1].
8. Connect gas hose to particle filter sleeve and secure it using hose clamp. Check to see if the gas hose is securely seated on the sleeve.

## Replacing the device fuses

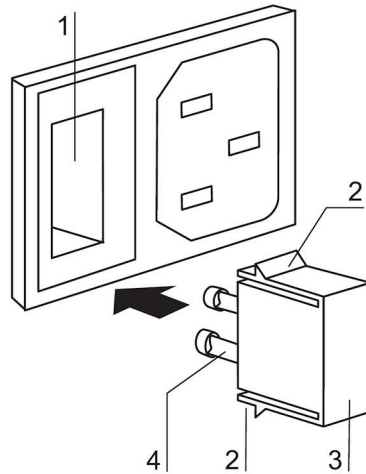


Figure 23 – Device fuse replacement

The two identical device fuses [4] are installed in the fuse compartment [1] next to the power plug receptacle of the device:

- Time delay fuses, 6.3 A (5x20 mm)

1. The fuse holder is secured to the fuse compartment [1] using two locking tabs [2].
2. To remove the fuse holder, squeeze the two locking tabs and pull holder [3] out of fuse compartment.
3. Remove faulty fuse from holder and install new fuse.
4. Slide fuse holder into fuse compartment and press holder on until locking tabs are fully engaged.

## Replacing the door seal

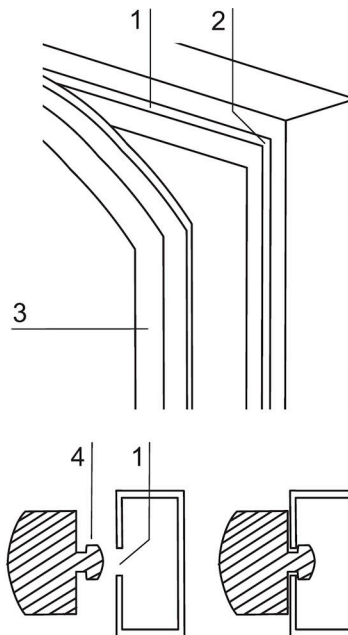


Figure 24 – Door seal replacement

The door seal (magnetic seal) of the outer door is located in the retaining slot. No tools are required to replace the seal.

1. Pull magnetic seal [3] out of the guide slot [1].
2. Position new seal at a corner [2] and press seal retaining rail [4] into slot.
3. Make sure that the retaining rail taper is positioned correctly in the slot [1] and that the seal is flush with the door frame.





## Parts and accessories

### Lists of parts and accessories

Technical Support:  
Phone +1 888-793-2300  
9am-5pm EST

When contacting the Technical Support for parts and accessories, please have the following information available:

- Model Number
- Serial Number
- Date Purchased

#### NOTE!

#### Repairs:

Use only original parts that have been tested and approved by VWR. The use of other parts presents potential hazards and will make the warranty void!

#### Additional parts:

For additional parts please contact VWR Service Organization.



# 12

## Technical data

TECHNICAL SPECIFICATIONS		
DESCRIPTION	UNITS:	VALUE:
<b>MECHANICAL</b>		
External dimensions	mm	637 x 867 x 766
Width x Depth x Height	in	25.1 x 34.1 x 30.2
Interior dimensions	mm	470 x 607 x 530
Width x Depth x Height	in	18.5 x 23.9 x 20.9
Chamber volume	l	approx. 151
	cu.ft	approx. 5.3
Shelves	mm	423 x 455
Width x Depth	in	16.7 x 17.9
Standard quantity	Piece	3
Maximum quantity	Piece	10
Maximum surface load	Piece	10 / insertion shelf
Maximum device overall load	kg	30
	lb	66.1
Weight, without accessories	kg	70 (stainless steel)
	lb	154.3 (stainless steel)
<b>THERMAL</b>		
Ambient temperature range	°C	+18...33
Temperature control range	°C	RT + 3 ... 55
Temperature deviation at 37°C, time	°C	± 0.1
Temperature deviation, spatial (DIN 12880, Part 2) at 37 °C	°C	± 0.6
Duration of the auto-start routine, to 37 °C ambient temperature 20 °C	h	5 ... 10
Temperature recovery time, at 37 °C, door open 30 seconds (to 98% of initial value)	min	< 10
Heat transfer to environment: at 37 °C during 90 °C decontamination	kWh/h	0.06
	kWh/h	0.26

TECHNICAL SPECIFICATIONS		
DESCRIPTION	UNITS:	VALUE:
<b>HUMIDITY</b>		
Water quality		demineralized / distilled or autoclaved or completely deionized / distilled or autoclaved.
Liquid quantity: Incubation operation 90°C decontamination operation	l ml	max. 3.0 / min 1.2 300
Constant humidity at 37 °C	% rH	approx. 93
Humidity recovery time, at 93% rH, door open 30 s (to 95% of initial value)	min min	approx. 20 (stainless steel)
<b>CO<sub>2</sub> GAS SUPPLY SYSTEM</b>		
Gas purity	%	min. 99.5 or medical quality
Prepressure	bar	min. 0.8 - max. 1
Measuring and control range	% vol.	0... 20
Control deviation, temporal	% vol.	± 0.1
Recovery time, at 5%, door open 30 seconds (to 98% of initial value)	min	< 8
<b>CO<sub>2</sub> MEASURING CELL</b>		
Accuracy (absolute)	% CO <sub>2</sub>	± 0.3
<b>ELECTRICAL SYSTEM</b>		
Rated voltage	V	1/N/PE 120 V, AC
Rated frequency	Hz	50/60
Interference suppression (DIN VDE 0875)		Interference level N
Type of protection (DIN 40 050)		IP 20
Protection class		I
Overvoltage category (IEC 1010, EN 61010)		II
Pollution severity (IEC 1010, EN 61010)		2
Rated current	A	5.3 (120 V, AC)
On-site fusing: Fuse Circuit breaker		T 16 A G 16
Rated input	kW	0.64 (120 VAC)
EMC class		B
<b>OTHERS</b>		
Sound pressure level (DIN 45 635, Part 1)	dB(A)	< 50
Relative humidity of environment	% rH	max. 80
Location elevation	m NN	max. 2000

Average gas consumption:

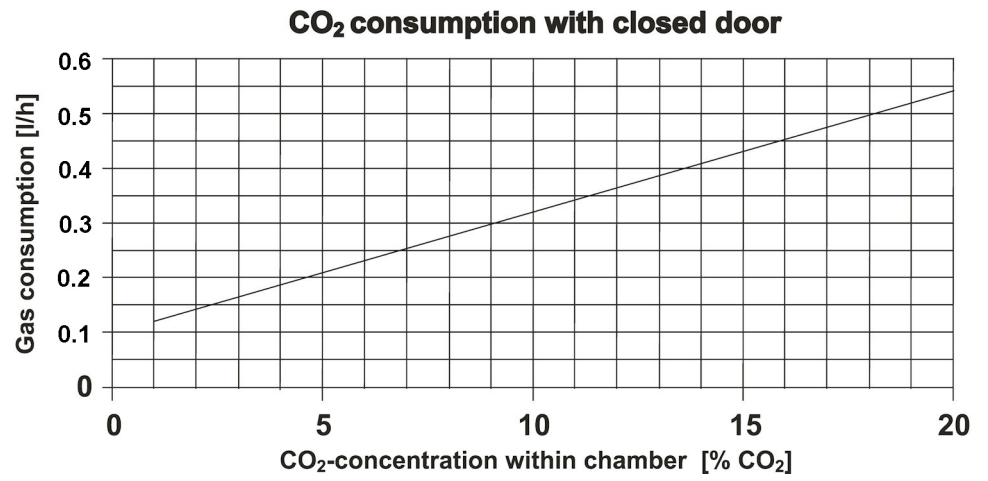


Figure 25 – CO<sub>2</sub> consumption



## Disposal



### CAUTION

#### Contamination hazard:

The device can be used for preparing and processing infectious substances so that the device or device components may become contaminated.

Before device components are discarded, they must be decontaminated!

- The device components must be cleaned thoroughly; after the cleaning, they must be disinfected or sterilized, as required by the application.
- Discarded devices or device components must be provided with an appropriate certificate showing the decontamination measures performed!

All device components can be discarded properly after they have been decontaminated properly.

### NOTE!

#### Recycling service:

VWR offer, for a small fee, an environmentally compatible recycling service for discarded devices!

#### List of used materials:

Component	Material
Thermal insulation components	Polystyrene foam EPS/PPS-Compound
Printed circuit boards	Enclosed electrical components coated with different plastics, equipped on epoxy resin-bound boards.
Plastic components, general	Note material labeling
Exterior housing	Galvanized steel sheet, painted
Device rear panel	Galvanized steel sheet
Outer door	Galvanized steel sheet, painted
Door inner panel	Galvanized steel sheet, painted
Operating panel housing and protective foil	Polyethylene
Magnetic door seal	Magnetic core sheathed with EMPP
Heating	Silicone-sheathed resistance-type wires

Component	Material
Interior containers, installed components and shelves	Stainless steel 1.4301
Plug for pipe channel	Silicone
Pressure compensation opening insert	POM with brass sinter filter
Glass screen	Soda-silicate glass
Glass door seal, measurement opening	Tempered silicone
Sensor block	Stainless steel 1.4301
Blower wheel	Stainless steel 1.4305
Measuring cell baseplate seal	Tempered silicone
Cables	Plastic-sheathed copper flexible
Packaging	Corrugated board, polyethylene film, and styrofoam



# 14

## Device log

Record following information here:

- Nameplate information
- Work carried out
- Maintenance work
- Repairs



# 15

## Certificate of decontamination



Invoice recipient / Customer no.:				Location / Forwarding address:			
Year of manufacturer:	KC:	ST:	Name of technician:		Appointed date:		
order date:	Ordered by:		Order no.:				
Type of device:			ID no. / Order no.:		Operating hours:		
Equipment no.:	Factory no.:	Service device no.:	Date of delivery:	Date of start-up:	Customer inventory no.:		

## Certificate of decontamination

Dear customer,

when using biological and chemical agents within and outside of devices, hazards to the health of the operating personnel may be present and contamination of the surroundings of the device may occur when service or repair works are carried out.

Within the scope of national and international legal regulations, such as

- responsibility of a company for the protection of its employees,
- responsibility of the operator for the operational safety of devices,

all possible hazards must absolutely be prevented. Prior to any calibration, service, and repair works, prior to any relocation of a device, and prior to the shut-down of a device, the device must be decontaminated, disinfected, and cleaned as required by the work to be carried out.

Therefore, we ask you to fill in this certificate of decontamination before you start with the required work.

Yours sincerely

VWR International

### Works to be carried out (please mark where applicable)

Service	<input type="checkbox"/>	Filter replacement	<input type="checkbox"/>
Repair	<input type="checkbox"/>	Relocation	<input type="checkbox"/>
Calibration	<input type="checkbox"/>	Transport	<input type="checkbox"/>

### Declaration of possible contamination (please mark where applicable)

The device is clear of biological material	<input type="checkbox"/>	The device is clear of dangerous chemical substances	<input type="checkbox"/>
The device is clear of radioactivity	<input type="checkbox"/>	The device is clear of other dangerous substances	<input type="checkbox"/>
The device is clear of cytostatic agents	<input type="checkbox"/>		

### Certification:

Prior to carrying out the required work, we have decontaminated, disinfected, and cleaned the device as described in the operating instructions of the device and in accordance with nationally applicable regulations.

The device does not present any hazards.

Note:

Date, legally binding signature, stamp

[www.vwrsp.com](http://www.vwrsp.com)

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