Minitron
Operating Manual

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INFORS HT

An all-around genius in a small space

Minitron – Rel. 2.1
Incubation Shaker
FW: 3.1

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V.04.00 - Original

This operating manual can also be found online at:
www.infors-ht.com/en/minitron

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1 General Information

1.1 About this Manual

This manual enables the safe and efficient handling of the device.

All the information and instructions in this operating manual comply with the current standards, legal regulations, the latest technological and scientific developments and the knowledge gained from the manufacturer's many years of experience in this field.

This operating manual is a component part of the device. It must be kept near to the device and must be accessible to the operators at all times.

The users must read the operating manual thoroughly and fully understand its contents before beginning any work.

Adhering to all the safety and operating instructions in this manual is essential to ensure that work is carried out safely.

The scope of delivery may differ from the explanations, descriptions and figures in this operating manual due to special designs, additional options specified on ordering and the latest technical/mechanical modifications.

This manual contains illustrations to aid general understanding. These may differ from the actual device as supplied.

1.2 Explanation of Special Notices

1.2.1 Warning Notices

Warning notices in this manual are indicated by a coloured bar and begin with a signal word that signifies the degree of the hazard.

DANGER

The signal word "DANGER" indicates a dangerous situation that will lead to severe or even fatal injuries if not avoided.

WARNING

The signal word "WARNING" indicates a potentially dangerous situation that may result in severe or even fatal injuries if not avoided.

CAUTION

The signal word "CAUTION" indicates a potentially dangerous situation that may result in minor injuries if not avoided.

1.2.2 Other Notices

ATTENTION

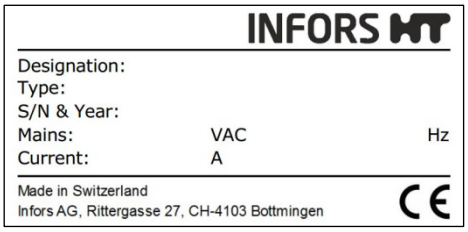
The word "ATTENTION" on a blue bar indicates a situation that may result in significant damage to property if not avoided.

INFORMATION

Texts located below a grey bar bearing the notice "INFORMATION" provide useful tips and recommendations for ensuring efficient, fault-free operation of the device.

1.3 Device Identification (Standard Identification Plate)

The identification plate is designed to allow clear identification of the device. It contains the following information:



- Manufacturer name
- Designation = Category of device
- Type = Device type (name)
- S/N = Serial number
- Year = Year of manufacture
- Mains = Nominal voltage and frequency
- Current = Current consumption
- Manufacturer address
- CE marking

1.4 Declaration of Conformity

The device is in compliance with the essential requirements of the following Directives:

- Machinery Directive 2006/42/EC
- EMC Directive 2014/30/EU

The Declaration of Conformity according to EC Machinery Directive 2006/42/EC, annex II 1 A is attached to the operating manual (see chapter 13 "EC-Declaration of Conformity", page 139).

1.5 Customer Service and Services

Our Customer Service is at your disposal for technical advice and specialist enquiries. For contact information, see page 2.

Due to their familiarity with the potential applications of the device, the Customer Service team is able to provide information on whether the device can be used for a specific application or modified to handle the planned process.

Furthermore, our colleagues are always interested in new information and experiences resulting from user's applications for the device that may be valuable for the continued development of our products.

2 Safety and Responsibility

This section describes general considerations relating to user safety that must be taken into account when working with the device.

In the remaining sections, warning notices are used only to highlight particular hazards directly arising from the actions being described in the section in question.

It is essential to read the operating manual carefully – especially this section and the warning notices in the text – and to follow the instructions therein.

This section also refers to areas that are the responsibility of the provider due to certain risks arising from particular applications for which the device is used deliberately and with full awareness of the associated risks.

2.1 Intended Use, Incorrect Use and Misuse

Depending on its features, the device is designed to be used as an incubation shaker for cultivating microorganisms or cell cultures under the following conditions:

- **Cultivation of non-pathogenic microorganisms or cell cultures of risk category 1 in a biotechnology laboratory of biological protection level 1.**
- **Cultivation of pathogenic microorganisms or cell cultures of risk category 2 in a biotechnology laboratory of biological protection level 2.**

When using the device in protection level 2, users are responsible for taking appropriate protective measures to ensure that organisms cannot escape uncontrollably due to flask breakage, unintentional detaching of the sterile seal or similar.

⚠ WARNING

The device is designed and constructed exclusively for the intended use described above.

Each instance of non-conventional use is considered as misuse and may lead to dangerous situations.

Intended use also includes following all the instructions in this manual, especially those relating to:

- The installation site
- Use of suitable cultivation vessels
- User qualifications
- Permissible parameter setpoints
- Correct operation and maintenance

Any failure to observe the requirements specified in this manual shall be deemed incorrect use, in particular, use of inappropriate cultivation vessels and/or unsuitable holders at speeds that are too high.

Any use of the device outside the scope of the intended use as described above shall be deemed misuse. This also applies to applications for which the device is not designed, especially the following:

- The device is not protected against explosions. Use and manufacture of explosive gases as well as operating the device in the Ex area are therefore not permitted.
- The device is not designed to sufficiently protect its users if pathogenic organisms escape uncontrollably. Cultivation of pathogenic organisms of risk categories 3 and 4 is therefore not permitted.

To use the device for special applications not covered by conventional, intended use, the device must be modified and certified accordingly by the manufacturer.

Any use of the device outside of a biotechnology laboratory, i.e. in any environment in which the conditions required for the safety of users cannot be met or cannot be met to their full extent, shall also be deemed misuse.

2.2 Cultivation Vessels to Be Used

Significant forces are applied to cultivation vessels, in particular in case of large vessels and high speeds. Hence, the cultivation vessels used are particularly significant in relation to user safety.

ATTENTION

Use of unsuitable or defective cultivation vessels can lead to glass breakage and therefore damage to property.

Approved cultivation vessels

The device has been designed for use with the following vessels using the holders designed specifically for them:

- Erlenmeyer flasks up to 5,000 mL made of borosilicate glass (e.g. Schott Duran®) or high-grade plastic, such as polycarbonate (z. B. Corning®) etc.
- Fernbach flasks up to 3,000 mL made of borosilicate glass (e.g. Schott Duran®) or high-grade plastic, such as polycarbonate (z. B. Corning®) etc.
- Other vessels with the holders designed for them:
  - Test tubes
  - Centrifuge tubes
  - Microtitre plates
  - Deep well plates

To avoid the vessels coming out of the clamps at very high speeds, they might have to be secured using cable ties underneath the springs or some other suitable measure.

Cultivating organisms of risk category 2

When cultivating pathogenic organisms of risk category 2, special measures must be taken to stop the organisms from escaping. The user is responsible for this.

When using the device under protection category 2, stainless steel clamps of the correct size must be used to affix the flasks. Due to limited resistance to disinfectants as well as the risk of unintentional detaching of flasks, Sticky Stuff adhesive matting is not suitable for this purpose.

We further recommend using disposable plastic flasks with screw tops and filter membranes. We recommend using sticky tape to secure the lid against loosening unintentionally. Using glass flasks with cotton wool or paper plugs is not sufficiently safe.

Trays with Sticky Stuff

INFORMATION

For trays with Sticky Stuff, special provisions apply in relation to maximum permitted speeds. These must be observed to prevent cultivation vessels from detaching.

For detailed information see chapter 5.1.3 "Tray with Sticky Stuff", page 51.

2.3 Qualified Personnel

Due to the complexity of the device and the potential risks arising from its operation, the device may only be used by qualified, specialist personnel.

2.3.1 Provider

The term "provider" applies to all persons who are responsible for making the device and the necessary infrastructure available. These persons may also be included in the group of people known as "users", though this is not always the case.

Irrespective of whether a provider is a member of the company's board of management or a supervisor, they bear a special level of responsibility with regard to the processes and the qualification and safety of the users.

2.3.2 User

General

The term "user" applies to all persons who come into contact with the device in any way and perform work on or with it. This primarily applies to the following activities, which can be performed by the manufacturer's own specialists or a variety of other persons (it is not always possible to distinguish clearly between the different types of person):

- Assembly, installation and commissioning
- Definition and preparation of the process
- Operation
- Troubleshooting and remedying of faults
- Maintenance and cleaning (autoclaving, if necessary)
- Service work and repairs
- Disassembly, disposal and recycling

Qualified personnel

On account of their specific education, training and – in many cases – experience, the qualified personnel required for this work are able to recognise risks and respond accordingly to potential hazards.

The qualified personnel (either internal or external) who cannot be categorised under the separate "operators" group are made up of the following groups of persons:

- Electricians (electrical engineers)
- Decontamination specialists
- Repair specialists
- Specialists in disassembly and (environmentally friendly) disposal
- Recycling specialists

2.3.3 Operator

The "operators" are a specific sub-group of users distinguished by the fact that they work with the device. They are the true target audience for this operating manual.

Qualified technicians

Only technicians who have been trained for working in a biotechnology laboratory can be considered for the role of operator. These include:

- Process technicians in the fields of biotechnology and chemistry
- Biotechnologists (biotechnicians)
- Chemists with a specialisation in biochemistry; chemists in the field of organic chemistry or biochemistry
- Life scientists (biologists) with special education in cytology, bacteriology, molecular biology, genetics, etc.
- Lab assistants (lab technicians) from various fields

In order to be classed as a "sufficiently qualified technician" for the operation of the device, the persons in question must have received thorough training and have read and understood the operating manual.

The operator must be informed in a training session provided by the provider of the tasks delegated to the operator and the potential risks of improper conduct. Tasks that go beyond the scope of operation under normal conditions may only be performed by the operator if this is specified in the manual and the provider has explicitly entrusted said tasks to the operator.

Technicians in training

Persons in this group who are undergoing training or apprenticeships are only permitted to use the device under supervision and in accordance with the instructions of a trained and qualified technician.

2.4 Unauthorised Persons

The term "unauthorised persons" applies to all persons who can access the work area but are not qualified to use the device in accordance with the aforementioned requirements.

Unauthorised persons are not permitted to operate the device or use it in any other way.

2.5 Responsibility of the Provider

The device is used for industrial and scientific purposes. As such, the provider of the device is individually liable with regard to the legal requirements relating to occupational health and safety in a biotechnology laboratory. In particular:

- The provider is responsible for ensuring that the work and environmental regulations applicable in a biotechnology laboratory are observed.
- The provider must ensure that the device remains in safe and proper working condition throughout its entire term of use.
- The provider must ensure that all safety equipment is fully functional and is not disabled.
- The provider must ensure that the device is only worked on by qualified users, and that said users receive sufficient training.
- The provider must ensure that the protective equipment required for working with the device is provided and worn.
- The provider must ensure that this operating manual remains in the immediate vicinity of the device throughout its entire term of use.

2.6 General Hazards

This section covers general hazards and residual risks that are always present when using the device in accordance with normal, intended use.

The following notices are general in nature. As such, with a few exceptions they are not repeated in the remaining sections.

2.6.1 Electrical Current

The device is operated electronically. There is an immediate risk of fatal injury if contact is made with live parts.
The following points must be observed in order to avoid the risk of fatal injury:

- In case of damage to insulation, disconnect the device from the mains immediately and arrange for it to be repaired.
- Disconnect the device from the mains before commencing any work on the electrical system.
- Always use qualified electricians for any work on the electrical system.
- Disconnect the device from the mains before beginning any maintenance, cleaning or repair work.
- Do not bypass any fuses or take them out of operation.
- When replacing fuses, ensure they have the correct number of Amperes.
- If the power cable is defective, replace it with a power cable of the same type.
- Keep moisture away from live parts. It may lead to a short circuit.
- Never remove covers from the casing.

2.6.2 Unauthorised Spare Parts and Accessories

Incorrect or imitated spare parts and accessories as well as spare parts or accessories that have not been authorised by the manufacturer represent a significant safety risk. As such, we recommend procuring all spare parts and accessories from an authorised dealer or directly from the manufacturer. For the contact details of the manufacturer's representatives, see page 2.

2.7 Particular Hazards

This section covers particular hazards and residual risks that may arise when using the device for special applications in accordance with normal, intended use.

Since the use of the device for such applications is deliberate, it is the responsibility of the operators and the provider to ensure that all personnel are protected from potential damage to health. The provider is responsible for ensuring that the appropriate protective equipment for such applications is provided, and that the necessary infrastructure is in place.

2.7.1 Danger due to Hot Surfaces

For applications that are performed with temperatures over 55 °C, there is a danger of burns on hot surfaces in the interior or on the cultivation vessels.

- For applications with temperatures over 55 °C wear heat-resistant protective gloves.

2.7.2 Dangerous Gases

The use or production of dangerous – i.e. toxic or asphyxiant – gases entails a significant health risk, especially in enclosed spaces. To prevent high emissions of dangerous gases, the following measures must be taken:

- When using CO_2 control or manufacturing dangerous gases, the device must be set up in a well-ventilated area.
- The gas connections on the device must be checked before any cultivation processes using dangerous gases are initiated.

2.7.3 Flammable or Explosive Substances

The use or production of flammable or explosive substances is not covered under “intended use” of the device, as the device is not explosion-proof.

If the provider intends to use the device for such purposes, he must check its suitability for the planned application with the responsible local authorities.

2.7.4 Corrosive or Toxic Substances

The use or production of corrosive or toxic substances entails a significant health risk. As such, special measures must be taken to protect the users for such applications.

Since the device is used deliberately for such applications, it is the responsibility of the users to ensure that they have sufficient protection.

2.7.5 Pathogenic Organisms

The device is not approved for cultivation of pathogenic organisms of risk categories 3 and 4. In the context of intended use, it is nonetheless possible for pathogenic organisms and viruses to be cultivated. Contact with pathogenic organisms bears a significant health risk. Hence, users are responsible for ensuring adequate protection.

2.8 Safety Features

The device is equipped with the following safety features:

Fuses
The device is protected from impermissibly high power input by two fuses. The slot for the fuses is directly above the mains connection on the right side of the casing underneath the *MAINS* label. For descriptions of which fuses to use for which device type see chapter 12.2 "Specifications of the Basic Unit", page 125.

Overheating shut-down
The heating of the device is protected against overheating by a temperature limiter. This triggers as soon as the temperature on the heating element exceeds the maximum allowed value and immediately turns off the heating.

Door monitoring
The position of the door is monitored electronically. If the door is opened, all dangerous movements (shaker drive and fans) are stopped immediately. As soon as the door is closed again completely, the shaker drive and fans restart automatically.

2.9 Warning Symbols on the Device

The following warning symbols (stickers) are attached to the device:

Position
On the device casing next to the power plug.

Meaning
Danger due to electrical current. The device covers may only be opened by qualified electricians or authorized service technicians. Switch off the device and pull out the mains plug before starting any work on the electrical system.

Position
On the housing of the optional direct steam humidification on the rear of the device.

Meaning
Observe the instructions in the operating manual when connecting the direct steam humidification to ensure compliance with the required water quality. For information regarding the required water quality, see chapter 12.4.3 "Direct Steam Humidification", page 133.

WARNING

Illegible or missing warning symbols on the device will lead to the user being exposed to risks that the warning symbols in question were designed to make him or her aware of.

It is the provider's responsibility to ensure that all the stickers with warning symbols on the device are always intact.

2.10 Declaration of Decontamination

When returning the device for repair, disassembly or disposal, it is required for the safety of all parties involved and because of legal provisions that a lawful declaration of decontamination is present.

The following must be observed if this is the case:

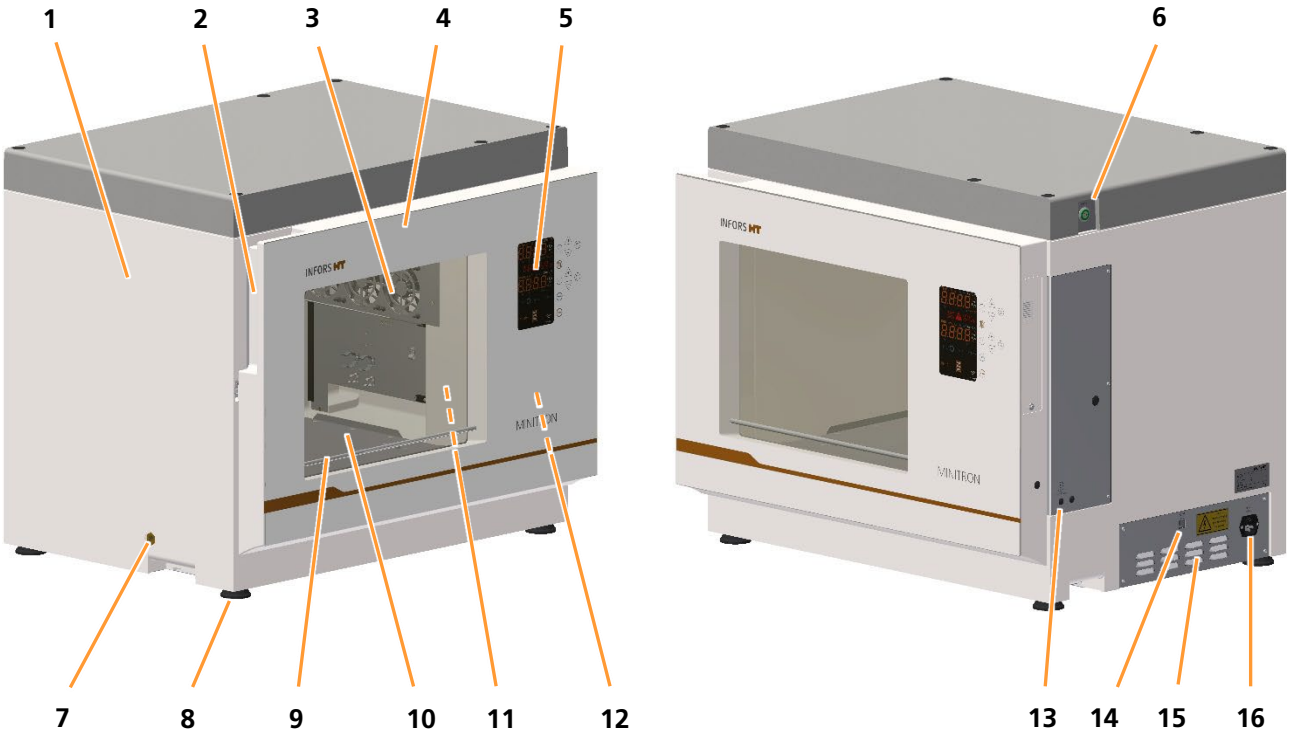
- The device, the component part or accessory must be entirely decontaminated before sending to the manufacturer
- The provider is therefore required to completely and truthfully fill out a declaration of decontamination, and have it signed by the person responsible.
- **The declaration of decontamination must be affixed on the outer packaging in which the device is sent back.**
- These forms can be obtained from the licensed dealer or the manufacturer. See address on page 2.

Important notice

If the return shipment is not accompanied by a signed and complete declaration of decontamination or it is not affixed to the outer packaging, the shipment will be returned unopened to the sender at their expense (see also T&C).

3 Setup and Function

3.1 Structure of the Basic Unit



1 Casing
2 Grip recess for opening the door
3 Axial fans
4 Door with window (opening to the right)
5 Display and operating elements
6 Power switch (*POWER*)
7 Discharge outlet
8 Rubber feet
9 Door heating
10 Table
11 Pt100 temperature sensor (+ optional sensors)
12 Connection for the external alarm (behind the door)
13 CO_2 connection (*CO_2 IN*, optional)
14 Ethernet interface (*LAN*)
15 Air vents
16 Mains connection with slot for fuses (*MAINS*)

Brief description

The Minitron incubation shaker is used to cultivate microorganisms or cell cultures in a laboratory environment. The basic version of the device is fitted with a shaker drive and a heater. Depending on which version of the device you have bought, it will come with either a 25 mm or 50 mm throw.

The device can be operated either locally, using the operating panel on the front of the device, or remotely, using a computer connected to the device via the Ethernet interface.

Stacking devices

If necessary, two units can be stacked to save space. In a stack of two, the rubber feet must be replaced by the stable base (height: 120 mm). Devices can also be stacked subsequently but stacking must be performed by the manufacturer's qualified expert personnel or persons authorised by the manufacturer.

If stacked devices are operated, you have to keep in mind that the maximum permissible rotation speed is limited for the top unit in the stack.

For a detailed description of the technical data and possible maximum rotation speeds of stacked devices, see see chapter 12.3.1 "Rotation Speed Parameter (Shaker Drive)", page 129.

Overview of options

To be able to adapt the device to different application situations, the following options are available:

Option	Additional information
Internal or external cooling	see chapter 4.1, page 31
Direct steam humidification	see chapter 4.2, page 33
CO_2 control	see chapter 4.3, page 36
Removable shelf	see chapter 4.4, page 38
LED lighting	see chapter 4.5, page 39
Darkening	see chapter 4.6, page 41
Analog output	see chapter 4.7, page 42
Cable pass-through	see chapter 4.8, page 43

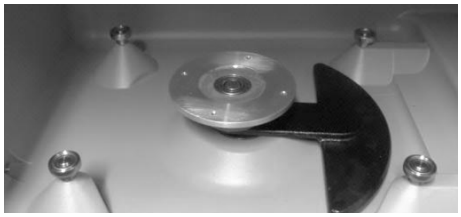
3.2 Basic Functions

The standard features of the device include the shaking function (parameter *RPM*) and temperature control (parameter *Temp*).

3.2.1 Standard Function Shaking

An electronic motor provides the shaking function. Thanks to the strong motor, rotation speeds of up to 400 min^{-1} can be reached even with a full load.

Mechanics



In the centre, there is an eccentrically rotating wave with the flange for receiving the table. The device is available with a 25 mm or 50 mm throw.
The image shows the counterweight for balancing the mass on the table. In the corners of the interior, there are four bearings for stabilising the table.

Table

The table is affixed to the flange by means of four hexalobular socket screws. It is used to accept the tray measuring 48 x 42 cm (N tray), various versions of which are available.
Bars on the side, a stop (at the back) and two tapered plugs ensure that the tray is positioned correctly.
To clean the base tray, the table can removed by loosening the four screws in the centre (see chapter 9.2.1 "Cleaning", page 118).

Operation

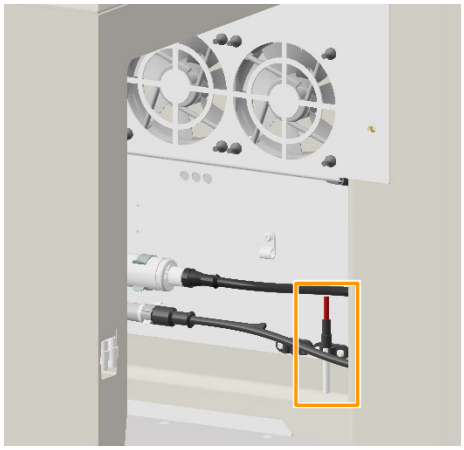
The *rotation speed* parameter is operated via the operating panel. Beside the actual value the symbol *RPM* and unit *min^{-1}* appear on the display.
For a detailed description of how to set and activate the parameters see chapter 7.4 "Adjusting, Activating and Deactivating Parameters", page 77.

Technical data and setpoints

For detailed descriptions of the technical data and possible maximum speeds, see chapter 12.3.1 "Rotation Speed Parameter (Shaker Drive)", page 129.

3.2.2 Standard Function Temperature Control (Heating)

Using a heater and fans, a specific temperature can be reached and maintained in the entire incubation chamber. In order to reach temperatures below the ambient temperature, the device can be fitted with an optional cooling system.



Heating element and axial fans

The heating element is located on the bottom, right side of the device, behind the sheet metal cover. The axial fans ensure constant air circulation and the most even temperature distribution possible in the incubation chamber.

Sensor

The temperature sensor (Pt100) is located at the front right inside the casing and is positioned vertically.

Operation

The *Temperature* parameter is operated using the operating panel. Beside the actual value the symbol *Temp* and unit *°C* appear on the display.

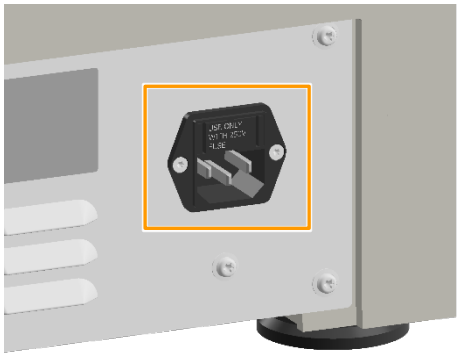
For a detailed description of how to set the parameters see chapter 7.4 "Adjusting, Activating and Deactivating Parameters", page 77.

Technical data and setpoints

For detailed descriptions of the technical data and possible minimum or maximum temperatures, see chapter 12.3.2 "Temperature Parameter (Heating and Ventilation)", page 131.

3.3 Connections and Interfaces

3.3.1 Mains Connection



The mains connection is located at the back of the device at the bottom right and is labelled *Mains*. Three different versions of the device are available for different mains voltages:

- 230 V 50 Hz
- 230 V 60 Hz
- 115 V 60 Hz

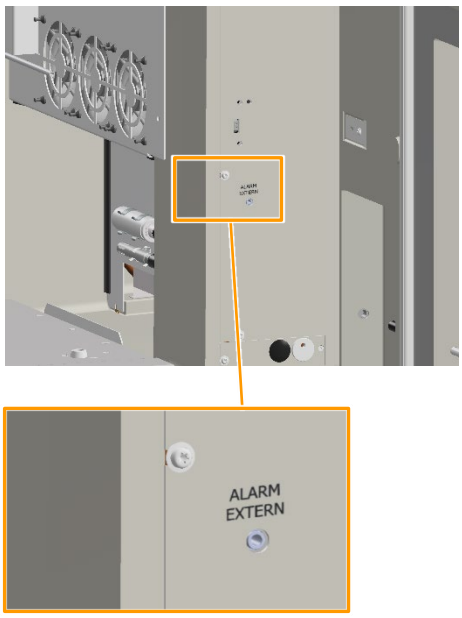
Two fuses above the mains connection protect the device from impermissibly high power input.

The country-specific power cable required for connecting the device to the mains is included in the device's scope of delivery. If the power cable is defective, replace it with a power cable of the same type.

Prior to connecting the device, make sure that the voltage values of the device match those of the local power supply. The mains connection must always be easily accessible so that the device can be disconnected from the power supply quickly in case of an emergency.

For more information see chapter 6.2 "Requirements for the Mains Connection", page 62.

3.3.2 Alarm Connection

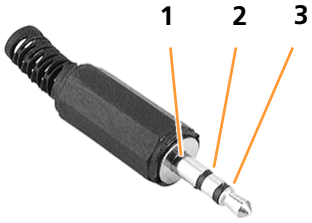


On the cover on the right side of the casing, behind the door, there is a socket (stereo jack, 3.5 mm) for connecting the device to an alarm system. It is labelled *ALARM EXTERN*. The cable of this connection is installed downwards through the door gap on the right side of the seal.

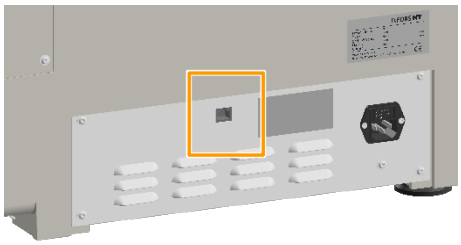
The socket is designed for a maximum of 34 V AC/DC, 1 A. The alarm relay is permanently activated as long as the alarm is active (not toggling).

Allocation of contacts

1 COM (common)
2 NC (normally closed)
3 NO (normally open)



3.3.3 Ethernet Interface



The device is provided with an Ethernet interface (RJ45 socket). The socket is located on the right side of the device.

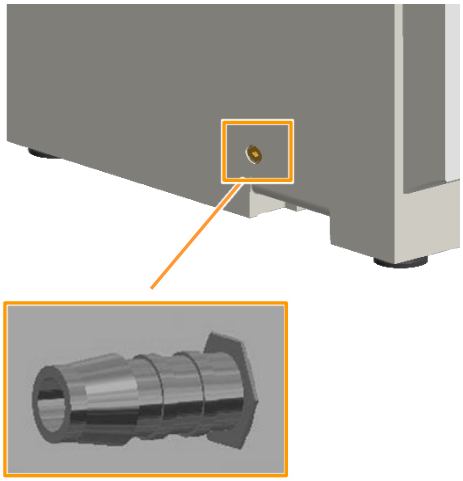
The Ethernet interface can be used to integrate the device into a network and thus control it using a remote computer. To control the device using a remote computer, eve® the bioprocess platform software is required. If the device is to be controlled using other software, a special communication protocol is required. For further information contact INFORS HT.

The Ethernet interface makes it possible to send and receive data. For example, setpoints can be sent to the device or values measured by the sensors can be sent to eve®. If the device is connected to eve® via Ethernet or if the device is controlled using eve®, this is displayed on the operating panel.

For more information on the use of the Ethernet interface, see chapter 7.6 "Using eve® to Operate the Device", page 97.

3.4 Openings

3.4.1 Discharge Outlet



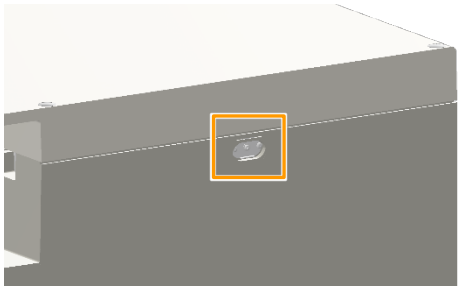
The opening for discharging leaked liquids, detergents or condensation that has been collected is located at the bottom, on the left hand side of the casing, close to the centre.
The opening is sealed with a yellow plug. A hose nozzle (¼ inch) for connecting a hose (Ø 10 mm) is provided.

INFORMATION

In case of large fill volumes, we recommend installing the discharge hose to avoid the bearings coming into contact with liquid if a flask breaks.

If safety requirements must be met, e.g. when working with genetically modified organisms, the discharge hose must lead to a suitable, sealed receptacle. This can be, for example, an empty chemical container that is sealed with foil.

3.4.2 Ventilation Opening



An opening for ventilation of the interior is located in the top centre of the rear of the casing. The purpose of ventilation is to supply bacterial cultures with oxygen from the air.
The opening with a diameter of 22 mm is covered by a metal plate that can be mounted in two different ways:

- If the bevelled parts of the plate point outwards, the plate seals the opening.
- In contrast, if it is mounted with the two screws in such a way that the bevelled parts face the device, this results in a ventilation slot.

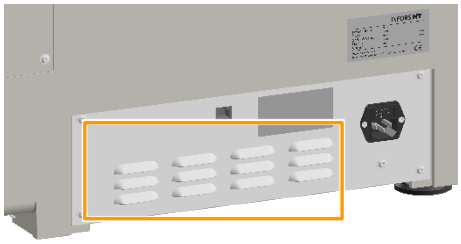
The opening can also be used to insert reference sensors.

INFORMATION

If the optional parameters *CO_2* and/or *humidity* are available on the device, the device is delivered with the opening sealed. The subsequent opening of the ventilation can lead to a significantly higher gas consumption in this case.

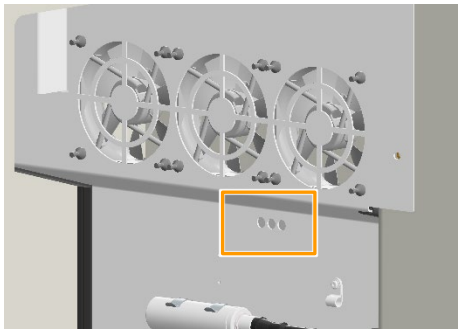
If the optional parameters *CO_2* and/or *humidity* are not available, closing the ventilation can lead to a lack of oxygen or the culture and therefore to low growth.

3.4.3 Air Vents



The device has air vents on the right-hand side of the casing. When setting up the device, you must ensure that these air vents remain unobstructed (keeping a minimum distance of 80 mm to walls or other objects) in order to ensure that the exhaust air can be extracted without obstruction and none of the components overheat.

3.5 Interior Lighting



The device features interior lighting. The interior lighting consists of a print with 3 white LEDs, which is installed on the right side of the casing in the recess underneath the fan.

The interior lighting is switched on automatically as soon as a key is tapped or the door is opened. After 20 seconds without input or 20 seconds after closing the door, the lighting switches off again automatically. In the settings menu (**OPTION** key) the interior lighting can be completely deactivated if necessary.

3.6 Frames

The incubation shaker is available with the following frames:

3.6.1 Rubber Feet

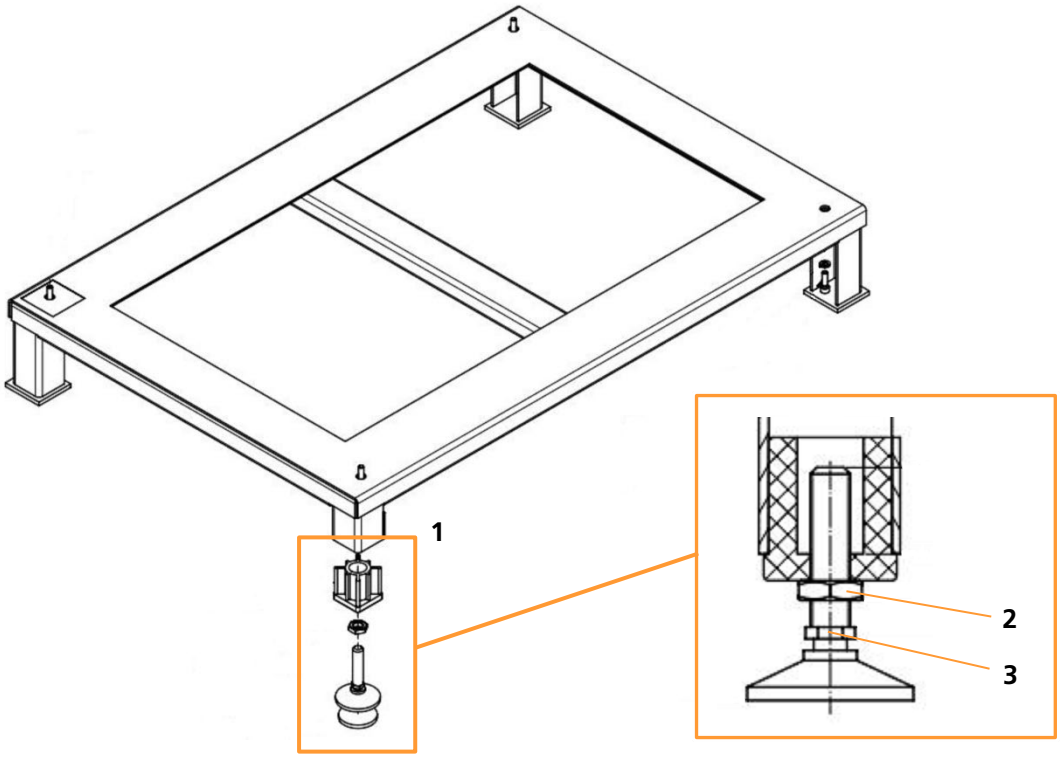
Individual units placed on a table are equipped with a grounding plate with four rubber feet. The rubber feet are firmly screwed to the housing and cannot be adjusted in height. Table models must therefore always be placed on a level surface.

3.6.2 Base, 12 cm

Individual and stacked units can be fitted with a 12 cm base. The base has an adjustable foot that can be used to level the device.

Levelling the base

To be able to operate the device at very high speeds, it must be absolutely level. Hence, the optionally available base is equipped with a foot that can be levelled. The adjustable foot is located on the front right side of the base.

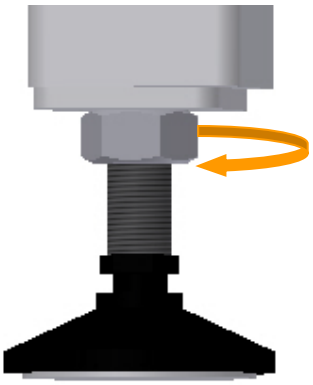


1 Adjustable foot

2 Locknut (SW 19)

3 Hexagon for adjusting the foot (SW 12)

Procedure



To level the base, proceed as follows:

1. Loosen the locknut (SW 19) on the adjustable foot.
2. Set the desired height on the hexagon (SW 12) of the foot.
3. Use a spirit level to check the correct position of the device on all three axes.
4. Tighten the locknut again.
5. With loaded device, use increments of 50 min^{-1} to test whether vibrations occur at certain min^{-1} ranges.

INFORMATION

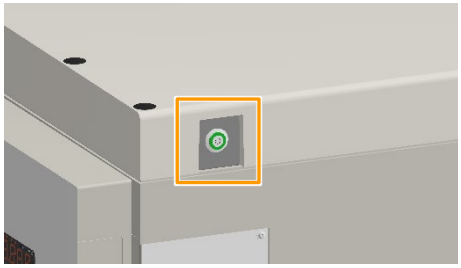
If you have a stack of 2, simultaneously load both units, start them and operate them at increasing rotation speed to test both of them together.

If vibrations occur during this final test, the steps described above have to be repeated until a stable run is achieved throughout the whole range of rotation speed.

If the device is positioned on particularly slippery ground, anti-slip underlay must be placed under all feet. The device can thus be stopped from moving on the floor.

3.7 Operating and Indicating Elements

3.7.1 Power Switch



The power switch is located on the right-hand side of the device. As soon as the device is switched on, the power switch lights up green. In addition to normal switching on and off, the power switch also works as an emergency switch.

INFORMATION

In case of an emergency shut down via the power switch, all parameter setpoints are stored and the device restarts immediately when it is switched on again.

3.7.2 Operating Panel

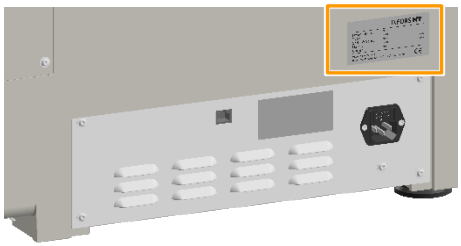
All device functions can be controlled directly via the operating panel on the front of the unit. The operating panel is divided into display and operating sections:

- In the display section on the left side, information on actual values and setpoints, runtimes of the timer function and fault notifications are displayed, among other things.
- The keys in the operating section on the right side can be used to set the parameters and the timer function and adjust the basic settings of the device.

For detailed information on the display and operating elements see chapter 7.3 "Overview about the Display und Controls", page 72.

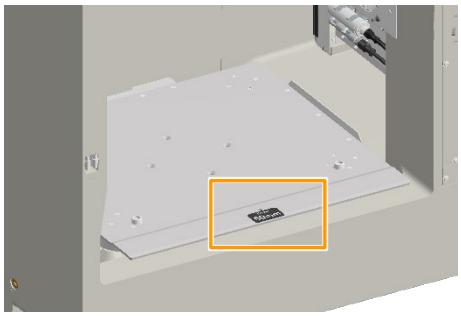
3.8 Markings on the Device

3.8.1 Identification Plate



The identification plate for identifying the device is located on the right side of the casing, directly above the mains connection.
For information on the data provided on the identification plate see chapter 1.3 "Device Identification (Standard Identification Plate)", page 8.

3.8.2 Identification of the Throw



At the front in the middle of the table, there is a sticker that identifies the throw of the device.

4 Options

To adapt the device to the specific usage scenarios, the device can be enhanced with various options. The options can be ordered at the same time as the device or can be fitted at a later stage. For detailed information on the options as well as advice, contact our customer service (for contact information, see page 2).

4.1 Cooling

As the device is self-heating, it can be operated at a temperature of 5 °C above ambient temperature. For processes that require temperatures significantly lower than this temperature, the device can be fitted with internal cooling or connected to an external cooling system.

4.1.1 Internal Cooling

The cooling unit is installed at the top right (viewed from the front) on the back of the device. This cooling unit can be used to achieve temperatures of up to 16 °C lower than the ambient temperature but no lower than 4 °C.
The refrigerant circulates in a closed circuit which makes the cooling unit mostly maintenance-free.

⚠ CAUTION

During operation, the surface of the compressor of the cooling unit reaches temperatures of around 70 °C. Touching the hot surface can result in burns.

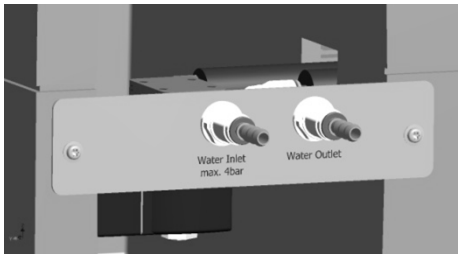
However, the compressor is installed in such a way that it normally cannot be touched during operation.

4.1.2 External Cooling

Setup and function

If you are planning to connect the device to an external cooling system, a cooling register and a control valve are installed. A control valve opens when necessary to allow cooling liquid to flow through the cooling register. Temperatures are measured using the Pt100 sensor which is installed by default.

Connection conditions



The connections for the external cooling system are located at the back of the device, at the top right, near the opening designed for the cooling unit. The connections are labelled *Water Inlet* und *Water Outlet*.
The connection pressure at the inlet of the cooling medium may be up to 4 bar, the outlet should be depressurised.
The external diameter of the hose nozzles is 8 mm.

ATTENTION

The installed valve regulates the temperature by closing and opening the cycle. Hence it can be necessary to install a bypass from the inlet to the outlet to protect the circulation pump against damage.

4.1.3 Operating the Cooling Unit

Cooling is operated using the *Temperature* parameter. The top alphanumeric display shows the actual value in *°C* with the symbol *Temp*. The only way to see that cooling is used is that temperatures below the ambient temperature can be reached in the incubation chamber.

For a detailed description of how to set and activate the parameters see chapter 7.4 "Adjusting, Activating and Deactivating Parameters", page 77.

4.1.4 Specifications and Technical Data

For detailed descriptions of the technical data and possible minimum and maximum temperatures, see chapter 12.4.1 "Internal Cooling", page 131.

4.2 Direct Steam Humidification

Part of the medium can evaporate, in particular in case of small volumes of work (e.g. when using microtitre and deep well plates) and long cultivation processes. To reduce evaporation, the device can be fitted with a direct steam humidification. This regulates the humidity in the incubation chamber to a defined setpoint and thus ensures a consistent culture volume.

4.2.1 Setup und Function

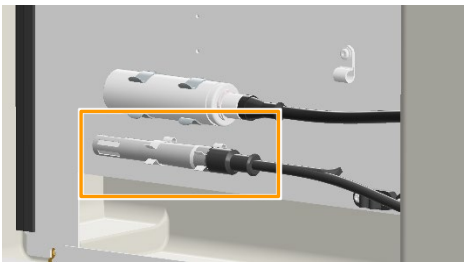
The direct steam humidification is mounted on the rear of the casing.

A controlled pump feeds water dropwise into an evaporator chamber via a feed hose. The water evaporates and is then fed into the incubation chamber.

There are three possibilities to supply the water:

- Unpressurised from a water tank
- From a pressurised pipe with inlet pressure of max. 0.3 bar

To prevent condensation on the window of the door, a door with a built-in bar heater is installed.



The humidity in the incubation chamber is measured and regulated using a humidity sensor. This is located on the right-hand side of the incubation chamber.

Observe the following points when using the direct steam humidification:

- The direct steam humidification only works actively in one direction. It only humidifies; it does not dehumidify.
- The direct steam humidification is optimised for operation at temperatures up to 40 °C.
- If the direct steam humidification is used in combination with the LED illumination, the heat radiating from the LEDs can result in the desired humidity not being reached. In addition, there can be significant condensation in the incubation chamber.
- The *Temperature* parameter must be activated.

4.2.2 Connection Conditions

To commission the direct steam humidification, it must be connected to an unpressurised water tank or to a pressurised water supply. The inlet pressure must not exceed 0.3 bar.

The connection for water supply for the direct steam humidification is located at the bottom of the casing and is designed for hoses with a diameter of 6 to 7 mm.

! ATTENTION

Using tap water can quickly lead to limescale in the vaporiser of the humidification unit, which would affect correct functioning.

Adding detergents, disinfectants or similar chemicals to the water for the direct steam humidification can damage the device. Only use water without additions, in accordance to the specification (see chapter 12.4.3 "Direct Steam Humidification", page 133).

For an optimal operation, reverse osmosis water with a conductivity of approx. 5 µS/cm is recommended. Ultra-pure water or WFI (water for injection purposes) are also permissible. However, these are highly corrosive and can cause damage to the vaporiser in the long term.

4.2.3 Operating the Direct Steam Humidification

The direct steam humidification is operated using the *Humidity* parameter. The bottom of the alphanumeric display shows the value in *%* (relative humidity) with the symbol *Humid*.

After switching on the parameter, it takes approx. 5 minutes for the steam generator to heat up. During the heating time, the current actual humidity value and the message *Strt* are displayed alternately.

To prevent condensation on the walls in the incubation chamber, the direct steam humidification is only switched on when the set temperature setpoint (± 1 °C) is reached and stable for at least 1 minute. During the time until the temperature is stable, the message *nA* is displayed.

INFORMATION

When direct steam humidification and the optional cooling unit are operated at the same time, strong condensation might occur on the cooling register – depending on the conditions. This can occur, in particular, when temperatures are low and when the temperature setpoint is lowered.

For a detailed description of how to set and activate the parameters see chapter 7.4 "Adjusting, Activating and Deactivating Parameters", page 77.

4.2.4 Specifications and Technical Data

For detailed descriptions of the technical data and possible humidity values, see chapter 12.4.3 "Direct Steam Humidification", page 133.

4.3 CO_2 Control

The optional CO_2 control makes it possible to enrich the atmosphere in the incubation chamber by 0 to 20 % CO_2. The CO_2 control option is particularly suited to cultivation of mammalian cells and algae because the CO_2 ensures that the pH value in the culture solution is stable.

⚠ CAUTION

During normal operation, small amounts of CO_2 are constantly dissipated into the environment. Leaking CO_2 can lead to discomfort, loss of consciousness or even death by suffocation, especially in small rooms.

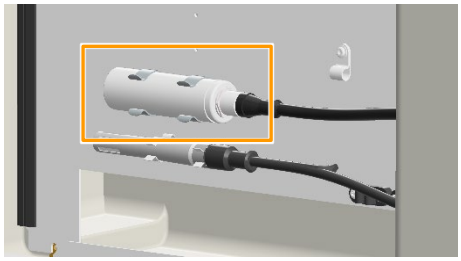
- The operator is obliged to install a monitoring system which permanently monitors and analyses the CO2 concentration in the room.
- If you are using the CO_2 control, only operate the device in well-ventilated areas.
- Comply with local health and safety regulations and regulations regarding the use of CO_2 and its limits.
- Regularly check the gas pipelines for leaks.

i INFORMATION

Opening the ventilation opening at the back of the device can lead to significantly higher gas consumption. We therefore recommend leaving the ventilation opening closed when using the CO_2 control option.

4.3.1 Setup and Function

CO_2 supply is controlled using a controlled valve. Inflow of CO_2 must be ensured using external supply where the pressure can be regulated. On the right side of the casing, there is a hose nozzle for a hose with a diameter of 3 to 4 mm to connect the supply.



The CO_2 content in the incubation chamber is measured and regulated using a CO_2 sensor. This is located on the right-hand side of the incubation chamber.

4.3.2 Connection Conditions

The in-house gas supply and connecting hose must meet the following requirements:

Gas supply

- Constant input pressure not exceeding 0.5 bar (± 0.1)
- Only use clean, dry, oil and dust free gas.

Hoses

- Use only pressure-resistant and intact hoses.
- The hose must have an appropriate diameter; an adapter may be used, if necessary.
- Secure hoses using appropriate clamps.

4.3.3 Operating the CO_2 Control

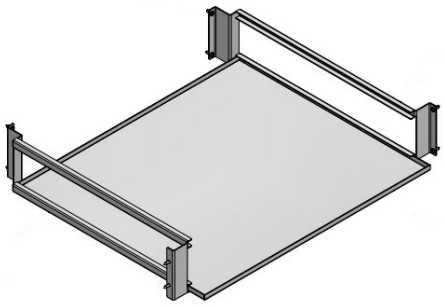
The CO_2 control is operated using the *CO2* parameter. The top alphanumeric display shows the actual value in *%* with the symbol *CO2*. To prevent large amounts of CO_2 from escaping, the CO_2 control is deactivated automatically while the door is open.

For a detailed description of how to set and activate the parameters, see chapter 7.4 "Adjusting, Activating and Deactivating Parameters", page 77.

4.3.4 Specifications and Technical Data

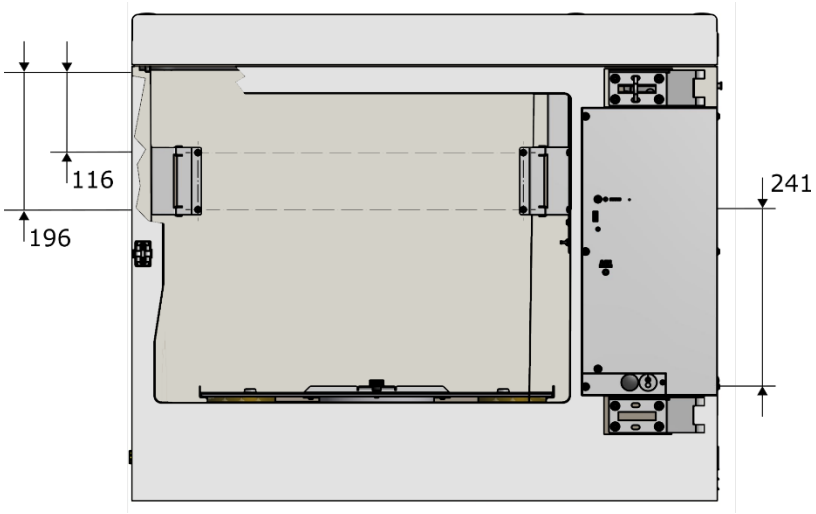
For detailed descriptions of the technical data and possible CO_2 values, see chapter 12.4.4 "CO_2 Control", page 135.

4.4 Removable Shelf



The removable shelf (approx. 503 mm x 426 mm) allows static incubation in climatic conditions almost identical to the cultivation flasks.

The removable shelf can be inserted at two different heights and is very easy to remove.



Depending on the position of the removable shelf, the following shake flasks can be placed on the tray underneath it

- If the removable shelf is in the lower position, shake flasks with a volume of up to 1 litre (maximum height: 220 mm) can be placed on the tray.
- If the removable shelf is in the upper position, shake flasks with a volume of up to 3 litres (maximum height: 320 mm) can be placed on the tray.

ATTENTION

The inserted removable shelf can change the climate conditions in the incubation chamber and lead to higher tolerances as it hinders air circulation. To prevent damage to cultures, the climate above and beneath the removable shelf should be checked frequently and, if necessary, monitored using mobile sensors.

4.5 LED Lighting

The device can optionally be equipped with an LED lighting. This illuminates the surface of the table at an adjustable light intensity. For example, the LED lighting can be used to cultivate photo-sensitive cells.

4.5.1 Setup and Function

Overview

The LED lighting consists of LEDs installed on the circuit boards and is located underneath the top plate.

It generates a light intensity of up to 240 µmol m^{-2} s^{-1} (at the 100 % setting), which is distributed evenly over the surface of the table.

An end-to-end sealed protective screen made of polycarbonate separates the LED lighting from the interior. It protects the electronics from splashes and steam.

Heat generated by the LED lighting is dissipated via two fans.

Distribution of the light intensity

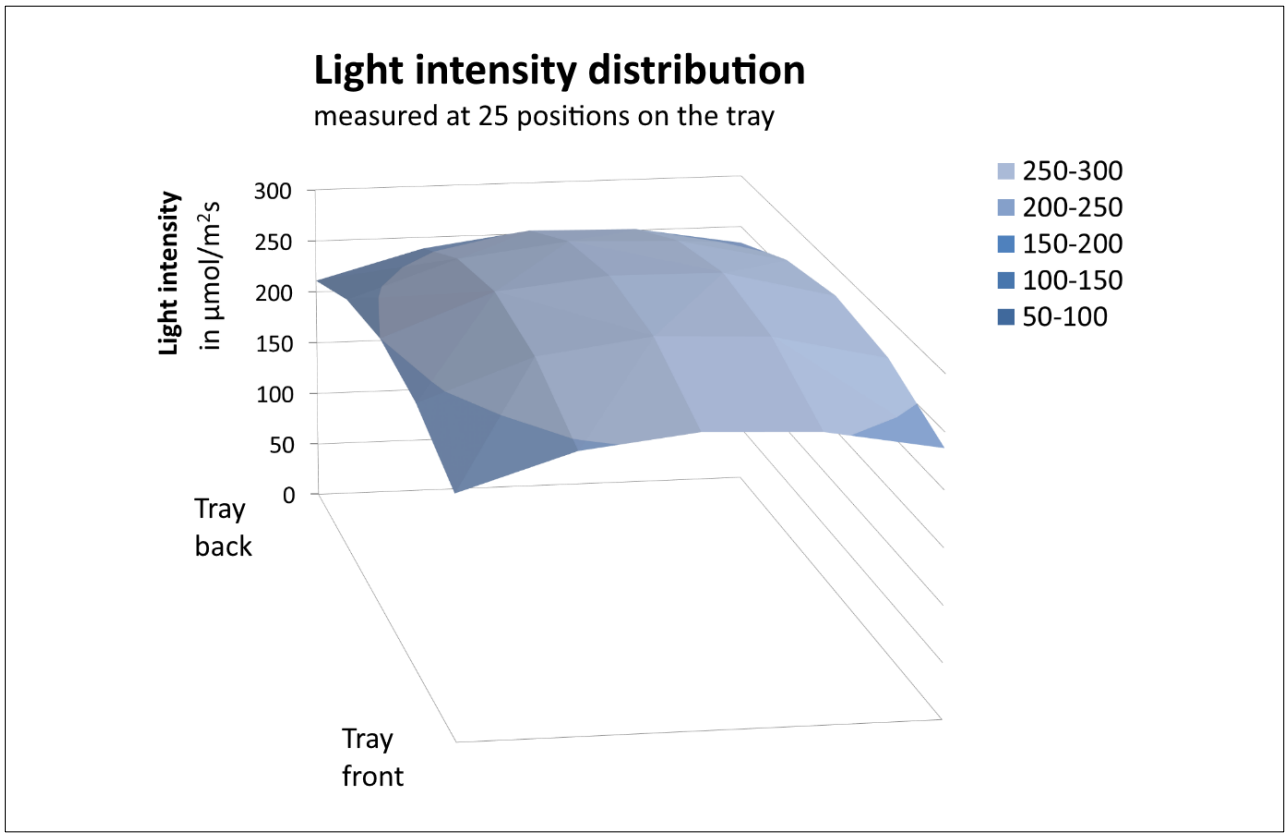
The distribution of the light intensity at the level of the tray was measured using a Quantum LI-COR sensor. The measurement was taken at 25 points distributed evenly over a black tray at 100 % light intensity (max. 240 µmol m^{-2} s^{-1}).

The average of the measurement was 240 µmol m^{-2} s^{-1} with a relative standard deviation of ± 10 % (in relation to the total amount).

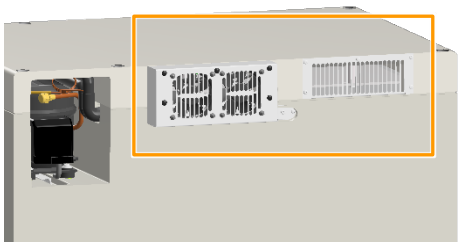
INFORMATION

The deviation is greatest in the corners of the tray.

Options

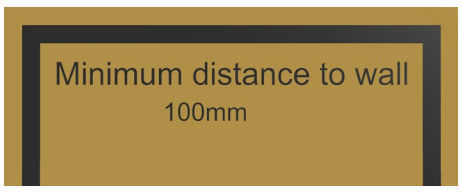


The diagram shows the distribution of the light intensity on the tray. The basic area of the diagram corresponds to the tray, the z axis shows the light intensity in µmol m^{-2} s^{-1}.



Fans

The heat generated by the LED lighting is dissipated by two fans. The air vents for exhaust air are located on the back of the device.



ATTENTION

If the LED lighting gets too hot, it switches off automatically.

- The air vents must not be covered.
- Keep a safety distance to walls and other devices (min. 100 mm).

4.5.2 Operating the LED Lighting

The LED lighting is operated using the *Light* parameter. The bottom of the alphanumeric display shows the value in *%* with the symbol *Light*.
The light intensity can be regulated from 1 to 100 %. It responds linearly to a value of 5 to 240 µmol m^{-2} s^{-1}.

INFORMATION

At a light intensity of above 80 %, do not set temperatures of above 45 °C.

At a light intensity of less than 80%, temperatures of up to 65 °C can be selected.

If the LED lighting gets too hot, it switches off automatically.

For a detailed description of how to set and activate the parameters see chapter 7.4 "Adjusting, Activating and Deactivating Parameters", page 77.

4.5.3 Specifications and Technical Data

For detailed descriptions of the technical data and possible settings, see chapter 12.4.5 “LED Lighting”, page 136.

4.6 Darkening

The glass panel of the door can be covered with white adhesive film on the inside. This is used for darkening as well as to ensure better light distribution in the incubation chamber when using LED lighting.

4.7 Analog Output

4.7.1 Setup and Function

The device can optionally be equipped with an analog output module. This provides 8 channels via which setpoints and actual values can be transferred to external devices.

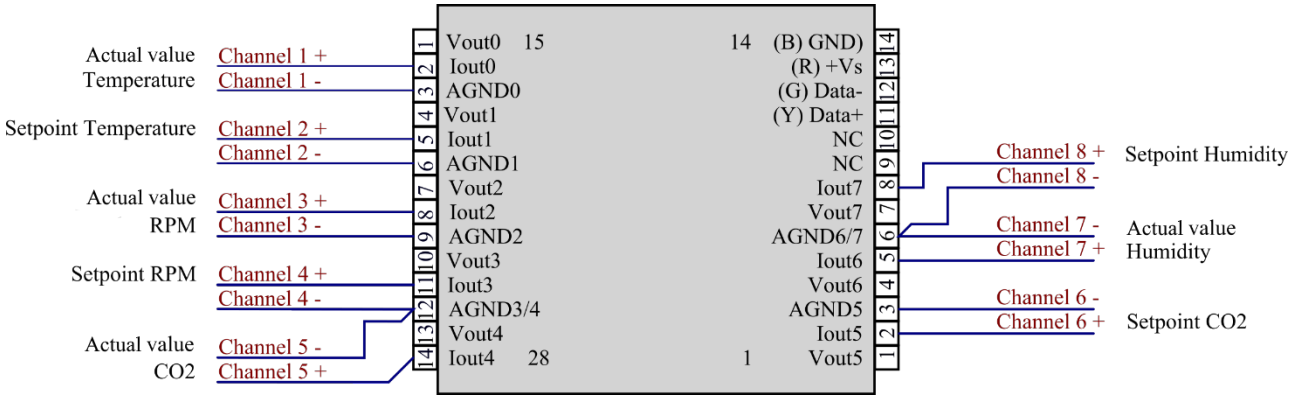
The output module is located on the right-hand side and is in its own casing. The signal range corresponds to 4 – 20 mA with a precision of ± 0.05 mA.

The operator must pre-assemble and connect the cable. To connect the cable, the lid of the casing can be removed by loosening the four hexalobular screws (M4x6). The cable is guided out of the casing using a cable gland. This protects the cable as well as the output module from mechanical influences and humidity.

4.7.2 Connection Assignment

The connections of the output module are assigned as follows:

Channel	Connection	Function	Signal range
1	Iout0 / AGND0	Actual temperature °C	0 % to 100 % = 4 mA to 20 mA
2	Iout1 / AGND1	Temperature setpoint	0 % to 100 % = 4 mA to 20 mA
3	Iout2 / AGND2	Actual speed	0 min^{-1} to 500 min^{-1} = 4 mA to 20 mA
4	Iout3 / AGND3/4	Speed setpoint	0 min^{-1} to 500 min^{-1} = 4 mA to 20 mA
5	Iout4 / AGND3/4	Actual CO_2 value	0 % to 20 % = 4 mA to 20 mA
6	Iout5 / AGND5	CO_2 setpoint	0 % to 20 % = 4 mA to 20 mA
7	Iout6 / AGND6/7	Actual humidity	0 % to 100 % = 4 mA to 20 mA
8	Iout7 / AGND6/7	Humidity setpoint	0 % to 100 % = 4 mA to 20 mA



4.8 Cable Pass-Through

On the left side of the casing, a pass-through for cables or hoses can be installed, for example, if you wish to use additional sensors or gassing.

The pass-through reduces loss of heat and/or humidity and, if applicable, gas consumption if cables or hoses have to be passed into the incubation chamber.

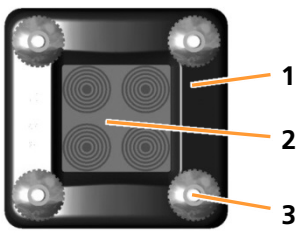
⚠ WARNING

If external devices that are supplied with mains power are operated on the table whilst it is operating, there is a risk that the cable might break or get jammed. This poses a risk of death by electrocution.

– Electrical devices may only be used when the shaking function is switched off (e.g. in conjunction with the *Temperature* parameter).

– Electrical devices may only be used in conjunction with the *Humidity* parameter if the device is adequately protected against humidity. Observe the permissible environmental conditions for operating the device.

4.8.1 Setup



The pass-through consist of a stable, black frame (1) into which blue sealing elements (2) are inserted. By removing layers, these elements can be adapted to the diameter of the cable or hose.
The entire part is affixed to the casing by means of four knurled screws (3).

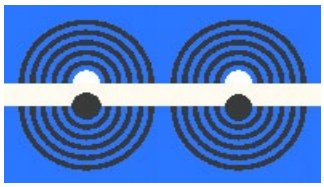
4.8.2 Adjusting and Mounting the Cable Pass-Through

Procedure

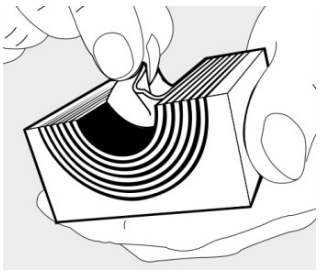
1. Loosen the knurled screws on the cable pass-through frame.

2. Remove the cable pass-through.

3. Push the blue interior part out of the frame.

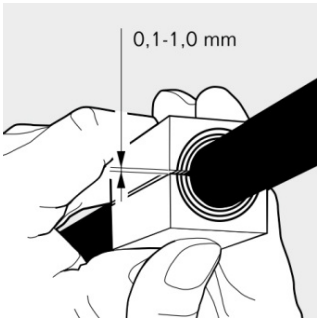


4. Split the blue modules in the middle and take out as many layers of segments as needed to make the opening slightly smaller than the diameter of the cable or hose.



INFORMATION

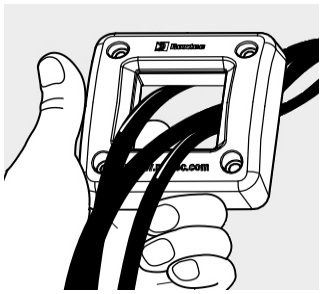
Keep the removed parts of the segments in the bag provided. They are needed to reseal the hose pass-throughs once they are no longer needed.



5. Place the module halves around the cables and/or hoses.

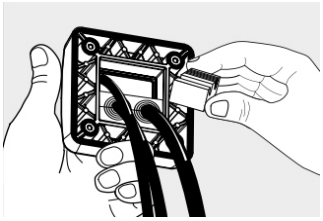
The module halves must fit together in such a way that a 0.1 to 1.0 mm gap remains between the modules once they are put together.

This ensures that the pass-through provides seals sufficiently once installed.



6. Pass the hoses and/or cables through the opening of the frame.

7. Generously lubricate the inner edge of the frame with the provided gel lubricant (Roxtec).



8. Push the complete modules placed around the cables and the complete modules back into the frame.

   Ensure that all module parts are on the same level.

9. Pass the cables and/or hoses through the opening of the casing.
10. Affix the frame to the cases using the knurled screws.

To seal an opening that is temporarily not required, a red plug is provided for a standard diameter (8 mm).

ATTENTION

When installing the cables and/or hoses in the interior, make sure that they do not rub and do not get jammed to prevent damage.

5 Accessories

In the following section, the available accessories for the device are described. For special applications, please contact our customer service for advice (for contact information, see page 2).

5.1 Trays

Different trays are available for the device; these can be purchased individually or ordered with the device. In addition to the universal table tray, which can be equipped as desired, various trays with fixed features are available for different purposes.

5.1.1 Universal Table Tray

The N tray referred to “universal table tray” with the dimensions 48 x 42 cm features drill holes on a grid so that it can be fitted as desired. For fitting, various clamps and test tube holders are available, that can be combined as desired (see chapter 5.2 "Clamps and Other Holders", page 54).

The universal table tray is made of anodised aluminium and can be sterilised in autoclaves if required.

The separately available Sticky Stuff adhesive matting (4 units of 20 x 20 cm) can also be stuck onto the universal table tray.

Technical data of the universal table tray	
Description	**Value**
Material	Aluminium
Size	480 x 420 mm
Threaded holes	M4
Threaded holes	224
Threaded hole grid	28.28 x 28.28 mm
Sterilisation in autoclave	YES

5.1.2 Pre-Fitted Trays

Pre-fitted trays are equipped with one clamp type each. They are used if only a single size of flask is to be used for certain experiments. In contrast to the universal table tray, their holders cannot be changed.

Trays with fixed fixtures feature a capacity that is up to 30 % higher than an individually equipped universal table tray. Since no drill holes have to be taken into account in the grid, the clamps can be installed closer together.

Tray with steel clamps

Fitting identical clamps on the entire N tray results in the following capacities:

Flask size	Number of flasks per N tray
25 ml	105
50 ml	69
100 ml	46
250 ml	25
500 ml	15
1000 ml	10
2000 ml	6
3000 ml	5

Tray with pin holders

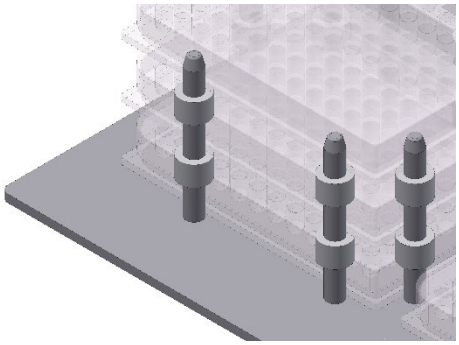
For applications in which large numbers of microtitre or deep well plates are to be incubated, various trays with pin holders are available. These enable loading with several layers of microtitre and deep well plates.

The plates can be stacked. This makes it possible to simultaneously incubate up to 24 deep well plates and up to 36 microtitre plates on one N tray.

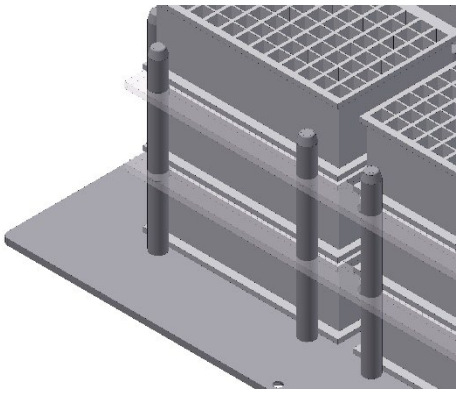
The trays are designed for plates with the dimensions 85.1 x 127 mm.

To ensure the cultures receive the optimum oxygen supply, spacers can be placed between stacked plates. These are available in two variants:

Accessories



- **Ring spacers** (10 mm high) are placed on the pins individually. Depending on the type of tray loading, this makes it possible to remove individual plates or stacks of plates.



- **Quickload spacers** are long plastic strips (4 mm high) that span across several plates, thus allowing you to save time while loading.

! ATTENTION

The spacers are made of plastic and therefore cannot be autoclaved.

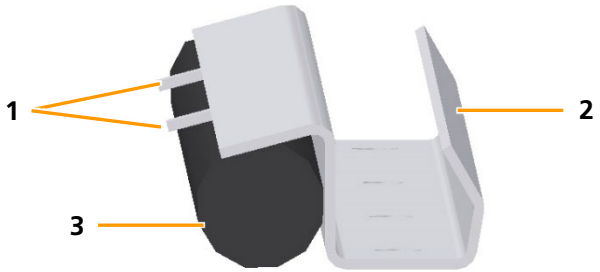
Technical data for pin holders	
Description	**Value**
Material	Aluminium
Fastening screws	M5 x 12
Cleaning	Mild neutral cleaning agent
Disinfection	Commercially available disinfectant
Sterilisation in autoclaves	YES
External dimensions of the microtitre plates	85.1 x 127 mm
Height of the deep well plates	42 mm

Tray with clamping assembly

To affix microtitre and deep well plates, there is a quick clamping assembly. Two versions of this clamping assembly are available:

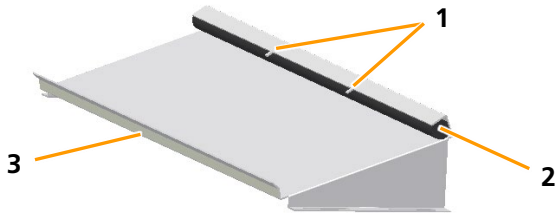
Tray with flat clamping assembly (on the image to the right, horizontal incubation).

The straight clamping assembly is a profile made of sheet metal that is equipped with an angled strip (2). On the other side, there is an edge featuring a foam rubber strip (3). To position the microtitre plates or deep well plates, there are two spacers on the edge (1).



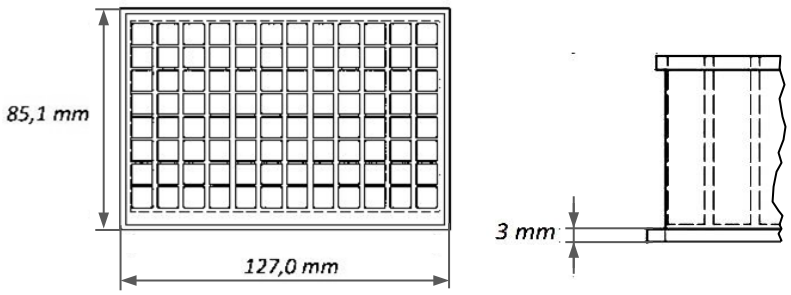
Tray with folded clamping assemblies at an angle of 20° (on the image to the left, angled incubation):

The folded clamping assembly is wedge-shaped metal sheet with two profiles. The lower profile is an angled bar (3). The upper profile is a U profile into which the cellular rubber string (2) is inserted. To position the microtitre plates or deep well plates, there are two spacers on the upper edge (1).

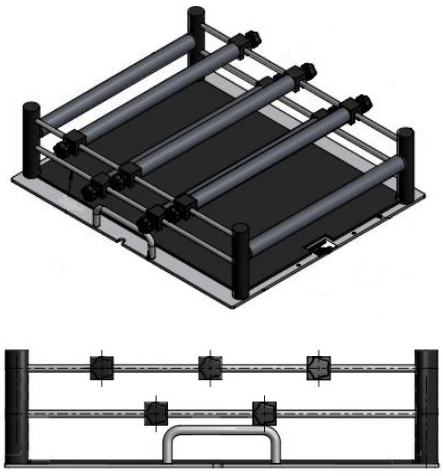


The trays with clamping assemblies are designed for microtitre and deep-well plates with dimensions 85.1 mm x 127 mm. To ensure sufficient clamping force can be achieved, plates with a web height of at least 3 mm must be used.

Accessories



Technical data for clamping assemblies	
Description	**Value**
Rail material	Aluminium
Foam rubber material	CR rubber
Temperature range	≤ 80°C
Cleaning	Mild neutral cleaning agent
Disinfection	Commercially available disinfectant
Sterilisation	NO
Size of microtitre and deep-well plates	85.1 x 127 mm



Tray with sliding bars

Trays with sliding bars allow you to fix vessels of any shape. The sliding bars can be affixed onto any desired point on the support bars. This makes it possible to also affix bottles with vertical walls and a curved bottom.

The bars enveloped in soft material are arranged on two different levels to securely hold bottles of different sizes.

The scope of delivery of the tray includes the fixed frame and 5 movable sliding bars.

Technical data for the sliding bars	
Description	**Value**
Material	Aluminium, plastic
Cellular rubber mat	EPDM cellular rubber
Cellular rubber cover	Armaflex
Cleaning	Mild neutral cleaning agent
Disinfection	Commercially available disinfectant
Max. operating temperature	65 °C
Sterilisation in autoclaves	NO

5.1.3 Tray with Sticky Stuff

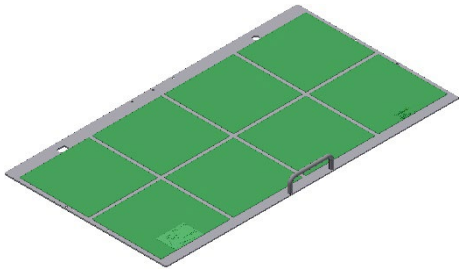
ATTENTION

If condensate forms on the tray or on the cultivation vessels, the adhesiveness of the Sticky Stuff is no longer guaranteed. As a result, cultivation vessels can become detached from the Sticky Stuff and break.

Hence, consider the following when using Sticky Stuff:

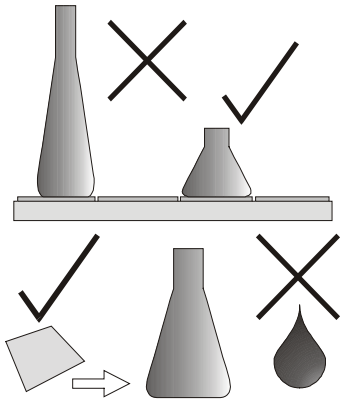
– Ensure that no condensate forms on the tray or on the cultivation vessels. This is especially necessary if cultivation is started at low temperatures and the temperature then is increased.

– Let cultivation vessels that were stored in the fridge warm up to ambient temperature first before placing them on the adhesive matting.



- If you are looking for a very flexible option for equipping the tray, Sticky Stuff offers an ideal alternative.
- However, you have to keep in mind that speeds are limited when using Sticky Stuff (for more information on this, refer to the table at the end of the chapter).

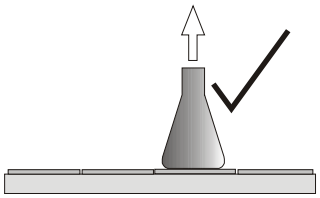
Accessories



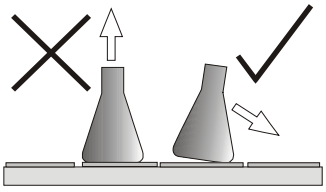
About using Sticky Stuff

- Use only vessels with a broad flat base. Large Erlenmeyer flasks (e.g. 3000 mL) adhere more strongly than smaller ones (e.g. 500 mL).
- Ensure that the entire bases of the flasks are on the adhesive matting. They must not extend beyond the edge of the tray.
- Check vessels for damage prior to use and replace, if necessary.

  Never use damaged vessels!
- Prior to putting down any vessel, ensure that its base is dry, clean and grease-free.

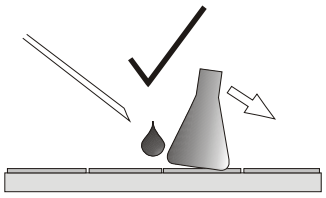


- Prior to the shaking process, gently pull on every vessel to ensure they are all stuck on firmly.
- If the humidity is too high or the temperatures are too low or if there are extreme jumps in temperature (e.g. when using the timer function), keep an eye on condensate. Condensate can result in vessels detaching from the adhesive matting.

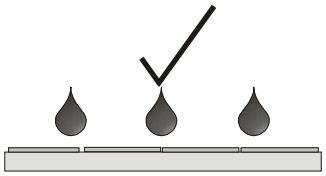


- To remove vessels, gently and evenly pull or push on the neck and wait a few seconds.

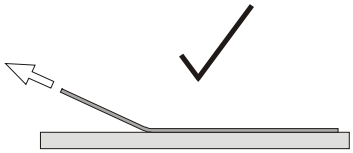
  Never use force!
- In case of large vessels, it can take 20 to 30 seconds until they detach from the adhesive matting.



- Vessels that are stuck can be removed from the adhesive matting by using a syringe to inject water under the flask.
- Due to their shape (wide base, short neck), Fernbach flasks in particular can be difficult to remove. If necessary, cover part of the adhesive matting with the protective foil provided.



- The adhesive power can deteriorate over time due to dust and dirt. To clean and restore full adhesive power, thoroughly wipe down the surfaces with a brush or a dish sponge and clear water with mild detergent (dishwashing liquid). Then let dry overnight.
- **Quaternary ammonium compounds are suitable for disinfection.**
- Consider application times and thoroughly rinse with water. If the adhesive matting is disinfected at regular intervals, it might need to be replaced sooner.



To replace the adhesive matting proceed as follows:

1. Thoroughly spray the tray with water
2. On one side, peel the adhesive matting off the tray and pull it up diagonally.
3. Use acetone to degrease the tray and apply new **wet** adhesive matting (according to separate installation instructions). Only peel off protective foil prior to use.

The removed adhesive matting can be reused and can be reapplied after regeneration in water.

Adhesive matting that is severely worn due to aging must be replaced. This also applies if a reduction in the adhesive force is detected.

INFORMATION

Due to limited resistance to disinfectants as well as the risk of unintentional detaching of flasks, Sticky Stuff is not suitable for cultivating pathogenic microorganisms.

Maximum rotation speed with Sticky Stuff

To ensure that the flasks do not detach from the adhesive matting, the maximum permissible speed is limited when using adhesive matting.

INFORMATION

The following guidelines only apply to undamaged, completely dry adhesive matting and flasks free of grease. If old or dirty adhesive matting is used, there is a risk that flasks detach even at lower speeds.

Schott Duran® glass Erlenmeyer flask	Filling	Maximum permissible speed	
		25 mm throw	50 mm throw
25 to 750 mL	20 %	250 min^{-1}	200 min^{-1}
1000 mL	20 %	300 min^{-1}	250 min^{-1}
2000 mL	20 %	300 min^{-1}	250 min^{-1}
3000 mL	20 %	350 min^{-1}	300 min^{-1}
5000 mL	20 %	300 min^{-1}	250 min^{-1}

Corning plastic Erlenmeyer flask	Filling	Maximum permissible speed	
		25 mm throw	50 mm throw
125 to 3000 mL	20 %	300 min^{-1}	200 min^{-1}

Corning plastic Fernbach flask	Filling	Maximum permissible speed	
		25 mm throw	50 mm throw
3000 mL	20 %	300 min^{-1}	250 min^{-1}

5.2 Clamps and Other Holders

For individual fitting of the universal table tray, various clamps and holders are available.

5.2.1 Clamps

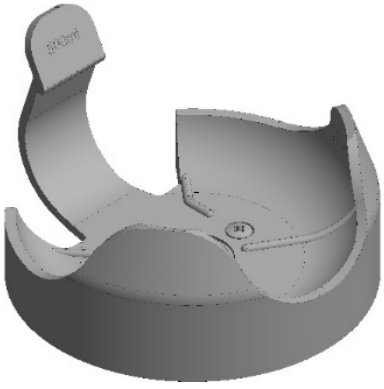
Clamps in various sizes are available for equipping a universal table tray. These can be ordered individually and mounted on the universal table tray.

Stainless steel clamps

The following stainless steel clamps are available:

For flask type	Volume		
Erlenmeyer	25 mL	500 mL	4000 mL
	50 mL	1000 mL	5000 mL
	100 mL	2000 mL	
	250 mL	3000 mL	
Fernbach	1800 mL	2800 mL	

Technical data of the steel clamps	
Description	**Value**
Material	Stainless steel
Fastening screws	25 up to 50 ml: M4 x 6 100 up to 5000 ml: M4 x 8
Temperature range	95 °C
Cleaning	Mild neutral cleaning agent
Disinfection	Commercially available disinfectant
Sterilisation in autoclave	YES



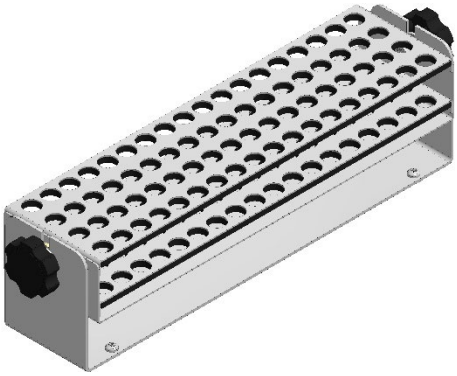
Plastic clamps

The following plastic clamps are available:

For flask type	Volume		
Erlenmeyer	100 mL	250 mL	500 mL

Technical data of the plastic clamps	
Description	**Value**
Material	POM Co polymer
Fastening screws	M4 x 6
Temperature range	65 °C
Cleaning	Mild neutral cleaning agent
Disinfection	Commercially available disinfectant
Sterilisation in autoclave	NO

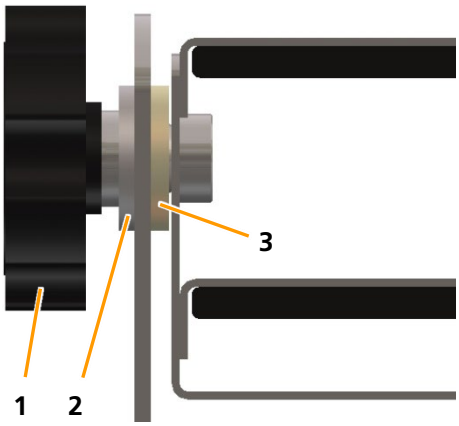
5.2.2 Test Tube Holders



Test tube holders are used to securely affix different sized test tubes. Test tube holders can be screwed onto a universal table tray or placed on Sticky Stuff adhesive matting.

The following test tube holders are available (details and special types on request):

- For long test tubes, Ø 8 bis 30 mm
- For short test tubes, Ø 12 bis 18 mm
- For plastic tubes with ventilation lid, Ø 16 and 30 mm
- Special holders, e.g. for 600 ml cultivation vessel



If necessary, the inserts with the tubes can be tilted by loosening the black nuts (1). The tilt can be set freely. Then tighten the nuts again.

The entire inner part with the holders for the tubes can be removed by loosening the black nuts, whereby the u-shaped holder remains on the tray.

When inserting the inner parts, ensure that the feet of the holder (part on the tray) on both sides rest between the rubber ring (3) and the Teflon washer (2).

Test tube holders can also be used on a tray with Sticky Stuff. To do this, the pre-installed screw must be removed from the base plate.

ATTENTION

The test tube holders adhere extremely strongly to the Sticky Stuff, so that water has to be sprayed underneath the edge of the holder with a syringe in order to remove them. This is done to prevent damage to the holder or the tray.

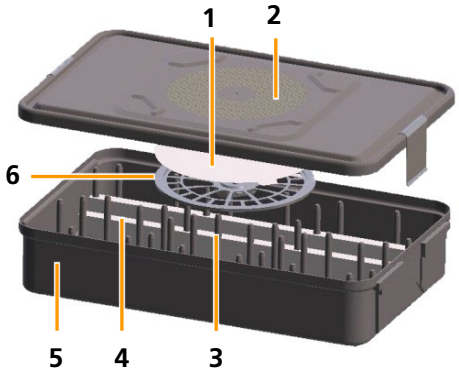
5.3 Box for Microtitre Plates

Overview

The box for microtitre plates is used for low-vapour cultivation of microtitre plates and deep well plates. It protects cultures from drafts in the incubation chamber and also offers a stable container in which cultures can be transported.

The box for microtitre plates consists of an aluminium container with a removable lid into which a replaceable paper filter is integrated. A microtitre insert with screw-mounted pins is used for mounting microtitre plates and deep well plates.

For shaking, the box for microtitre plates can be screwed onto a universal table tray or placed on the Sticky Stuff adhesive matting.



Structure

1 Filter
2 Top plate
3 Microtitre insert
4 Quickload spacers
5 Container
6 Filter washer

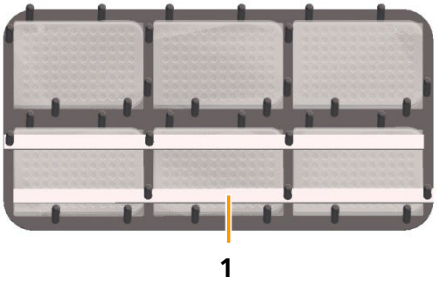
Mounting the box for microtitre plates

The box for microtitre plates is mounted on the table by means of four Phillips-head screws. When delivered, the fastening screws are covered with plastic cap nuts. These must be removed prior to installation.

Alternatively, the box for microtitre plates can be placed on the Sticky Stuff adhesive matting. In this case, all fastening screws must be removed to avoid damaging the adhesive matting.

During installation, ensure that the tray is always loaded evenly.

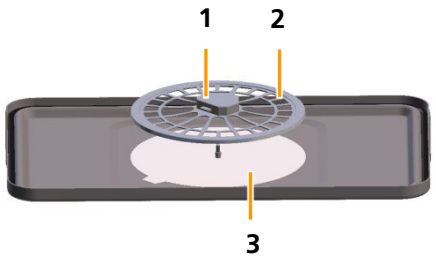
Accessories



Loading the box for microtitre plates

To improve transfer of oxygen to the cultures and facilitate the removal of the plates, spacers (Quickload spacers) (1) can be placed between the individual layers. Prior to loading, the Quickload spacers must be removed. Following that, microtitre or deep well plates can be inserted.

For cultivations with low oxygen requirements, Quickload spacers do not have to be used.



Inserting/replacing a filter

To insert or replace a sterile filter (3), the filter washer (2) must be removed first. To do so, press the locking button (1) on the filter washer and lift up the filter washer. Following that, the filter can be inserted and the filter washer can be put back in its place.

Sterilising the box for microtitre plates

The box for microtitre plates can be autoclaved (recommendation: 20 min at 120 °C). To do so, remove the Quickload spacers first and disinfect them using commercial disinfectant.

Rotation speed limits

When there are high agitation speeds or insufficient grip due to humidity or dirt, the box for microtitre plates can separate from the Sticky Stuff during agitation and cause damage to the incubation chamber. The maximum permissible agitation speed is therefore limited as follows:

Description	25 mm throw	50 mm throw
On universal table tray	350 min^{-1}	250 min^{-1}
On Sticky Stuff	150 min^{-1}	150 min^{-1}

INFORMATION

When working with maximum rotation speeds, it is strongly recommended to use a special tray with permanently mounted boxes. Details on request.

Technical data

Container with top plate and tray	
Description	**Value**
Dimension	465 x 280 mm
Weight	4.23 kg
Filter, paper, round, Ø	185 mm
Screws for microtitre tray	M4 x 8 hexalobular
Screws for microtitre box	M4 x 12 Phillips head
Material	Aluminium, autoclavable
Detergent	Mild dishwashing liquid or neutral cleaning agent

Quickload spacer	
Description	**Value**
Dimension	412 x 14 x 5 mm
Quantity	12 units
Material	Polyamide 6.6 can be sterilised
Detergent	Mild dishwashing liquid or neutral cleaning agent

Loading capacity	
Standard plate size 85.1 x 127 mm	**Value**
Microtitre plates	18 units
Deep well plates height 42 mm	12 units

5.4 eve®

eve® is a platform software for planning, controlling and analysing bioprocesses. Among other features, eve® enables bioprocess data to be recorded and stored in a centrally managed database. The software offers workflows for simple bioprocesses up to the planning and execution of complex strategies with different process phases.

eve® offers the possibility to generate and store bioprocess knowledge. For example, different libraries are available for storing information about organisms or culture media. Thanks to soft sensors, additional knowledge can be generated.

In addition to INFORS HT products, biotech equipment and analysis devices from third-party manufacturers can also be integrated. In this way, bioprocesses can be controlled, monitored and evaluated entirely via one software.

eve® is installed on a centralised server. Access takes place via a browser, no client-side installation is required. Bioprocess data is thus directly available via the browser and is independent of the operating system.

The software is available in different packages. This allows the software to be perfectly adapted to the individual needs and requirements of the users. eve® (in the Premium version) is also suitable for working in a validated environment in accordance with FDA CFR 21 Part 11.

Our customer service is at your disposal for detailed information. For contact information, see page 2.

6 Installation

Only the manufacturer's qualified expert personnel or persons authorised by the manufacturer may install and initially commission the device. Hence, the following section only lists the requirements for the installation location to be observed by the provider.

⚠ WARNING

Installation and initial commissioning require trained expert personnel with sufficient experience. Errors during installation may lead to dangerous situations or significant damage to property.

– Only the manufacturer's expert personnel or person's authorised by the manufacturer may install and initially commission the device.
– The manufacturer must also be consulted if the device is subsequently moved.

6.1 Operating Conditions at the Installation Location

To achieve optimal and reproducible results, the device should be set up in stable ambient conditions without strong temperature or humidity fluctuations. Changes in ambient temperature or humidity (even short-term) can have a negative effect on the climate in the incubation chamber.

Operating conditions	
Temperature range	10 to 32 °C
Humidity	10 to 85 %
Restrictions	■ Do not expose to direct sunlight ■ Do not expose to dust ■ Do not expose to vibrations
The device may only be set up indoors.	

To achieve a stable climate in the incubation chamber and to be able to control the climate accurately, the following installation locations must be avoided:

- Poorly ventilated recesses or in the exhaust heat air stream of air conditioners or other sources of heat
- Directly underneath, next to or in the air stream of the air conditioners or other devices that generate strong air flows (e.g. circulation fans in clean rooms)
- Next to devices with strong heat radiation, such as heaters or autoclaves, or in their exhaust heat air stream
- Next to devices for refrigeration, such as ultra-low temperature freezers or refrigerated centrifuges, or in their exhaust heat air stream

INFORMATION

In order to achieve the desired temperature in the incubation chamber, the ambient temperature directly at the device is decisive. This can be considerably higher than the temperature at other positions in the room due to waste heat from the device or other devices with strong heat radiation in the immediate vicinity!

6.2 Requirements for the Mains Connection

To avoid dangers due to electrical current, the in-house mains connection must meet the following requirements:

- Single-phase, constant power supply
- In the building, the power supply must be protected using a fault current protection switch (RCD – Residual Current Device).

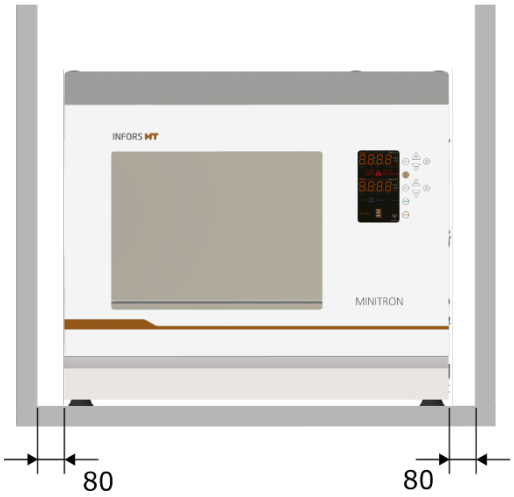
In addition to that, the following requirements must be met:

- Make sure that the voltage values of the device match those of the local power supply. Note the description on the identification plate.
- Only use the power cable provided. If the power cable becomes defective, replace it with a power cable of the same type.
- Ensure that the mains connection is accessible at all times.

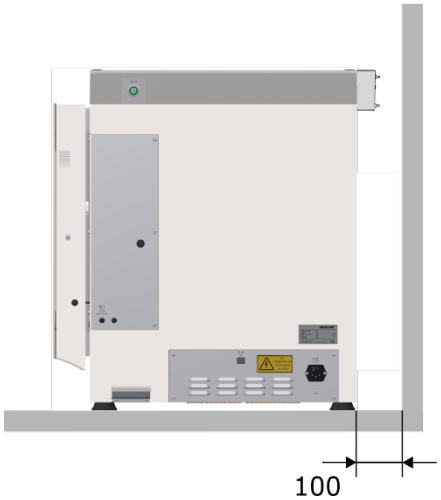
6.3 Minimum Distances to the Device

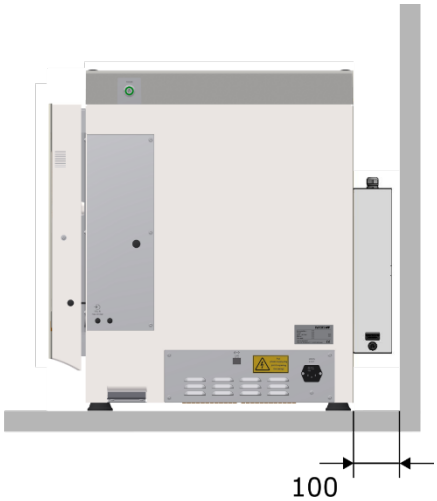
When setting up the device, the following minimum distances must be observed to ensure adequate ventilation and access to the most important connections:

Minimum distances to the basic unit



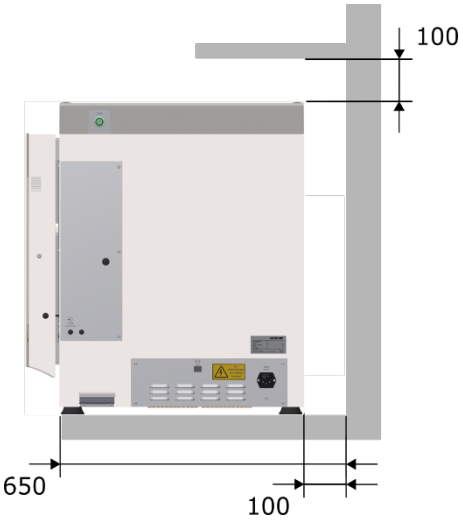
Minimum distances with options (LED lighting, direct steam humidification and cooling)





Installation

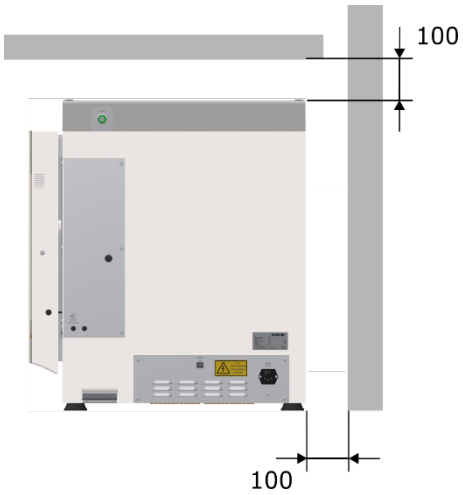
Placing the device on a table



When placing the device on a table, observe the following:

- To prevent the table from vibrating, use a heavy table with diagonal braces as the minimum (ideally use a stable laboratory bench). Alternatively, the table can be affixed to the wall.
- The minimum required depth of the table is 650 mm.
- You must leave a ventilation gap of at least 100 mm between the device and rear wall.
- If shelves or cupboards are installed above the table, you must leave a minimum distance of 100 mm.
- No gas outlets, shelves or cupboards must be in the way.

Placing the device under a table



When placing the device under a table, observe the following:

- You must leave a ventilation gap of at least 100 mm between the device and rear wall of the table to ensure heat produced by the device can escape.
- The minimum distance between the device and the underside of the table top is 100 mm.
- When operating the device with installed cooling, heat can accumulate under a closed laboratory bench. This can result in the desired temperature in the incubation chamber not being reached. In addition, heat accumulation increases power consumption, as more cooling is required. Hence, we recommend only installing the device under a laboratory bench with air vents.

ATTENTION

Failure to comply with the required minimum distances can result in components of the device overheating and the device being damaged. Therefore, please note:

– Never cover the air vents on the right side or those on the rear of the device.

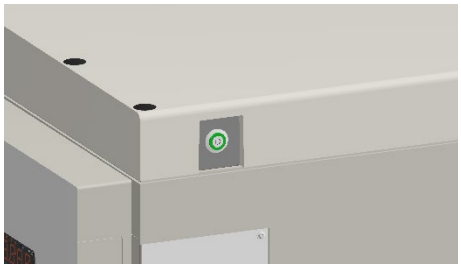
– Never position the device directly on a wall.

7 Operation

7.1 Switching on the Device

ATTENTION

The shaker drive can start automatically if the device has not been switched off correctly beforehand. Loose objects in the incubation room can damage the device and the cultivation vessels.



1. Press the power switch on the right side of the casing.

   The power switch lights up in green after switching on. The device undergoes an initialisation process where various messages appear on the alphanumeric display. As soon as the initialisation process is finished, the device is ready for operation.

7.2 Loading the Device

7.2.1 Opening the Door

Door lock

The door can be opened while the device is running. The shaker drive, temperature control and all other parameters are stopped automatically. To open the door, proceed as follows:

Procedure

1. Temporarily stop the device by slightly opening the door.
2. Wait until the table stands still.
3. Open the device door all the way.

The shaker drive and all other parameters will start up again automatically as soon as the door is closed.

INFORMATION

If you wish to stop the table slowly, e.g. to avoid culture liquid from spilling out, you have to set the *Rotation speed* parameter to *OFF* prior to opening the door. In this case, the table stops slowly, with the brake force set in the settings menu (see chapter 7.7.4 "Setting the Brake Force for Stopping the Table", page 100).

Door alarm

To prevent the door from being left open unintentionally, the device has a door alarm (beeping). This is triggered if the door is left open for longer than the set time. If no parameter was active prior to opening the door, the door alarm is not triggered. The time until the door alarm is triggered can be set in the settings menu (1 to 10 minutes). If necessary, the door alarm can also be deactivated completely.

7.2.2 Removing the Tray

The device is supplied with a mounted tray. Depending on the type of loading it might be necessary to remove the tray for loading. However, the tray usually stays in the device and only has to be removed if a different configuration is required (e.g. with larger or smaller clamps).

To remove the tray, proceed as follows:

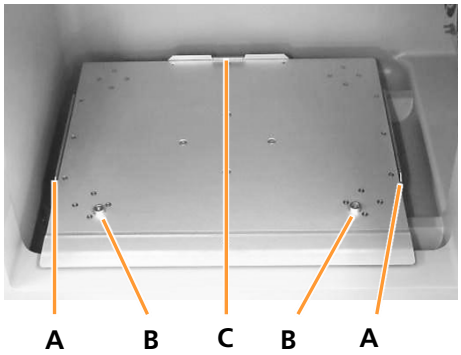
Procedure

1. Open the device door all the way.
2. Remove the screw in the front centre of the tray.
3. Use the grip to lift the tray and take it out of the incubation chamber by pulling it forward along the side guides.

7.2.3 Inserting the Tray

The insertion of the tray works independently of the position of the table. Proceed as follows:

Procedure



1. Open the device door all the way.
2. Insert the tray between the two side guides on the table (A).
3. Use the grip to slide the tray on the table all the way back until you reach the stop (C).
4. Ensure that the tray is correctly snapped into the two slightly conical plugs on the table (B).

D

5. Affix the tray in the centre using the knurled screw at the front (D); tighten the screw so that it cannot come lose.

INFORMATION

When loading, observe the description regarding ideal masses (see chapter 7.2.5 "Tips & Tricks for Loading the Tray", page 70).

ATTENTION

If the tray is not held in place securely on the table, the tray's movement may damage the interior of the device.

– Do not start up the device unless the tray has been inserted correctly and affixed securely.
– Make sure the knurled screw is inserted and tightened correctly.

Tray cannot be inserted

If you are unable to insert the tray correctly, perform the following checks:

- Remove the tray and check it is not twisted or bent.
- Check the incubation chamber for foreign matter and other objects.
- If it is still not possible to insert the tray correctly, contact your local INFORS HT representative.

7.2.4 Fitting the Holders

ATTENTION

The threaded holes of the tray can be damaged if the fastening screws are not screwed straight into the thread:

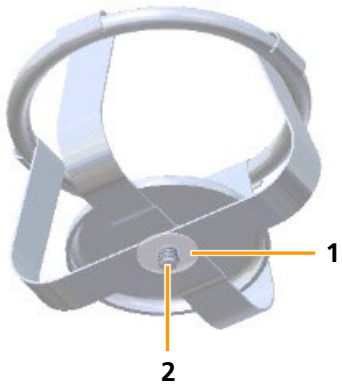
– Place the screws vertically on the drill holes.

– Ensure they can be tightened easily.

ATTENTION

All holders are supplied with pre-fitted screws. If a test tube holder or a box for microtiter plates is placed on the Sticky Stuff adhesive matting, there is a risk that the adhesive matting is damaged by protruding screws.

Remove the screws before you place test tube holders or boxes for microtiter plates on the Sticky Stuff adhesive matting.



Fitting a holder

Clamps, test tubes and boxes for microtiter plates are fixed to the tray using screws. The device is delivered with pre-fitted screws (2). The screws are each secured with one flat gasket at the bottom (1) so that they cannot fall out. Only use the screws provided or screws of the same size for assembly.

To fit a holder, proceed as follows:

Procedure

1. Loosen flat gaskets.
2. Position the holder on the tray.
3. Centre a screw on the threaded hole in the tray and screw it in loosely. It must still be possible to turn the holder.
4. Align the holder so that all screws are vertical above the respective threaded hole in the tray.
5. Insert screws loosely. Ensure that the screws are screwed in straight and do not tilt.
6. Evenly tighten all screws cross-wise.

Screw sizes

ATTENTION

If screws that are too long are used to affix the holders, these will stick out at the bottom of the tray. This has the effect that the tray can no longer be inserted and affixed correctly.

If you have to replace lost fastening screws, you must use screws that comply with the specification below.

Steel clamps		
Flask size	**Screw**	**Flat gasket**
25 up to 50 mL	Flat head screw with Phillips head M4 x 6 A4	D = 3.2 x 12 x 0.5
100 up to 5000 mL	Flat head screw with Phillips head M4 x 8 A4	D = 3.2 x 12 x 0.5

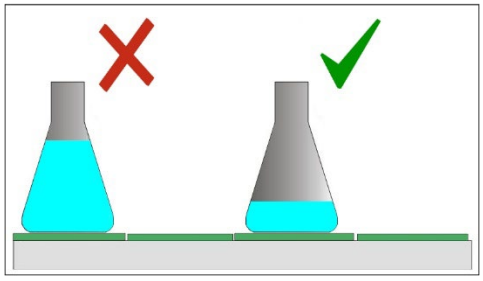
Plastic clamps		
Flask size	**Screw**	**Flat gasket**
100 up to 500 mL	Flat head screw with Phillips head M4 x 6 A4	D = 3.2 x 12 x 0.5

Test tube holders		
Size	**Screw**	**Flat gasket**
Ø 8 up to 30 mm	Oval head screw with Phillips head M4 x 6 A2	D = 3.2 x 12 x 0.5

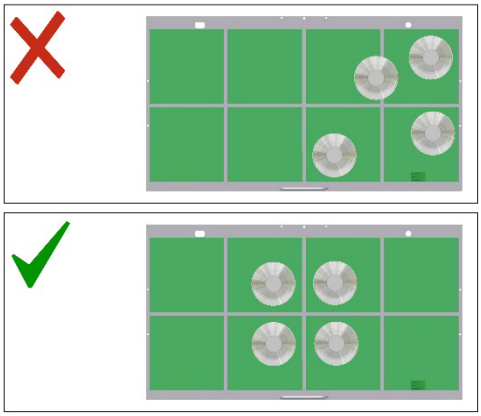
Boxes for microtiter plates	
Screw	**Flat gasket**
Oval head screw with Phillips head M4 x 12 A2	D = 3.2 x 12 x 0.5

7.2.5 Tips & Tricks for Loading the Tray

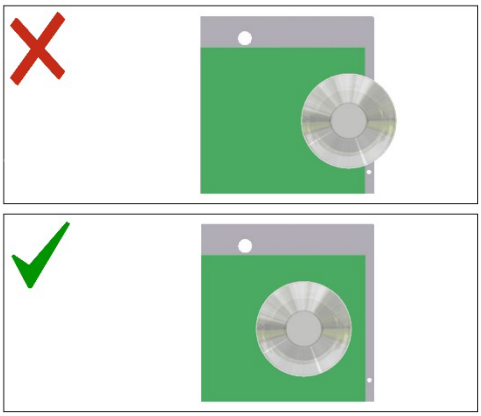
Observe the following notices when loading the tray:



- The working volume should not exceed 1/3 of the total volume of the vessel.



- To ensure a smooth movement, place the cultivation vessels symmetrically and in the middle of the tray. Do not place any heavy vessels at the edge of the tray.



- If any of the vessels protrude over the edge of the tray, they could collide with the inner wall, resulting in the device being damaged or vessels breaking. As such, always ensure that the cultivation vessels do not protrude when positioning them on the tray.

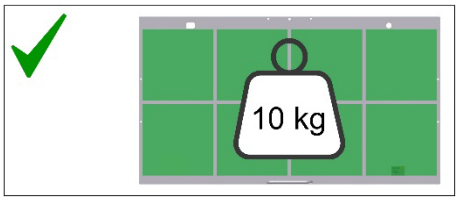
- If the tray is only loaded lightly and is going to be run at high speeds, place additional cultivation vessels filled with water on the tray. This will ensure that the device runs more smoothly. At shaker speeds of approx. 200 up to 250 min^{-1} (depending on the throw and the position of stacked units), the load distribution plays only a minor role.

WARNING

If the loading mass of the table is too high or too low or the load is distributed unevenly, high rotation speeds can cause vibrations. This can result in the device moving uncontrollably.

– Do not operate the device without tray and loading.
– In case of strong vibrations, reduce the rotation speed and check the loading weights or the distribution of the load.

Ideal loading weights



The ideal load for a tray falls into the following ranges (mass incl. tray, clamps, flasks and filling):

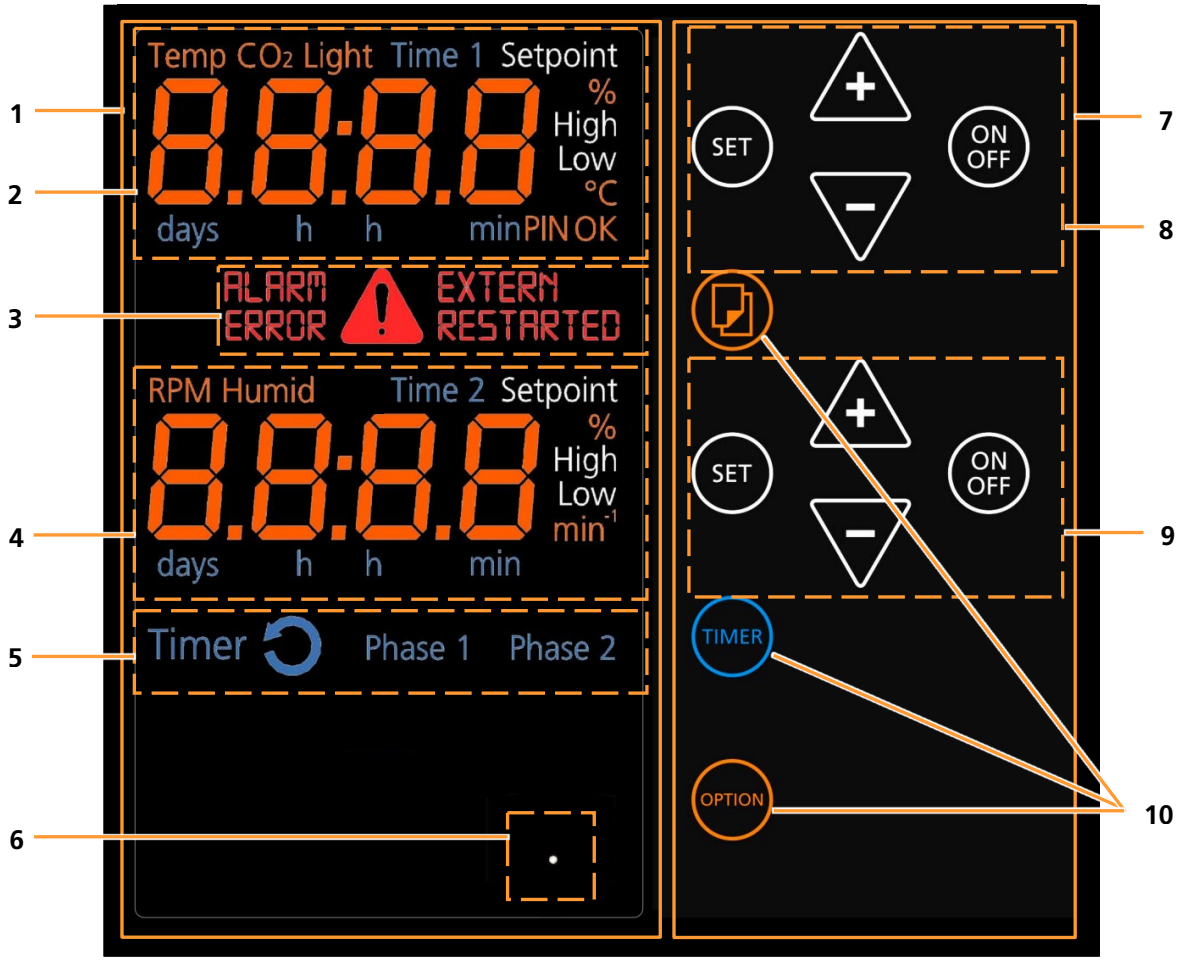
Throw	Ideal load
25 mm	**6 – 11 kg**
50 mm	**7 – 10 kg**

The loads listed above ensure that the device is ideally balanced. Both higher and lower loads cause an imbalance, which results in strong vibrations at higher speeds and can lead to flasks breaking. When the load on the tray is too light, the tray must thus be weighed down using flasks filled with water or weights until the optimum mass is reached. If the load is too high, reduce the speed, remove vessels or reduce the fill volume.

ATTENTION

If load weights that are too high or too low are constantly selected, this can place increased wear on the device. However, short-term deviations in load weights, be they higher or lower, do not lead to increased wear.

7.3 Overview about the Display und Controls



1 **Complete display area**

2 Upper display: Parameter setpoints and actual values (*temperature*, *CO_2*, *light*); time (timer 1)

3 Error and warning messages, alarm

4 Lower display: Parameter setpoints and actual values (*RPM*, *humidity*); time (timer 2)

5 Display area for the timer function

6 Display for the ethernet function when the device is operated via ethernet

7 **Complete operating panel**

8 Upper operating panel: For setting the parameters (*temperature*, *CO_2*, *light*), time (timer 1)

9 Lower operating panel: For setting the parameters (*RPM*, *humidity*), time (timer 2)

10 Further operating keys (selection, TIMER and OPTION)

Parameters in gray are only available when the according option is installed.

7.3.1 Display Area

The complete display area

The display area is dominated by the two alphanumeric displays by which the setpoint and actual values of the parameters as well as different messages are communicated.

Between the alphanumeric displays there is an area for various signs in combination with error, warning and alarm messages.
Below the lower alphanumeric display there is the area for blue signs in connection with the timer function. Also the blue signs above and underneath the two alphanumeric displays are related to the timer function.

The alphanumeric displays with signs and unit symbols

The two display areas consist of a centrally located 7-digit alpha-numeric display and various signs and symbols which are arranged around them and which are explained in the following.

The upper display area is allocated to the following parameters:

- *temperature* (*Temp*)
- *CO_2 concentration* (*CO_2*) (optional)
- *light intensity* (*Light*) (optional)

The lower display area is allocated to the following parameters:

- *rotation speed* (*RPM*)
- *humidity* (*Humid*) (optional)

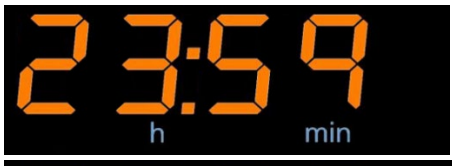
7.3.2 Signs and Messages Regarding the Timer Function

In the upper and lower display area

All signs and symbols in connection with the timer information – except the duration which needs to be entered – light up in blue.

In the upper display area the sign *Time 1* lights up, when within the timer function (see below) the setpoint value for the duration of the first phase (*Phase 1*) can be entered.
First, the message *OFF* appears, if the timer is not activated.

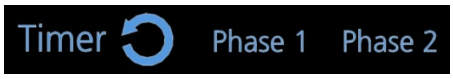
In a similar way but not at the same time, the according information for the second phase (*Phase 2*, *Time 2*) is shown in the lower display area.



On both alphanumeric displays the time for the timer function is shown.

When entering a time between one minute (00:01) and 23 hours and 59 minutes (23:59) the units *h* and *min* light up.
When entering a time between 24 hours or one day (01:00) and the maximum of 9 days and 23 hours (09:23) the units *days* and *h* light up.

In the separate timer display area



In the separate timer display area there are the four signs *Timer*, a symbol for *cycle*, *Phase 1,* und *Phase 2*.

The sign *Timer* indicates that either within the timer function the setpoints for the duration (*Time 1* and/or *Time 2*) can be entered or that at least one timer has been activated.

The symbol for the *cycle* mode lights up in addition to the sign *Timer* as soon as two durations (*Time 1* and *Time 2*) have been entered and both timers are activated. Then the device alters between the parameter setpoints of the first and the second phase in an endlessly repeated cycle.

The signs *Phase 1* and *Phase 2* indicate in which phase the device is operating if both timers are active with different parameter settings. They also indicate for which phase (*Time 1* or *Time 2*) the parameter setpoints can be entered or the actual values of the parameters are shown on the alphanumeric display.

7.3.3 Error, Warning, and Alarm Signs

Between the upper and the lower alphanumeric display area there is a separate field with various signs associated with error, warning, and alarm messages.

The big red general symbol for warnings lights up in connection with error messages and alarms to emphasise the importance of the message.
It always flashes up when the setpoints are changed to avoid mistakes. The warning symbol also lights up, if somebody tries to enter a setpoint value or tapping the **ON/OFF** key without tapping the **SET** key first. In addition, it also appears if someone tries to enter an invalid setpoint value.

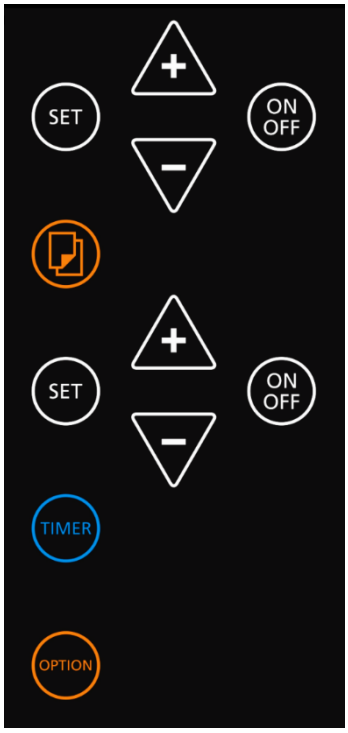
The sign *ALARM* appears in connection with other signs like *ERROR*, *High* or *Low* and it indicates that there is a problem with the device. In addition, there will be an acoustic alarm.

The sign *ERROR* indicates that an error occurred in the operation of the device which provoked an error message.
In connection with the sign *ERROR* there are often messages on the alphanumeric display which give some more detailed information on what happened. For the according abbreviations (see chapter 8.2.1 "Error Messages Explained", page 108).

The sign *EXTERN* lights up when the device is controlled externally (e.g. by means of a bioprocess software).

The sign *RESTARTED* indicates that the device had been disconnected from the power supply and did restart automatically on the basis of the saved parameter setpoints.

7.3.4 Operating Panel



The various keys on the operating panel serve to select and set the parameters, timers and other functions and modes. On the panel there are selection keys in orange (parameters, operator mode) and in blue (timer function) as well as white keys for the setting.
The white keys for the setting exist twice because they are arranged in an upper and a lower group within the operating key area which corresponds with the according display area.

INFORMATION

The sensor controlled soft-touch keys are behind a glass cover and they only need to be touched very gently.

INFORMATION

Tapping an arbitrary key on the operating panel turns on the light inside the incubation chamber. 20 seconds after tapping the last key it is automatically turned off.

Keys for selecting

With the **Select** key the parameters and functions are selected within the timer function or the operator mode.
The symbol of the selected parameter or timer (*Time 1* or *Time 2*) is displayed in the upper or lower display area.

With the **TIMER** key the timer function is selected. Afterwards, the two timers can be programmed using the keys in the upper or lower operating area.
On both display areas the symbols *Time 1* (upper area) und *Time 2* (lower area) are displayed
For detailed information see chapter 7.5 "Timer Function", page 83.

By holding the **OPTION** key for at least 2 seconds the operator mode is selected. It allows to change the setup of the device.
The **OPTION** key is also used to select the functions within the operator mode.
For detailed information see chapter 7.7 "Settings Menu (Option Function)", page 99.

Keys for setting

After tapping the **SET** key the parameter setpoints or the duration for the timer can be entered.
In the according display area the sign *Setpoint* lights up.

With the **Plus** key the values for the parameters or the time are increased.
By tapping the key once, the value is increased with the smallest increment for the particular parameter. By holding the key, the increment increases in ever bigger steps.

With the **Minus** key the values for the parameters or the time are reduced.
By tapping the key once, the value is reduced with the smallest increment for the particular parameter. By holding the key, the increment increases in ever bigger steps.

The **ON/OFF** key serves to turn the parameters and timers on or off.

7.4 Adjusting, Activating and Deactivating Parameters

Has the device been turned on via the power switch and is the initialisation process terminated, the device is ready for getting programmed.

7.4.1 Overview about the Parameters

Temperature (*Temp*)

The parameter *temperature* (*Temp*) belongs to the standard scope of delivery.
When entering the setpoint value for the temperature it is shown in degrees Celsius with an accuracy of one decimal place.

INFORMATION

Which temperatures can effectively be reached depends on various factors, like the ambient temperature, the ventilation or the temperature of the other device in a stack.

Carbon dioxide concentration (CO_2)

The parameter *carbon dioxide concentration* (*CO_2*) does not belong to the standard scope of delivery and therefore it is only available if the according option is installed.

When entering the setpoint value for the carbon dioxide concentration it is shown in percent with an accuracy of one decimal place. If the parameter is not installed, the display remains empty.

Light intensity (*Light*)

The parameter *light intensity* (*Light*) does not belong to the standard scope of delivery and therefore it is only available if the according option is installed.

When entering the setpoint value for the light intensity it is shown in percent.

If the parameter is not installed, the display remains empty.

Rotation speed (*RPM*)

The parameter *rotation speed* (*RPM*) belongs to the standard scope of delivery.

When entering the setpoint value for the rotation speed it is shown in rpm (min^{-1}) with an accuracy of one whole number.

INFORMATION

The highest rotation speed allowed depends on the throw, the position of the device in a stack and the load on the tray (mass).

Humidity (*Humid*)

The parameter *humidity* (*Humid*) does not belong to the standard scope of delivery and therefore it is only available if the according option is installed.
When entering the setpoint value for the relative humidity it is shown in percent with an accuracy of one decimal place.
If the parameter is not installed, the display remains empty.

Parameter-specific display elements

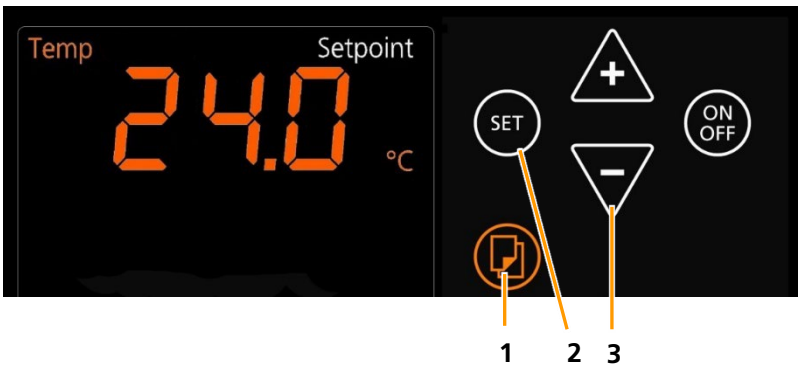
The sign *Setpoint* lights up, when by tapping the **SET** key on the upper or lower operating panel the setpoint values for the parameters can be entered.

The sign *High* or *Low* lights up, if the current value of a parameter is above respectively below its setpoint value.
After a certain time span or when a critical value is reached an alarm will be set off, because most probably an error or defect hinders the device to reach or maintain the setpoint value in question.

The possible setpoints for the parameters *rotation speed* and *temperature* can be limited in the settings menu. If an attempt is made to enter a higher value, the message *bloc* appears.

7.4.2 Setting the Parameter Setpoints

To set the parameter setpoints, proceed as follows:



Procedure

1. Select the desired pair of parameters with the **Select** key (1).

   The alphanumeric display field shows the current values of the selected parameter pair.

2. To activate programming, tap the **SET** key (2) in the upper or the lower setting key area, depending on which parameter setpoint should be set.

   The alphanumeric display field shows last set setpoint of the parameter. The *Setpoint* sign indicates, that the parameter setpoint can be set.

INFORMATION

The *Setpoint* sign lights up for 10 seconds. If you do not make an entry in that time, you have to tap the **SET** key again.

3. Use the **Plus** or **Minus** key (3) to set the desired setpoint of the selected parameter.

   After approx. 10 seconds the *Setpoint* sign disappears and the new setpoint is saved. You can speed up this process by tapping the **Select** key.

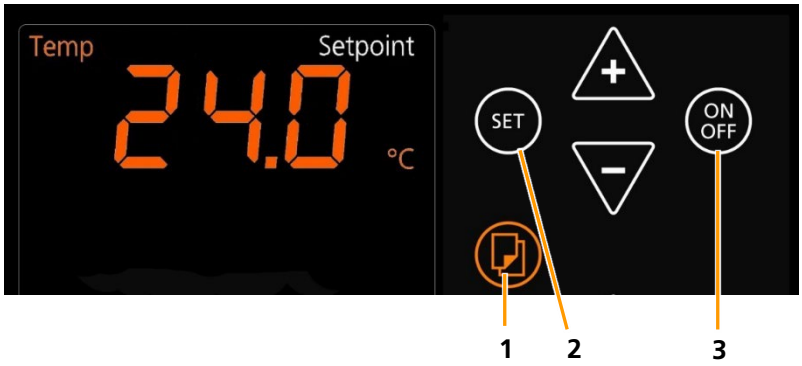
INFORMATION

The entered value is saved automatically. A separate confirmation is not necessary. If the parameter is already activated, the changes take effect immediately.

7.4.3 Turning a Parameter On or Off

Turning a parameter on

To turn a parameter on, proceed as follows:



INFORMATION

Steps 1 and 2 can be omitted, if the parameter is turned on directly after entering the setpoint value.

Procedure

1. Select the desired pair of parameters with the **Select** key (1).

   The message *OFF* indicates, that the parameter is switched off.

2. Tap the **SET** key (2) in the upper or the lower setting key area, depending on which parameter should be switched on.

   On the alphanumeric display the setpoint value of the parameter is shown. The sign *Setpoint* indicates, that the parameter can be switched on.

3. To switch on the parameter, tap the **ON/OFF** key (3) in the according operating key area.

   The parameter is instantly turned on.
   The sign *Setpoint* disappears. On the alphanumeric display the message on appears for a very short time, then the current value of the parameter is shown.

INFORMATION

When the parameter *rotation speed* (*RPM*) is activated, the shaker table starts to move instantly. It is therefore suggested to turn it on last.

INFORMATION

It takes a while for the parameters to reach the entered setpoint value. The sign *High* or *Low* lights up, if the current value of a parameter is above respectively below its setpoint value.

Turning a parameter off

Turning off a parameter is carried out the same way as switching on a parameter. The desired parameter can be selected by tapping the **Select** key and afterwards switched off by tapping the **ON/OFF** key. Is the parameter switched off, the message *OFF* appears on the alphanumeric display.

7.5 Timer Function

7.5.1 Overview

The timer function allows you to programme defined sequences (e.g. changing parameter setpoints after a defined time period or delaying the start of the cultivation process). The timer can be programmed in two different modes:

- One-time change from phase 1 to phase 2
- Cyclical change between phase 1 and phase 2

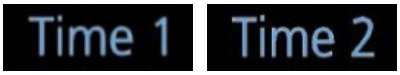
INFORMATION

More complex sequences and procedures (e.g. daylight curves) can be realised with the bioprocess platform software eve®.

Signs regarding the timer function

If the timer function is active, the following signs appear:

The sign *Timer* appears as soon as the timer function is active or if the timer can be programmed.



The signs *Time 1* and *Time 2* indicate, that the duration of phase 1 (*Time 1*) respectively phase 2 (*Time 2*) can be entered.

The signs *Phase 1* and *Phase 2* indicate which phase is active or for which phase the parameter setpoints can be entered:

- The sign is blinking: The phase is active.
- The sign is lit up: The parameter setpoints of the corresponding phase can be entered.

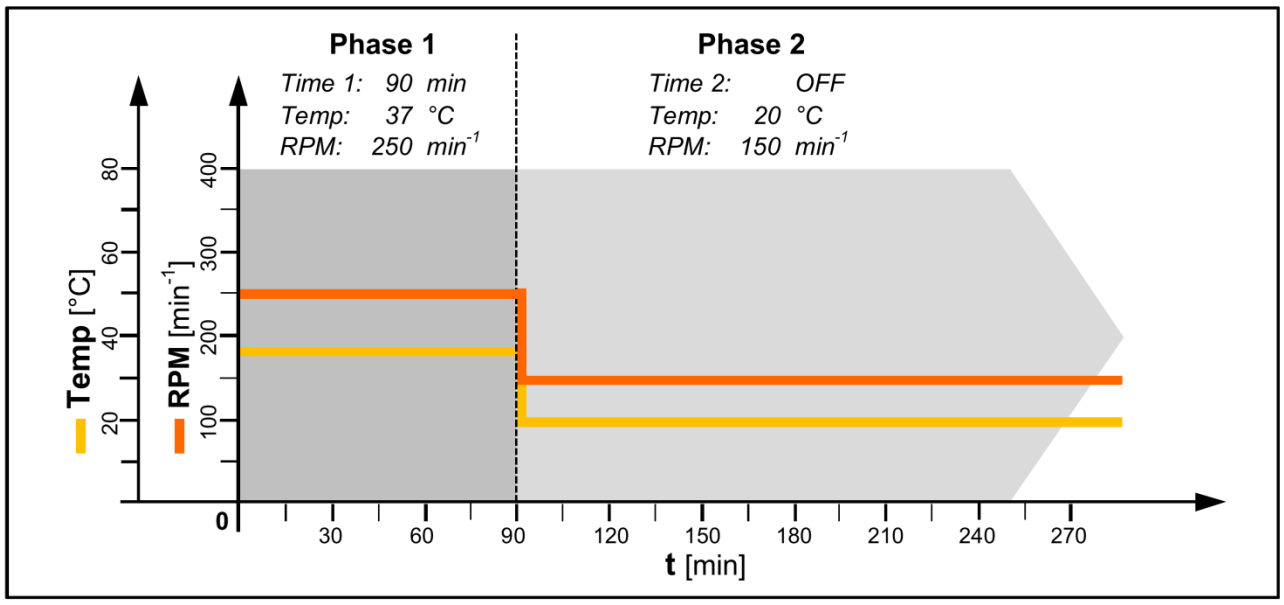
If the cyclic change between phase 1 and phase 2 is active, the sign *cycle* lights up.

One-time change from phase 1 to phase 2

If the device is programmed in this way, the two different parameter settings for the cultivating process change after the given period of time. The device then runs using the settings for the second phase until it is stopped manually by turning the parameters off.

Application examples:

- Delayed start of the cultivation process
- Induction of a protein expression
- Slow down or stop the cultivation process after the given time period



INFORMATION

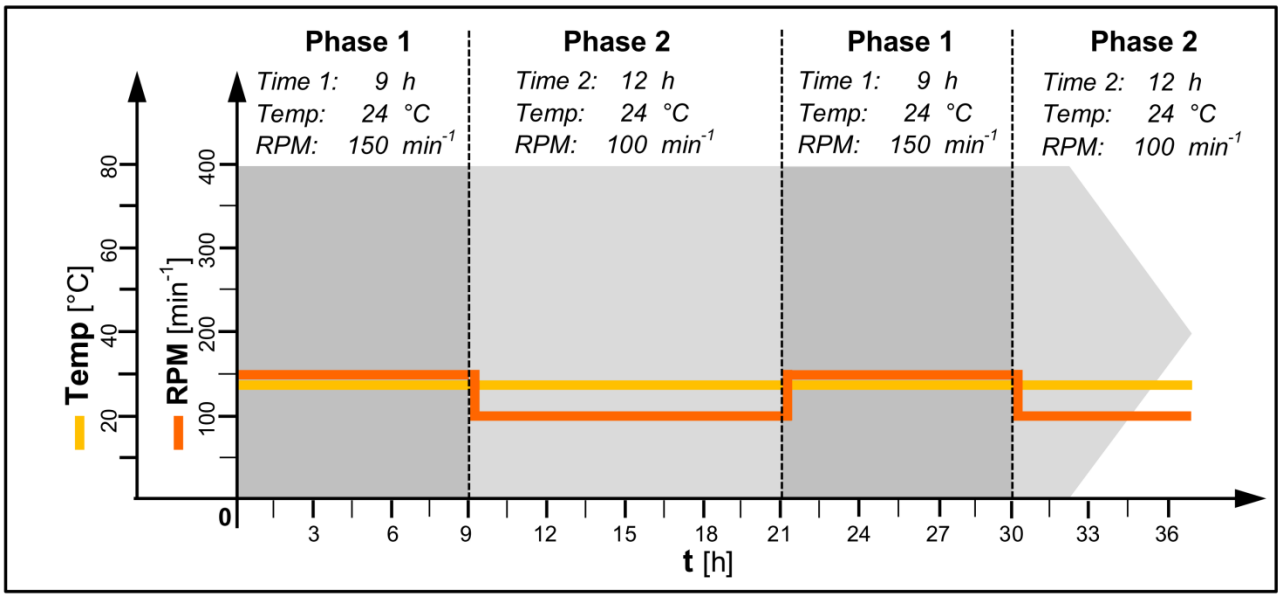
To programme a one-time change from phase 1 to phase 2, the timer for the second phase has to be switched off (*Time 2 = off*). If the timer for the second phase is switched on (*Time 2 = on*), there will be a cyclic change between the two phases (see the next example).

Cyclical change between phase 1 and phase 2

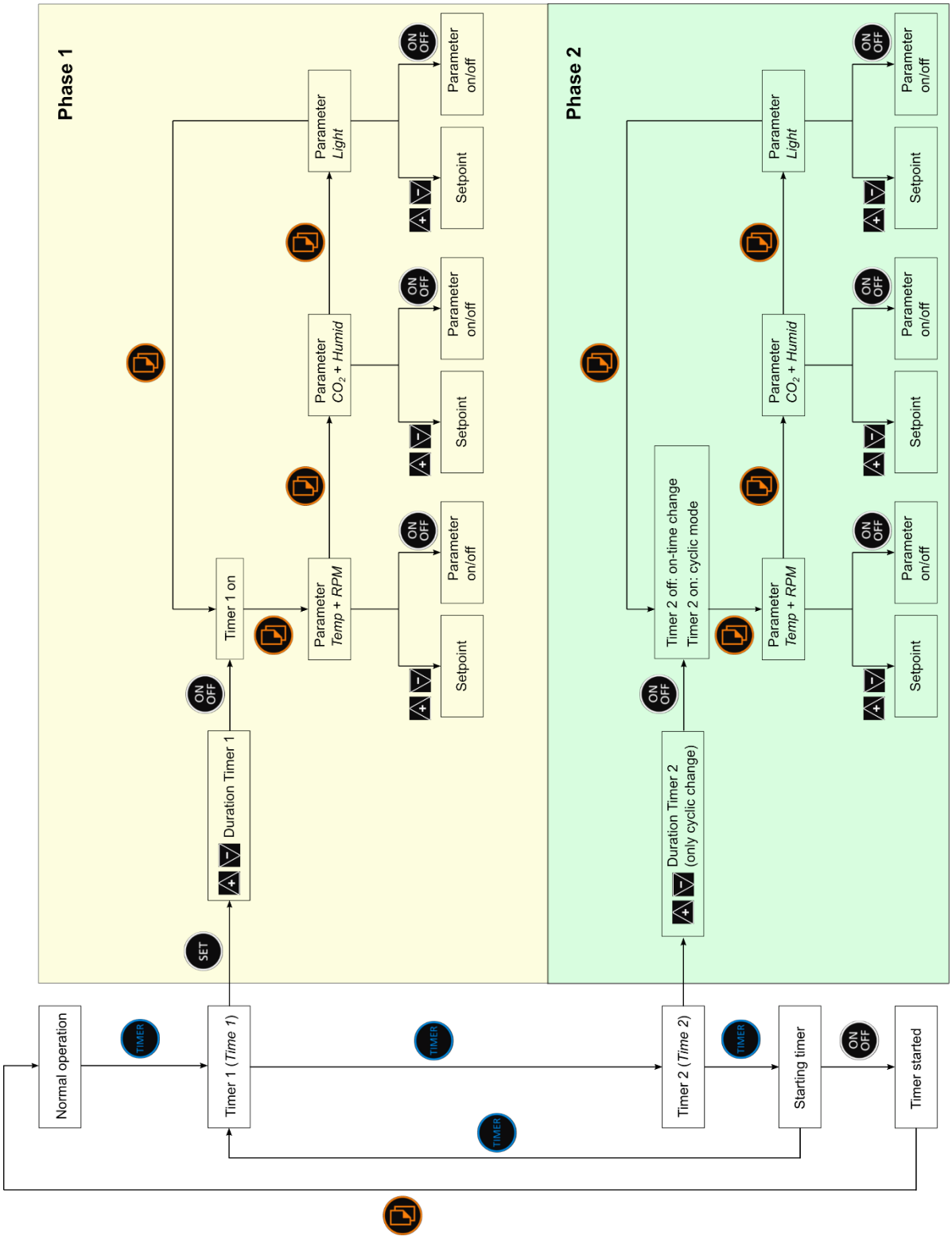
If the device is programmed in this way, two different parameter settings are repeated in an endless, precisely timed cycle. The two time intervals (Phase 1 and Phase 2) alternate until the cultivating process is stopped manually by turning the parameters off.

Application example:

- Simulation of day and night



Schematic overview of the timer programming



7.5.2 Programming the Timer - Single Change

Programming the timer for a single change consists of the following steps:

a) Entering the time for the first phase.

b) Entering the setpoint values for the first phase and switching on the parameters.

c) Making sure that the timer for the second phase (*Time 2*) is switched off.

d) Entering the setpoint values for the second phase and switching on the parameters.

e) Starting the timer.

Entering the time for the first phase

Procedure

1. Tap the **TIMER** key to start the timer function.

On the upper alphanumeric display the sign *Time 1* and the message *OFF* appear. Additionally the sign *Timer* is lit up.

> **INFORMATION**
>
> Possibly the message *OFF* for the second timer (*Time 2*) appears on the lower alphanumeric display. Then the **TIMER** key needs to be tapped again to get to the first timer (*Time 1*).

2. To set the time, tap the **SET** key in the upper setting key area.

The sign *Setpoint* indicates, that the time can be entered.

3. Use the **Plus** or the **Minus** key in the upper setting key area to set the time for the first phase (*Time 1*).

The time set is shown either in hours (*h*) and minutes (*min*) or in days (*days*) and hours (*h*).

4. Tap the **ON/OFF** key in the upper setting key area to activate the timer (*Time 1*).

   On the upper alphanumeric display the message *on* appears for a very short time and then the time entered is shown
   In the separate timer display area the sign *Timer* is lit up and the sign *Phase 1* lights up for the first time.

INFORMATION

It is not possible to set the parameters for the first phase as long as the timer for the first phase has not been activated.

Entering the setpoints for the first phase and switching on the parameters

As soon as the timer for the first phase (*Time 1*) has been switched on, the different parameters for phase 1 can be selected using the **Select** key and afterwards be switched on.

5. Tap the **Select** key to select the desired parameters.

   In both display areas the first integral pair of parameters (*Temp* and *RPM*) appears with the last setpoint values entered or the message *OFF*.
   The sign *Setpoint* indicates, that the setpoints can be entered.

INFORMATION

In this phase of the programming process the sign *Setpoint* remains lit up and does not disappear after 10 seconds.

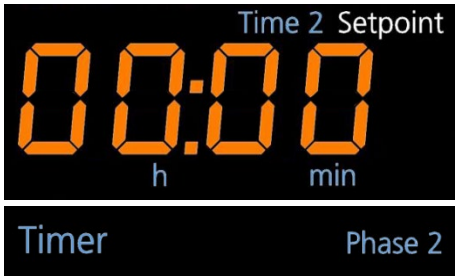
6. Tap the **Plus** or **Minus** key in the corresponding setting key area to set the desired setpoint values and switch the parameters on using the **ON/OFF** key.

INFORMATION

With the **Select** key the parameters and the time entered for the first phase can be selected and changed over and over again.

Checking the timer for the second phase

7. Tap the **TIMER** key to get to the time settings for the second phase (*Time 2*).



On the lower alphanumeric display appears the time entered last or 00:00 if no time has been entered.
In the separate timer display area the signs *Timer* and *Phase 2* are lit up.

8. Make sure the second timer is turned off. If not, use the **ON/OFF** key in the lower setting key area to turn the timer (*Time 2*) off.

Entering the setpoints for the second phase and switching on the parameters

After making sure, that the second timer (*Time 2*) is switched off, the different parameters for phase 2 can be selected using the **Select** key and afterwards be switched on.

INFORMATION

If the timer should be used to stop the cultivation process after a defined time, all parameters for phase 2 can be switched off. This causes the parameters to switch off after the set time for phase 1 has elapsed and therefore to stop the cultivation process.

9. Tap the **Select** key to select the desired parameters.

In both display areas the first integral pair of parameters (*Temp* and *RPM*) appears with the last setpoint values entered or the message *OFF*.
The sign *Setpoint* indicates, that the setpoints can be entered.

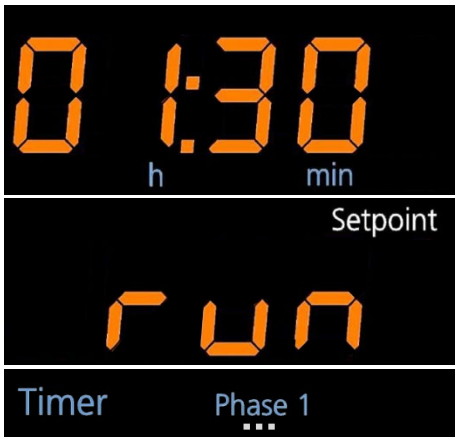
10. Tap the **Plus** or **Minus** key in the corresponding setting key area to set the desired setpoint values and switch the parameters on using the **ON/OFF** key.

Starting the timer

11. Tap the **TIMER** key when all settings for the second phase are correct

On the alphanumeric displays the messages *Strt* (upper) and *OFF* (lower) appear. In the lower display area the white sign *Setpoint* is lit up. This means that the timer function can now be started.
In the separate timer display area the sign *Timer* is lit up.

12. Tap the **ON/OFF** key in the lower setting key area to start the timer function.



On the alphanumeric displays the messages *Strt* (upper) and *run* (lower) appear. In the lower display area the white sign *Setpoint* is lit up. The display then changes to showing the remaining time of the first phase on the upper and the message *run* on the lower alphanumeric display.
In the separate timer display area the sign *Timer* is lit up. The blue sign *Phase 1* is blinking.

13. Tap the **Select** key to quit the timer programming mode.

If the **Select** key is not used, the display changes to the normal operating mode automatically after 60 seconds.

The displays now show the current values of the integral parameters *temperature* and *rotation speed*. If other parameters are installed, the display shows the current values of each pair of parameters for 20 seconds.

The cultivating process now runs with the parameter setpoint values for the first phase, until the time entered for the first timer (*Time 1*) has elapsed.

After the time for the first phase has lapsed, the message *End* appears on the lower alphanumeric display. This message alternates every 20 seconds with the current values of the parameters for the second phase. In addition, there is an acoustic alarm every 60 seconds.

The cultivating process now runs with the setpoint values of the second phase until the device is stopped manually by turning the parameters off. If the alarm is confirmed by tapping the **TIMER** key, the acoustic alarm stops, the message *End* does not appear anymore.

INFORMATION

The timer function can at any time be deactivated separately or by turning off the first timer. The cultivating process then continues with the last active parameter setpoint values.

7.5.3 Programming the Timer - Cyclic Change

Programming the timer for a cyclic change consists of the following steps:

a) Entering the time for the first phase (*Time 1*).

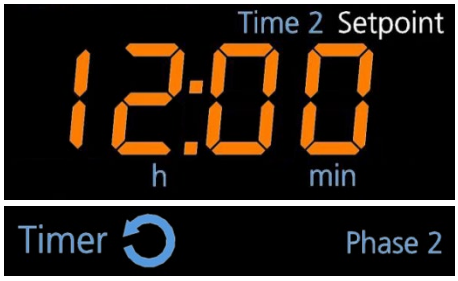
b) Entering the setpoint values for the first phase and switching on the parameters.

c) Entering the time for the second phase (*Time 2*).

d) Entering the setpoint values for the second phase and switching on the parameters.

e) Starting the timer.

Programming the timer for a cyclic change works the same way as programming the timer for a single change. The only difference is that for a cyclic change the second timer (*Time 2*) is switched on as well.



As soon as the second timer is switched on, the symbol *cycle* lights up in the separate timer display area.

INFORMATION

It is not possible to activate the timer for the second phase as long as the timer for the first phase has not been activated.

After starting the timer, the cultivating process runs with the alternating setpoint values of the first and the second phase until the device is stopped manually by turning the parameters off. The symbol of the currently active phase (*Phase 1* or *Phase 2*) is blinking.

INFORMATION

The timer function can at any time be deactivated separately or by turning off the first timer. When the first timer is turned off, also the second timer is deactivated and the cultivating process continues with the last active parameter setpoint values.

7.5.4 Changing Timer Settings during Activated Timer Function

If it is required to change the duration of the time intervals, both timers can be reprogrammed. To change the setting of the timers proceed as follows:

Procedure

1. Tap the **TIMER** key to select the timer function.
2. Tap again the **TIMER** key to enter the timer programming mode.

   On the upper alphanumeric display the setpoint value last entered for the time interval of the first phase (*Time 1)* is shown. The sign *Setpoint* indicates, that the time can be entered.

3. If required, tap the **Plus** or the **Minus** key in the upper setting key area to set the time for the first phase (*Time 1*).

INFORMATION

Do not tap the **ON/OFF** key after changing the timer setting, as this would turn off the timer immediately.
If this happens in the cycle mode with the timer for the first phase, also the timer for the second phase is deactivated. And if accidentally the second timer is turned off, it cannot be activated again.

4. Tap the **TIMER** key to get to the time settings for the second phase (*Time 2*).

   On the lower alphanumeric display the setpoint value last entered for the time interval of the second phase (*Time 2)* is shown. The sign *Setpoint* indicates, that the time can be entered.

5. If required, tap the **Plus** or the **Minus** key in the lower setting key area to set the time for the second phase (*Time 2*).
6. Tap the **TIMER** key again to quit the programming mode of the timer.

   On the alphanumeric display the remaining time of the active phase and the message *run* appear.

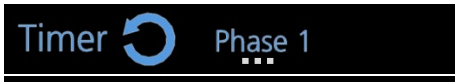
7. Tap the **Select** key return to the normal operating mode of the display.

7.5.5 Changing Parameter Setpoint Values during Activated Timer Function

Especially during long cultivating processes in the cycle mode it might be required to change the parameter settings after a certain time.

Parameters of the active phase

or (in the cycle mode)



Which phase is active is indicated by the blinking of the symbol *Phase 1* or *Phase 2* in the separate timer display area.

To change the setpoint values of the parameters of the active phase proceed as follows:

Procedure

1. Select the desired pair of parameters by tapping the **Select** key – if necessary several times.

   In the two alphanumeric display areas the setpoint values of the selected pair of parameters are shown.

2. Tap the **SET** key in the upper or lower operation key area.

   The sign *Setpoint* indicates, that a setpoint can be set.

3. Tap the **Plus** or **Minus** key in the according setting key area to set the new setpoint value.

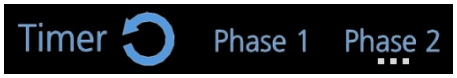
   The new setpoint value for the parameter appears on the according alphanumeric display.

4. Tap the **Select** key to quit the parameter setting mode.
   The display returns to the normal operating mode and shows the current values of the parameters.

Parameters of any phase

Procedure

1. Use the **TIMER** key to select the desired phase.
   - After taping the **TIMER** key once, the remaining time of the active phase appears with the message *run*.
   - After tapping the **TIMER** key twice, the time entered for the first phase (*Time 1*) appears.
   - After tapping the **TIMER** key three times, the time entered for the second phase (*Time 2*) appears.



The selected phase is indicated by the sign *Phase 1* or *Phase 2*. If this phase is not the active phase, then in addition the sign of the active phase is blinking. In the example on the left the second phase is active while the parameters for the first phase can be changed.

2. Use the **Select** key to select the desired parameters within the phase chosen.

In the two alphanumeric display areas the setpoint values of the selected pair of parameters are shown.
The sign *Setpoint* indicates, that a setpoint can be set.

3. Tap the **Plus** or **Minus** key in the according setting key area to set the new setpoint value.

The new setpoint value for the parameter appears on the according alphanumeric display.

4. Use the **Select** key to get to the next pair of parameters or quit the parameter setting mode with the **TIMER** key.
5. Tap the **Select** key to return to the normal operation mode of the display.

7.5.6 Stopping the Timer Function

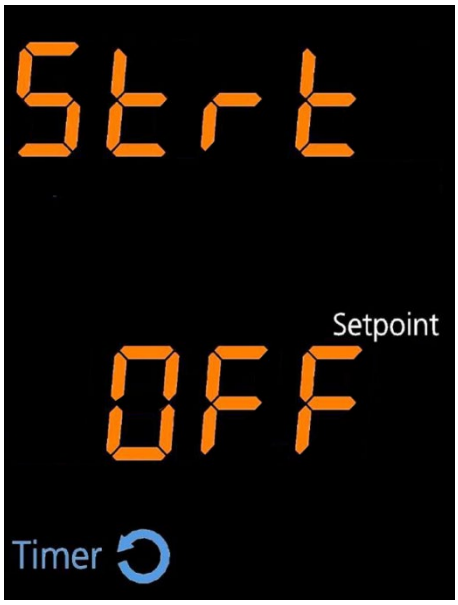
Turning off the timer function

If required, the timer function can be stopped at any time. Proceed as follows:

Procedure

1. Tap the **TIMER** key to select the timer function.
2. Tap the **ON/OFF** key in the lower operating key are to turn the timer function off.

   On the alphanumeric displays the messages *Strt* (upper) and *OFF* (lower) appear. In the lower display area the white sign *Setpoint* is lit up.
   In the separate timer display area the sign *Timer* and maybe the symbol *cycle* are lit up.



3. Tap the **Select** key to quit the timer programming mode.

   The display returns to the normal operating mode.

Turning off the first or second timer

Both timers (*Time 1* and *Time 2*) can also be switched off individually. Pay attention to the following:

- If the first timer (*Time 1*) is switched off, the second timer (*Time 2*) is switched off as well.
- If the second timer (*Time 2*) is switched off, the first timer (*Time 1*) remains active.
- In cyclic mode, the second timer (*Time 2)* can be switched off but not switched on again.

1. To switch off a timer individually, select the desired timer (*Time 1* or *Time 2*) by tapping the **TIMER** key and switch it off by tapping the corresponding **ON/OFF** key.

INFORMATION

The timer function is not deactivated by opening the door or by an interruption in the power supply.

7.6 Using eve® to Operate the Device

INFORMATION

For detailed information on how to use eve® to operate the device, refer to the documentation supplied with eve®.

The device comes with the option of being operated from an external computer via the Ethernet interface. This requires use of the eve® platform software for bioprocesses. The Ethernet interface can be used to send or receive data. For example, setpoints can be sent to the device or parameters can be activated or deactivated. In addition, the actual values of the parameters and the values measured on the sensors can be transferred to eve® and thus logged.

INFORMATION

To use the Ethernet interface with other tools, a special communication protocol is required. For more information, contact INFORS HT.

Points to be observed

The following points must be observed if you want to use eve® to control the device:

- Via eve®, the parameters cannot be activated/deactivated manually. If a permissible setpoint is sent to the device, the parameter is activated automatically. A parameter can be deactivated by sending the setpoint 0 to the device.
- If the device is connected to eve®, all setpoints set in eve® are applied automatically. Any setpoints manually set on the device are overwritten.
- The timer function cannot be activated via Ethernet. The timer function must be programmed and activated directly on the device. Alternatively, more complex programs can be programmed comfortably using eve®.

Requirements

To ensure the device can be operated via the Ethernet interface, the function must be activated in the settings menu. Here, you can choose between the options *on* (read only) and *Auto* (read and write) (see chapter 7.7.9 "Setting up Data Exchange via Ethernet", page 103).

Displays on the device

If the device is controlled using eve®, this is displayed on the device as follows:

- While the device is being registered in eve®, the interior lighting of the device is flashing. This is used, in particular, to identify the unit in case of stacked devices.
- The white dot at the bottom right of the operating panel (3) lights up if the Ethernet connection has been recognised (cable connected and IP address received from DHCP).
- If setpoints are written to the device, the red symbol *EXTERN* (2) lights up on the display field.
- If a parameter has been deactivated by sending setpoint 0, this is indicated by four dashes (1) on the operating panel.

7.7 Settings Menu (Option Function)

The settings menu enables you to adjust the main device settings. To open the device's settings menu, proceed as follows:

Procedure

1. Tap the **OPTION** key for at least 2 seconds.

On the top display, the *OPt* message appears with the symbols *Setpoint* and *High.* The Settings menu is thus open and you can make the desired settings.

Tapping the **OPTION** key again lets you switch to the next function. If no key is tapped for 60 seconds, the display returns to normal operating mode. If all functions are clicked through, the device also returns to normal operating mode.

INFORMATION

The limits for the allowed setpoints of the parameters can only be set within a few factory-set values.

If the setpoint for a parameter is limited in the settings menu of the device and an attempt is made to enter a higher value, the *bLoc* message appears.

The following chapters explain the individual functions.

7.7.1 Setting the Upper Limit for the Rotation Speed

Top display: *OPt*, *Setpoint* and *High*
Bottom display: *RPM*

The maximum rotation speed that can be entered as a setpoint can be restricted. To do so, tap the **SET** key (the sign *Setpoint* appears) and then use the **Plus** or **Minus** key to set the desired value.

7.7.2 Setting the Upper Limit for the Temperature

Top display: *OPt*, *Temp*, *Setpoint* and *High*

The maximum temperature that can be entered as a setpoint can be restricted. To do so, tap the **SET** key (the sign *Setpoint* appears) and then use the **Plus** or **Minus** key to set the desired maximum temperature.

Default value: 65 °C

7.7.3 Setting the Lower Limit for the Temperature

Top display: *OPt*, *Temp*, *Setpoint* and *Low*

The minimum temperature that can be entered as a setpoint can be restricted. To do so, tap the **SET** key (the sign *Setpoint* appears) and then use the **Plus** or **Minus** key to set the desired minimum temperature.

Default value: 4.0 °C

7.7.4 Setting the Brake Force for Stopping the Table

Top display: *OPt*
Bottom display: *br. 0-3*

The brake force with which shaking operation is stopped when switching off the parameter *rotation speed* can be set in four levels. To do so, tap the **SET** key (the sign *Setpoint* appears) and then use the **Plus** or **Minus** key to set the desired brake force.

The levels *br. 0* to *br. 3* have the following meaning:

- At brake force level **0** the table is stopped by reducing the speed very slowly.
- At brake force level **1** the table is also controlled but stopped a little less slowly.
- At brake force level **2** a passive brake is activated by switching off the motor (factory setting).
- At brake force level **3** the motor is short-circuited to stop the table as quickly as possible.

INFORMATION

When opening the door of the device, the table is stopped with the maximum brake force, regardless which brake force is set.

7.7.5 Activating or Deactivating the Key Pad Lock (with a PIN)

Top display: *OPt* and *PIN*

To prevent unauthorised persons making entries on the operating panel, the key pad can be locked using a PIN. To do so, tap the **SET** key (the sign *Setpoint* appears) and then use the **ON/OFF** key to activate or deactivate the key pad lock.

If the key pad lock has been activated, you can then tap the **OPTION** key followed by the **SET** key to enter a PIN (number between 0 and 9999). Once the PIN has been entered, this must be confirmed using the **ON/OFF** key (the message *PIN OK* appears on the top display).

INFORMATION

By entering the number "1756" (Super PIN), the PIN is deactivated and set to zero.

INFORMATION

When the key pad lock is active, this information can be read out via the Ethernet interface. In this way, when the device is remotely controlled (e.g. using eve®), it can be determined and logged whether the key pad lock is active or not.

7.7.6 Activating or Deactivating the Key Tone

Top display: *bEEP*

The key tone (clicking sound when tapping a key) can be activated or deactivated. To do so, tap the **SET** key (the sign *Setpoint* appears) and then use the **ON/OFF** key to activate or deactivate the key tone.

7.7.7 Setting the Interior Lighting

Top display: *OPT* and *Light*

The behaviour of the interior lighting can be set.
To do so, tap the **SET** key (the sign *Setpoint* appears) and then use the **ON/OFF** key to select the desired behaviour.

The following settings are possible:

- *Auto*: The light is activated by tapping any key. After 20 seconds, the light turns off again automatically.
- *on:* Interior lighting is permanently on.
- *OFF:* Interior lighting is permanently off.

7.7.8 Activating or Deactivating the Timer Function

Top display: *OPt* and *Timer*

The timer function can be activated or deactivated. To do so, tap the **SET** key (the sign *Setpoint* appears) and then use the **ON/OFF** key to activate or deactivate the timer function. If the timer functions is set to *OFF*, it can no longer be selected by using the **TIMER** key.

7.7.9 Setting up Data Exchange via Ethernet

Wireless

Top display: *OPt*, *EXTERN* and *Wireless*

You can set whether and in which direction data can be sent via the Ethernet interface. To do so, tap the **SET** key (the writing *Setpoint* appears) and then use the **ON/OFF** key to select the desired setting.

The following settings are possible:

- *Auto:* Send and receive data, i.e. information from the device can be recorded but commands can also be sent to the device (e.g. changes to the parameters).
- *on:* Only receive data, i.e. only data sent from the device can be recorded.
- *OFF:* The Ethernet interface is deactivated; no communication can take place.

7.7.10 Setting the Height Above Sea Level (Altimeter)

Top display: *ALti* and *CO_2*

The digital CO_2 sensor GMP251 is pressure-dependent. To achieve precise measuring results, the altitude of the device's location can be entered. To do so, tap the **SET** key (the sign *Setpoint* appears) and then use the **Plus** or **Minus** key to set the altitude in meters.

Default value: 0

7.7.11 Activating or Deactivating the Door Alarm

Top display: *doAL*

The device has a door alarm. This is triggered if the door is left open for too long. To activate or deactivate the door alarm, tap the **SET** key (the sign *Setpoint* appears) and then use the **ON/OFF** key.

The time after which the alarm is triggered can be set. To do so, tap the **SET** key again (the sign *Setpoint* appears) and then use the **Plus** or **Minus** key to set the desired time period (1-10 minutes).

7.7.12 Humidity – Switch On/Off High Alarm

Top display: *OPt* and *ALARM*
Bottom display: *Humid* and *High*

The High alarm of the *Humidity* parameter can be switched on or off. If the alarm is switched off, no alarm is triggered if the humidity exceeds the upper limit value. Since the humidity in the incubation chamber is normally not a critical parameter that has a direct impact on the success of the cultivation, the High alarm of the *Humidity* parameter is switched off ex factory.

To switch on or off the High alarm of the *Humidity* parameter, tap the **SET** key (the sign *Setpoint* appears) and then use the **ON/OFF** key to activate or deactivate the alarm.

7.8 Switching Off the Device

ATTENTION

Parameters, that have not been switched off prior to switching off the device, are automatically activated when the device is switched on. This can lead to damages to the device and cultivation vessels.

Always switch off all parameters before switching off the device.

INFORMATION

The parameter setpoints remain stored for approximately one month.

To switch off the device, proceed as follows:

Procedure

1. Switch off all parameters. Make sure that, in addition to the *rotation speed*, parameters that are not visible, such as *temperature*, *humidity* or CO_2, are also switched off.
2. Switch off the device by pressing the power switch.
3. If you do not intend to use the device for a long time, disconnect the device from the power supply.

7.9 Behaviour in Case of Interrupted Power Supply

If the power supply to the device is interrupted during a running cultivation process (e.g. by flicking the power switch or in case of a power failure), all parameters and timer setpoints as well as the residual time of the last active timer phase are stored.

If power supply is restored, the device restarts automatically with the last stored setpoints. If a timer was active prior to the interruption to power supply, the device restarts with the residual time of the last active phase and the setpoints stored for this phase.

As a warning, the word *RESTARTED* and the warning icon flash on the display field with the warning and alarm messages.
The *RESTARTED* message can be confirmed by tapping any key and then disappears.

8 Rectifying Faults

The following section describes possible reasons for faults and how to rectify them.

Fault messages

A distinction is made between alarms (*ALARM*) and error messages (*ERROR*):

- **Alarms** refer to errors in the process, for example, when the actual parameter values deviate from the setpoints. Alarms are indicated with the warning symbol and an acoustic signal. The alarm message can be confirmed by tapping any key. If an alarm is not confirmed manually, it disappears as soon as the condition, that has triggered the alarm, is not fulfilled anymore.

- **Error messages** relate to technical faults in the device. The affected functions are stopped automatically. Error messages are indicated with the warning symbol and an acoustic signal. The error can be confirmed by tapping the **Select** key.

Contact the manufacturer in case of faults that cannot be resolved by following the instructions below. For service contact details, see page 2.

8.1 Alarm Messages

8.1.1 Parameter Alarms (High / Low)

A parameter alarm is triggered if the actual value of a parameter deviates too much from the setpoint after a specified waiting time. In the example on the left the temperature is too high.
The maximum allowed deviation from the setpoint and the waiting time are factory-set and cannot be changed.

INFORMATION

An alarm is only triggered if the actual value of the parameter does not change for a certain period. If there is a fluctuation, the counter for triggering the alarm is reset.

Alarm	Meaning	Deviation from setpoint	Waiting time
Temp High / *Low*	Temperature too high/low	> ± 1 °C	20 min (18 °C to 40 °C)
			75 min (< 18 °C / > 40 °C)
RPM High / *Low*	Rotation speed too high/low	> ± 10 min^{-1}	2 min
CO2 High / *Low*	CO_2 concentration too high/low	> ± 0.5 %	15 min
Humid High / *Low*	Humidity too high/low	> ± 5 %	15 min
	Note: The *Humid High* alarm is deactivated by default. If required, the alarm can be switched on in the settings menu (see chapter 7.7.12, page 104).		

INFORMATION

If the setpoint for a parameter is limited in the settings menu of the device and an attempt is made to enter higher value, the *bLoc* message appears.

8.1.2 Alarm Message *RESTARTED*

The alarm message *RESTARTED* appears if the device has switched itself back on based on the stored parameters after a power failure. After power is restored, the device automatically restarts with the same parameters to avoid damage to the cultures due to an unintentional termination of the process. The alarm message indicates that the process has been interrupted. However, it is not possible to determine how long the interruption lasted.

8.2 Faults and Error Messages

8.2.1 Error Messages Explained

The faults listed here, the causes of which are described using error messages, can generally not be resolved by users. One of the manufacturer's service technicians needs to be consulted if these messages appear.

In addition to the warning indicator and the *ERROR* sign, messages that are abbreviated appear at the top and bottom alphanumeric displays. These messages have the following meanings:

Top	Bottom	General faults
		*Open* The device door is open. When the door is opened, the device is automatically stopped using the greatest possible breaking effect, whereby the shaking movement phases out over a few more seconds, depending on the speed.

Top	Bottom	In conjunction with the ***Temperature*** parameter (*Temp* symbol lights up)
		*Error 1, Temperature High* A temperature above 100 °C is measured.
		*Error 1, Temperature Low* A temperature below 0 °C is measured.
		*Error 1, Sensor* The Pt100 sensor is not returning any readings.
		*Error 2, Sensor* The mobile Pt100 sensor (optional) is not returning any readings.
		*Error 1, Fan 1* The front fan (near the door) is blocked.
		*Error 2, Fan 2* The centre fan is blocked.
		*Error 3, Fan 3* The back fan is blocked.

Top	Bottom	In conjunction with the ***Rotation speed*** parameter (*RPM* symbol lights up)
		*Error, Heat* The control of the motor has overheated because of excessively high rotation speed or excess loading. Once the device has cooled down it can be restarted.
		*Error, Blocked* The motor or tray is blocked. Remove any foreign objects from the incubation chamber, if necessary, dismount the table (see chapter 9.2.1 "Cleaning", page 118).
		*Error, Belt* The transmission belt is torn and has to be replaced.
		*Error, Control* The rotation speed of the shaker drive is more than 50 min^{-1} higher than the maximum possible speed set in the settings menu.

Top	Bottom	In conjunction with the ***Humidity*** parameter (*Humid* symbol lights up)
		*Error, Sensor* The humidity sensor is not returning any readings (humidity sensor not connected or defective).
		*Error, H_2O* The water supply for humidification is interrupted (empty water tank or defective hose).
		*Error 1, Heat* The heating or temperature recording of the steam humidifier is defective.
		*Error 2, Heat* The heating or temperature recording of the steam humidifier is defective.

Rectifying Faults

Top	Bottom	In combination with the *CO_2 concentration* parameter (*CO_2* symbol lights up)
		*Error, Sensor* The CO_2 sensor is not returning any readings (CO_2 sensor not connected or defective).
		*Error, Control* The actual CO_2 value does not rise (CO_2 supply interrupted, pressure too low or door not closed correctly).

Top	Bottom	In conjunction with the *Light* parameter (*Light* symbol lights up)
		*Error 1, Temperature High* The LED lighting unit got too hot and switched itself off automatically.

Top	Bottom	In conjunction with the control
		*Error, Program* Due to a new program version, problems with EEProm or problems with one of the internal data buses, EEProm was initialised. After this fault, it might be necessary to recalibrate temperature measuring again.
		*Error, Lock* The message appears when the key pad is locked with a PIN. If the message appears although the PIN function is not active, the key pad cannot be initialised. If the problem is caused by one of the internal data buses, the mainboard or HMI unit must be replaced.

8.2.2 Fault Tables

The following tables describe possible faults for which usually no error message appears on the display and for which no alarm is sounded, a few exceptions aside. In many cases operators can resolve these themselves.

General faults

Fault		
After activating the power switch, the display and the power switch do not light up.		
Possible cause	**Measures**	**Personnel**
Power supply of the device is interrupted.	■ Check if the plugs are plugged in correctly. ■ Check the mains connection.	Operator
The fuse of the device is defective.	Change the fuse (see chapter 8.3, page 115).	Operator

Fault		
The tray cannot be locked.		
Possible cause	**Measures**	**Personnel**
The tray is blocked by foreign objects.	Remove foreign objects from the table.	Operator
The tray is bent.	Replace the tray.	Operator

Fault		
The interior lighting does not work		
Possible cause	**Measures**	**Personnel**
Interior lighting is deactivated.	Activate interior lighting (see chapter 7.7.7, page 102).	Operator
The LED unit of the interior lighting is defective.	Contact your local INFORS HT branch.	INFORS HT service technician or specialist dealer

Rectifying Faults

In conjunction with the *Rotation speed* parameter

Fault		
The table does not move.		
Possible cause	**Measures**	**Personnel**
The table is blocked by foreign objects.	Remove foreign objects (see chapter 9.2.1, page 118).	Operator
The load is too heavy, making the drive too week or causing it to overheat.	Reduce the load. If the drive has overheated, the process can be continued after it has cooled down.	Operator
The drive has heated up too much so that it was turned off automatically.	Let the device cool down. Ensure that the air vents on the side are unobstructed.	Operator
The drive belt has torn.	Contact your local INFORS HT branch.	INFORS HT service technician or specialist dealer
The motor is defective.	Contact your local INFORS HT branch.	INFORS HT service technician or specialist dealer
The (open-loop) control of the drive is defective.	Contact your local INFORS HT branch.	INFORS HT service technician or specialist dealer

Fault		
Strong vibrations occur.		
Possible cause	**Measures**	**Personnel**
The load is too heavy so that the device is no longer balanced.	Reduce the load to the prescribed value.	Operator
The load is too light so that the device is no longer balanced.	Increase the load to the prescribed value.	Operator
The load is distributed unevenly.	Load the tray in the centre. If possible, do not place any heavy weights in the corners of the tray.	Operator
The rotation speed is too high.	Reduce the rotation speed.	Operator
The device is not standing straight.	Level the table or the device (adjustable foot on the base).	Operator
The substructure (table) is too weak.	Place the device on a stable table or the floor.	Operator

Fault		
The shaker drive accelerates too quickly or runs too fast.		
Possible cause	**Measures**	**Personnel**
Fault in measuring the rotation speed.	Switch the device off and then on again.	Operator
The motor control is defective.	Contact your local INFORS HT branch.	INFORS HT service technician or specialist dealer

Faults in conjunction with the *Temperature* parameter

Fault		
Temperature too high compared to setpoint.		
Possible cause	**Measures**	**Personnel**
Fault in temperature measuring.	Check if the Pt100 sensor works. In case of a defect, contact INFORS HT.	Operator
External cooling is not switched on.	Switch on cooling.	Operator

Fault		
The temperature does not reach the desired setpoint.		
Possible cause	**Measures**	**Personnel**
The heating is not switched on.	Activate the “Temperature” parameter.	Operator
The setpoint is set too low.	Raise setpoint.	Operator
The ambient temperature does not meet the requirements.	Check the ambient temperature and correct it if necessary (see chapter 6.1, page 61	Operator
Door not closed completely.	Close door completely.	Operator
Cooling fins dusty.	Clean cooling fins.	Operator
The heating fan does not work.	Contact your local INFORS HT branch.	INFORS HT service technician or specialist dealer

INFORMATION

The re-measuring of the temperature only provides reliable information when calibrated measuring tools are used and only if they are used at points specified by INFORS HT. A measurement at undefined positions in the casing will not produce any usable data.

For information about temperature measuring, contact your local INFORS HT branch or request a quote for calibrating the parameters.

Rectifying Faults

Faults in conjunction with the *CO_2 concentration* parameter

Fault		
CO_2 concentration too low (deviation > 1%).		
Possible cause	**Measures**	**Personnel**
CO_2 bottle empty.	Install new CO_2 bottle.	Operator
Inlet pressure or flow too low.	Increase inlet pressure or flow.	Operator
CO_2 valve closed or blocked.	Contact your local INFORS HT branch.	INFORS HT service technician or specialist dealer

Fault		
CO_2 concentration too high (deviation < 1%).		
Possible cause	**Measures**	**Personnel**
CO_2 inlet pressure too high.	Reduce inlet pressure.	Operator

Fault		
CO_2 value fluctuates, actual value is not constant.		
Possible cause	**Measures**	**Personnel**
Inlet pressure or flow too high.	Decrease inlet pressure or flow.	Operator

Faults in conjunction with the *Humidity* parameter

Fault		
The water supply for humidification is interrupted.		
Possible cause	**Measures**	**Personnel**
The water container is empty.	Top up the water container.	Operator
Air trapped between wet filter and reservoir.	Replace the wet filter with a dry one.	Operator
Valve defective.	Contact your local INFORS HT branch.	INFORS HT service technician or specialist dealer

Fault		
The *Humidity* parameter was deactivated automatically.		
Possible cause	**Measures**	**Personnel**
Communication error of the humidity sensor or temperature sensor.	Restart software (switch the device off and then on again).	Operator
Inlet pressure is too high.	Reduce inlet pressure (max. 0.3 bar).	Operator
Steam generator is defective.	Contact your local INFORS HT branch.	INFORS HT service technician or specialist dealer

Faults in conjunction with the *Light* parameter

Fault		
The LED lighting unit was switched off automatically.		
Possible cause	**Measures**	**Personnel**
The LED lighting unit got too hot.	Wait a minute. Then turn LED lighting back on again. Prior to turning it back on, check the following: ■ The fans are unobstructed and the required distance to the wall (min. 100 mm) is observed. ■ The temperature falls within the range specified in the incubator shaker. ■ The temperature at the installation location is the same as the room temperature (max. 25 °C).	Operator
LED lighting unit is defective.	Contact your local INFORS HT branch.	INFORS HT service technician or specialist dealer

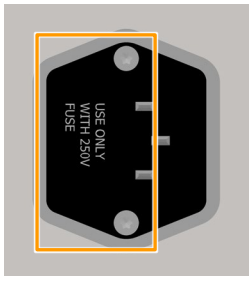
8.3 Replacing Fuses

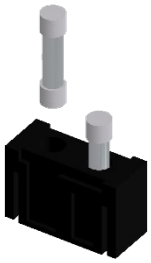
INFORMATION

The fuses may only be replaced by fuses of the same rating. For information concerning the requirements for the fuses see chapter 12.2 "Specifications of the Basic Unit", page 125.

To replace a defective fuse, proceed as follows:

Procedure





1. Turn off the device and pull out the mains plug.
2. Unlock the plug for the fuses by pressing together the two flaps and pull out the plug at the same time.
3. Remove the defective fuse.
4. Insert a new fuse with the correct number of Amperes.
5. Push the plug as far back in the opening as possible until it snaps in.
6. Re-establish the power supply to the device.

8.4 Returning for Repair

The provider must return the device or the faulty component part(s) to the manufacturer if, after consulting the service department of the local dealer or the manufacturer, on-site diagnosis and/or repair is not possible.

INFORMATION

When returning the device, the component part or accessory for repair, it is required for the safety of all parties involved and because of legal provisions that a lawful declaration of decontamination is present. Refer to main chapter “Safety and Responsibility”, chapter “Declaration of Contamination” for details.

9 Maintenance and Cleaning

⚠ WARNING

To prevent life-threatening electric shocks, always switch off the device and disconnect it from the power supply before carrying out any maintenance or cleaning.

9.1 Maintenance

The device requires hardly any maintenance. This reduces the running costs to certain regular checks and cleaning. The following table describes the maintenance work that is required to ensure optimum, fault-free operation.

If increased wear is detected during the regular checks, the required maintenance intervals must be reduced to suit with the actual signs of wear. Keep in mind that various media or gases will have more or less corrosive effects on the metal parts. When using particularly aggressive substances, more frequent checks are required in order to maintain smooth device operation.

Contact the manufacturer if you have any questions regarding maintenance work or intervals; see Service contact details on page 2.

Interval	Maintenance work	To be carried out by
Prior to each use	Check hoses and power cable for damage; replace if necessary.	Operator
	Check that hoses (water, CO_2) are connected tightly.	Operator
	Check all seals on the device, especially on the door, and replace if necessary.	Qualified technicians
	Check whether the interior lighting works, have lamps replaced if necessary.	Qualified technicians
After each use	Clean the device, if necessary, disinfect thoroughly.	Operator
Annually	If you are using humidity and CO_2 sensors, have these calibrated at least once a year to ensure measuring results remain accurate.	Qualified technicians

9.2 Cleaning and Disinfection

If substances, in particular hazardous substances, are spilled in or on the device, the device has to be cleaned and disinfected thoroughly. Furthermore, the device should be cleaned and disinfected on a regular basis to ensure proper operation.

If there are doubts concerning the compatibility of cleaning and disinfection agents, contact your local INFORS HT representative (see service contact details on page 2).

ATTENTION

Insufficient cleaning and disinfection can lead to damage to cultures due to contamination.

9.2.1 Cleaning

Detergent

Mild detergents, e.g. dishwashing liquid or neutral cleaning agents, are suitable for all surfaces:

- Exterior surfaces of the casing
- Front window
- Interior surfaces of the casing (incl. base tray)
- Steel plate covers
- Table
- Trays (incl. clamps and other holders)

ATTENTION

Aggressive cleaning agents, solvents and abrasive cleaning utensils (hard sponges, brushes) can scratch surfaces, damage the device and impair its function.

Notices on cleaning

To clean the surfaces, use a soft cloth, ideally lint-free. This applies in particular to the front window. Disinfect using commercially available disinfectant if necessary.

Splashing water

Always use a wet cloth when cleaning the base tray; never pour water into the tray. Make sure that no water splashes into the bearings.

After cleaning the device, especially the interior and the base tray, dry it with a cloth.

Dust

Over time, dust can collect in the vents and on other exposed parts. It can be removed carefully using a vacuum cleaner.

Removing the table

To thoroughly clean the base tray, e.g. after a flask breaks, the table must be removed. Proceed as follows:

Procedure

1. Remove tray.
2. Remove the four screws (hexalobular M6x16, Torx T30) in the centre of the table.

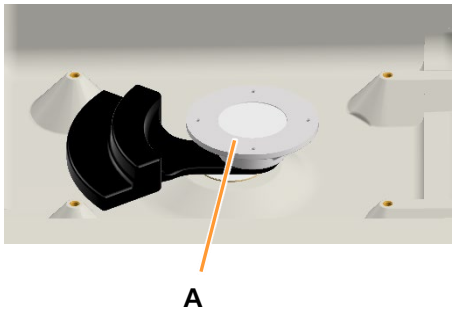
   Make sure that the screws are not lost. Otherwise they may only be replaced with equivalent hexalobular screws.
3. Carefully lift the table vertically.

   To completely clean the base tray, the black counterweight that is underneath the table can be moved slightly by hand.

Fitting the table

To refit the table after thoroughly cleaning the base tray, proceed as follows:

Procedure



1. Align the flange in the centre of the unit (A) in such a way that the four threaded holes are exactly on the vertical and horizontal axis.

   Positioning the flange right at the front in the centre makes it easier to fasten the screws.
2. Put down the table as straight as possible, parallel to the front edge of the device and lower it down vertically from above.

   In doing so, ensure that the four ball bearings are in the trays underneath the table.
3. Slightly move the table to cover the thread holes in the flange with the drilling in the table.
4. Insert the four screws crosswise (order: back, front, right, left) and tighten.

9.2.2 Disinfection

Only use quaternary ammonium compounds for wipe-down disinfection. As a tried as tested disinfectant, we recommend Fermacidal D2.

ATTENTION

Heat (temperatures above 80 °C), aggressive disinfectants such as chlorine bleach and UVC radiation can damage the device and significantly limit the function and useful life of the machine.

We recommend against using UV lamps for disinfection of the device because the UV rays can massively damage the plastic casing in case of multiple applications.

For information about the procedure for disinfection underneath the table, in particular removing and mounting the table, see chapter 9.2.1 "Cleaning", page 118.

10 Transport and Storage

The inbound delivery and transport to the assembly location are performed only by INFORS HT employees or by persons authorised by INFORS HT.

Nonetheless it is possible that the provider's personnel is entrusted with transport tasks in the context of on-site transport. In this case, observe the following notes.

10.1 Transport

⚠ WARNING

Improper transport, the use of incorrect auxiliary equipment and careless handling of the device may lead to injuries and severe property damage.

When transporting the device, observe the following:

- Prior to moving the device, transport fasteners (rubber wedges) must be inserted to prevent uncontrolled movements of the table.
- Always work in pairs and use suitable auxiliary equipment when transporting the unit.
- Especially when using auxiliary tools, it is important to keep in mind that the device's centre of gravity is not in the middle.

10.2 Storage

- Decontaminate, thoroughly clean and dry the device every time before placing it in storage. Maintain and store sensors produced by other manufacturers in accordance with their instructions.
- Store the device and its components clean, dry and protected against dust, dirt and liquids.
- Store the device and its components in a cool place with low humidity but protected against frost.
  - Storage temperature: 10 °C to 35 °C.
  - Relative humidity, non-condensing: 10 % to 85 %.
- Protect the device from aggressive media, direct sunlight and vibrations.

11 Disassembly and Disposal

The device must be disassembled and disposed of in an environmentally friendly manner if it is no longer in use.

INFORMATION

When returning the device for disassembly or disposal, it is required for the safety of all parties involved and because of legal provisions that a lawful declaration of decontamination is present. Refer to main chapter “Safety and Responsibility”, chapter “Declaration of Contamination” for details.

11.1 Disassembly

Prior to disassembly:

- Switch off the device and lock any isolation switch in the ‘off’ position.
- Physically disconnect the main energy supply from the device and wait for components to fully discharge.
- Remove and dispose of all additional consumable items, auxiliary components and/or spent processing material in an environmentally acceptable manner.

Clean and disassemble component parts professionally with regard to any local regulations concerning employment and environmental protection. If possible, separate materials.

11.2 Disposal

Recycle disassembled components if no agreement is made concerning reclaim or disposal.

- Send metals for scrap.
- Send plastic components for recycling.
- Sort and dispose of the remaining components according their material composition.

⚠ WARNING

Electronic waste, electronic components, lubricants or other auxiliary materials/supplies are subject to hazardous waste regulations and may only be disposed of by registered specialist disposal firms.

For disposal, the system units are to be disassembled and dismantled into individual material groups. These materials are to be disposed of according to the applicable national and local legislation.

Local authorities or specialist disposal firms can provide information regarding environmentally acceptable disposal.

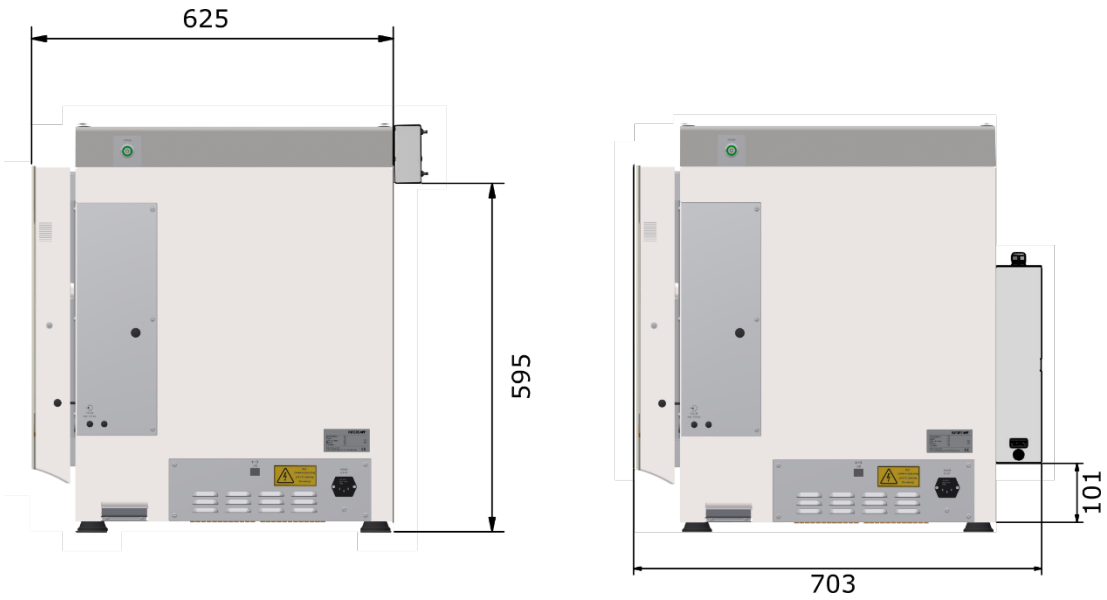
If no special arrangements have been made for return, INFORS HT units with the required declaration of decontamination can be sent back to the manufacturer for disposal.

12 Technical Data and Specifications

12.1 Dimension Drawings

Front and side view base unit without options

Side view with options (LED lighting and direct steam humidification)



All dimensions in mm

12.2 Specifications of the Basic Unit

12.2.1 Weight and Dimensions

Dimensions		
Description	**Value**	**Unit**
Device with 25 mm throw	75	kg
Device with 50 mm throw	77	kg

Exterior dimensions		
Description	**Value**	**Unit**
Width	800	mm
Depth (door closed)	623	mm
Depth (door open)	1375	mm
Height (without base)	683	mm
Height (with rubber feet)	700	mm
Height (with 120 mm base)	803	mm
Height (2 stack with base)	1486	mm

Interior dimensions (incubation chamber)		
Description	**Value**	**Unit**
Width	570	mm
Depth	528	mm
Height without LED lighting	508	mm
Height with LED lighting	460	mm

Floor space and required space		
Description	**Value**	**Unit**
Floor space [1]	ca. 1.0 x 0.7	m
Space required [2]	ca. 1.0 x 1.5	m

[1]) Incl. min. distance of 80 mm on the side of and behind the device
[2]) Incl. operating space when door is open

12.2.2 Electrical Connection and Performance Values

Description	Type 230 V	Type 115 V	Unit
	Value		
Voltage	230	115	VAC
Frequency range	50 / 60	60	Hz
Max. power input	500	500	W
Max. power consumption	2.8	5.6	A
Fuses (5 x 20 mm, time lag)	6.3	6.3	A
Overvoltage category	II	II	

12.2.3 Connections and Interfaces

Alarm connection		
Description	**Value**	**Unit**
Type	Stereo jack, 3.5 mm	
Relais	Rectifier NO / NC max. 1A 34V AC/DC	

Ethernet connection		
Description	**Value**	**Unit**
Type	RJ45	
Data transmission	10/100 Mbps Ethernet	

Discharge outlet		
Description	**Value**	**Unit**
Hose nozzle	¼	inch
Hose diameter	10	mm

12.2.4 Material

Component	Material
Casing	Polyurethane (PUR-IHS) with foam protection
Door	PUR-IHS, safety glass
Cover plate fans	Stainless steel (1.4301-2B)
Table	Aluminium, anodised

12.2.5 Emissions

Description	Value	Unit
Sound pressure	35	dB(C)

12.2.6 Operating Conditions

Description	Value	Unit
Temperature range	10 to 32	°C
Relative humidity, non-condensing	10 to 85	%
Altitude operating location	max. 2000	m.a.s.l
Pollution degree according to EN 61010-1	2	
Min. distance from walls, ceilings and other devices	80	mm

INFORMATION

The specified temperature range refers to the temperature directly on the device. In case of heat build-up due to insufficient ventilation, the temperatures on the device can be significantly higher than the room temperature.

12.2.7 Fire Protection Class and Protection Type

Description	Value
Fire protection class	B1 (as per DIN 4102)
IP protection type	20 (as per DIN 60529)

12.2.8 Operating and Auxiliary Materials

ATTENTION

Using the wrong auxiliary materials can result in significant damage to property.

Only use the auxiliary materials in accordance with the table below.

Description	Permitted/used Products
Cooling liquid (secondary cooling circuit of internal cooling)	■ Based on 1,2-propanediol with inhibitor (must be suitable for copper) ■ Approved for the food and pharmaceutical sectors ■ Example: Antifrogen L
General detergent	Mild neutral cleaning agent
Detergent for adhesive matting	Mild neutral cleaning agent Dishwashing detergent
Disinfectant	Quaternary ammonium compounds

12.3 Specifications of Standard Parameters

12.3.1 Rotation Speed Parameter (Shaker Drive)

Description	Value	Unit
Drive	External rotor motor	
Throw (orbital movement)	25 or 50	mm
Increment	1	min^{-1}
Control precision	± 4	min^{-1}

Rotation speeds

INFORMATION

The actual rotation speed that can be achieved depends on different factors, such as loading, vessel type (e.g. flasks with baffles) or holder (e.g. clamps or Sticky Stuff).

The minimum rotation speed for all device variants is 20 min^{-1}. The maximum rotation speed of a unit depends on the throw and the position of the unit in the stack:

Individual unit	25 mm	50 mm
	400 min^{-1}	350 min^{-1}
Two units stacked	**25 mm**	**50 mm**
Upper unit	400 min^{-1}	300 min^{-1}
Lower unit	400 min^{-1}	350 min^{-1}

Recommended rotation speeds

The following guidelines for the maximum rotation speeds are specified to avoid damage. As such, they must be observed, though other restrictions (e.g. tray with Sticky Stuff) must also be taken into account.

Single unit

Load	Filling	25 mm throw	50 mm throw
12 x 500 mL Erlenmeyer w/o baffles	⅓	400 min^{-1}	340 min^{-1}
8 x 1000 mL Erlenmeyer w/o baffles	⅓	380 min^{-1}	310 min^{-1}
5 x 2000 mL Erlenmeyer w/o baffles	⅓	290 min^{-1}	240 min^{-1}
3 x 5000 mL Erlenmeyer w/o baffles	⅓	260 min^{-1}	240 min^{-1}
4 x 2500 mL Ultra-Yield (plastic)	1000 mL	350 min^{-1}	280 min^{-1}
3 x 5000 mL Optimum Growth (plastic) (with Sticky Stuff)	2500 mL	240 min^{-1}	230 min^{-1}

Stacked devices

For the bottom unit of a stack, the values for the maximum rotation speed stated for individual units apply.

Due to the leverage effect, reduced maximum permissible rotation speeds apply to the top unit. The values for the top unit apply irrespective of the throw of the unit at the bottom.

Load	Filling	25 mm throw	50 mm throw
12 x 500 mL Erlenmeyer w/o baffles	⅓	400 min^{-1}	310 min^{-1}
8 x 1000 mL Erlenmeyer w/o baffles	⅓	360 min^{-1}	300 min^{-1}
5 x 2000 mL Erlenmeyer w/o baffles	⅓	270 min^{-1}	220 min^{-1}
3 x 5000 mL Erlenmeyer w/o baffles	⅓	230 min^{-1}	220 min^{-1}
4 x 2500 mL Ultra-Yield (plastic)	1000 mL	300 min^{-1}	240 min^{-1}
3 x 5000 mL Optimum Growth (plastic) (with Sticky Stuff)	2500 mL	210 min^{-1}	200 min^{-1}

All this information is intended solely as a guideline (not guaranteed). Depending on the load, higher rotation speeds are possible; in this case, the speed should be increased slowly. In such cases, the user is responsible for determining the maximum possible speed based on the vibrations and the vessel holders (the clamps may need to be secured) and communicating them. If vibrations occur, reduce the rotation speed until the device runs smoothly. Alternatively, increase or reduce the rotation speed until the device runs smoothly.

Maximum rotation speeds with Sticky Stuff

For a detailed description of the maximum permissible rotation speeds when using the Sticky Stuff, see chapter 5.1.3 "Tray with Sticky Stuff", page 51.

12.3.2 Temperature Parameter (Heating and Ventilation)

Description	Value	Unit
Power heating	350	W
Setting range	4.0 to 65.0	°C
Increment	0.1	°C
Lowest temperature (above ambient temperature, without optional cooling)	5.0	°C
Highest temperature	65.0	°C
Control precision 4 – 50 °C	± 0.3	°C
Control precision > 50 °C	± 0.5	°C
Sensor type	PT100 class 1/3 DIN B	
Measurement range of the sensor	0 to 80.0	°C
Ventilation	3 axial fans, 24 VDC	
Air circulation	100	m^3/h

12.4 Specifications of the Options

The following section summarises all important technical data and specification relating to the options.

12.4.1 Internal Cooling

Electrical data				
Description	**Value**			**Unit**
Grid type	**230 V/50 Hz**	**230 V/60 Hz**	**115 V/50 Hz**	
Power [1]	173	196	146	W
Power consumption	0.93	1.12	0.78	A

[1]) Power consumption of the compressor

Various		
Description	**Value**	**Unit**
Cooling power [2]	200 to 230	W
Additional mass	9.0	kg
Refrigerant cycle	closed	
Refrigerant	R134a (1,1,1,2-Tetrafluoreth-ane)	
Lowest possible temperature	16.0 °C under room tempera-ture, minimum 4.0 °C	

[2]) Cooling power at a room temperature of 20 °C

12.4.2 External Cooling

Connection data		
Description	**Value**	**Unit**
Inlet pressure	max. 4.0	bar
Required cooling power	200 to 300 [1]	W
Outer Ø hose nozzles	8	mm

[1]) Depends on the desired lowest incubation temperature and the climate condi-tions

Various		
Description	**Value**	**Unit**
Additional mass	approx. 3.0	kg
Preliminary temperature (VT)	> 0	°C

Recommended design for external cooling unit		
Description	**Value**	**Unit**
Preliminary temperature	8.0	°C
Pressure	1.0	bar
Flow rate at 0 bar	23.0	L/min
Cooling power	200 to 300	W

ATTENTION

The installed valve regulates the temperature by closing and open-ing the cycle. Hence it can be necessary to install a bypass from the inlet to the outlet to protect the circulation pump against dam-age.

Requirements for water quality

- Water hardness soft or very soft ($CaCO_3$ concentration 0 to 1,5 mmol/l)
- For medium hard to very hard water quality alternatively use de-mineralised water.

Requirements for cooling liquid

- Based on 1,2-propanediol with inhibitor (must be suitable for copper)
- Approved for the food and pharmaceutical sectors
- Example: Antifrogen L

12.4.3 Direct Steam Humidification

Casing dimensions		
Description	**Value**	**Unit**
Height	340	mm
Depth	80	mm
Width	200	mm

Various		
Description	**Value**	**Unit**
Additional mass	3.5	kg
Water consumption [1]	5.0	g/h
Temperature range for use [2]	28 to 40	°C
Heating time of the unit	5	min

[1]) At an ambient temperature of up to 20 °C, at a temperature of 37 °C in the incubation chamber and relative humidity of 75 %.

[2]) Temperature in the interior at which functioning can be guaranteed

Target and actual humidity values		
Description	**Value**	**Unit**
Setting range	20.0 to 85.0	%rH
Increment	1.0	%rH
Control precision	± 3.0	%rH
Values that can be reached (at 37 °C in the interior and the specified room temperature)	RT 20 °C: to 75.0	%rH
	RT 22 °C: to 80.0	%rH
	RT 25 °C: to 85.0	%rH

Technical Data and Specifications

Electrical data		
Description	**Value**	**Unit**
Voltage	230 / 115	V
Max. power consumption	130	W
Max. current consumption	0.4 / 0.9	A
Bar heater (in door)	24	V
	15	W

Specifications for the connection / water quality		
Description	**Value**	**Unit**
Connection (hose Ø)	6 to 7	mm
Input pressure	0 to 0.3	bar
Water hardness	< 0.01, $CaCO_3$ equivalent	mmol/L
Dissolved solids	< 10	mg/L

ATTENTION

Using tap water can quickly lead to limescale in the vaporiser of the humidification unit, which would affect correct functioning.

Adding detergents, disinfectants or similar chemicals to the water for the direct steam humidification can damage the device. Only use water without additions, in accordance to the specification.

For an optimal operation, reverse osmosis water with a conductivity of approx. 5 µS/cm is recommended. Ultra-pure water or WFI (water for injection purposes) are also permissible. However, these are highly corrosive and can cause damage to the vaporiser in the long term.

Specifications for the humidity sensor		
Description	**Value**	**Unit**
Sensor type	EE071 HCT01-00D	
Measurement range	20 to 90	%
Response time	< 300	ms
Temperature range for use	- 40 to 80	°C

12.4.4 CO_2 Control

Connection data		
Description	**Value**	**Unit**
Connection (hose Ø)	3 to 4	mm
Type of connection	Legris	
Inlet pressure	0.5 (± 0.1)	bar

Various		
Description	**Value**	**Unit**
Additional mass	0.5	kg

Vaisala CO_2 sensor		
Description	**Value**	**Unit**
Sensor type	GMP251	
Measurement range	0 to 20	%
Accuracy (at 1013 hPa, 25)	± 0.1	% CO_2

Target and actual CO_2 values		
Description	**Value**	**Unit**
Setting range	0 to 20	%
Control range	0.1 to 19.5	%
Control precision (at 1013 hPa, 20 °C to 40 °C)	at 0 to 5 % ± 0.5 %	
	at 5 to 10 % ± 0.6 %	
	at 10 to 15% ± 0.7 %	
	at 15 to 20% ± 0.8 %	
Gas consumption (at a gas flow of 3 NL/h)	at 5 % 2.0 NL/h (± 0.5 %)	

12.4.5 LED Lighting

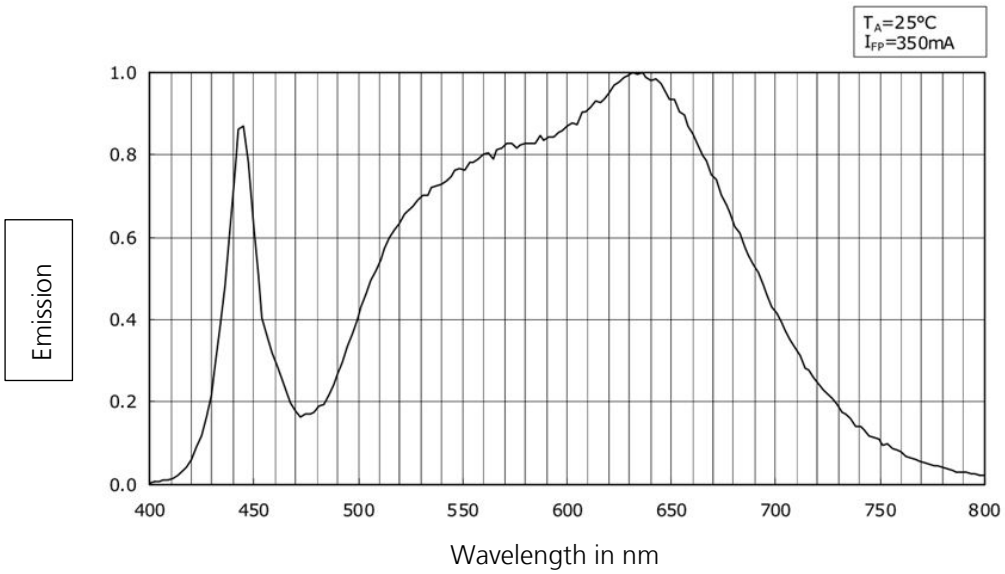
Description	Value	Unit
Power consumption (100 % light intensity)	210	W
Setting range	1 to 100	%
Increment	1	%
Light source	High power LEDs	
Light colour of the LEDs	Warm white	
Colour temperature of the light	3500	K
Max. irradiation power	60	W/m^2
Light intensity (linear)	100 % = 240 µmol m^{-2} s^{-1} 1 % = 5 µmol m^{-2} s^{-1}	
Light distribution[1] on the tray	+/- 10	%
Compatibility with humidity [2]	up to 85	%rH
Lighting control system	Pulse width modulation	

[1]) Relative standard deviation of the total number of 25 measuring points distributed evenly across the tray.

[2]) With the light switched off and a set max. temperature of 28 °C (without condensate).

Temperature range	
Description	**Value**
At 80 to 100 % light intensity	16 °C under RT up to 45 °C
At 0 to 80 % light intensity	16 °C under RT up to 65 °C

Specification of the light



Emission spectrum of warm white LEDs

12.4.6 Overview of the Masses with Options

Mass		
Description	**Value**	**Unit**
Basic unit with 25 mm hub [1]	75.0	kg
Basic unit with 50 mm hub [1]	77.0	kg
Base 120 mm	7.5	kg
Cooling unit	9.0	kg
External cooling	3.0	kg
Humidification	3.5	kg
CO_2 gassing	0.5	kg

[1)] Incl. rubber feet, 17 mm high

Examples		
Hub	**25 mm**	**50 mm**
Basic unit, all options [1]	88.0 kg	90.0 kg
with 120 mm base	95.5 kg	97.5 kg
Stack of 2 without options	159.0 kg	163.0 kg
Stack of 2 with cooling	177.0 kg	181.0 kg
Stack of 2, all options [2]	185.0 kg	189.0 kg

[1)] Incl. rubber feet, 17 mm high

[2)] With optional cooling unit (not external cooling)

Stack of 2 always with 120 mm base, incl. connecting rods (approx. 1.5 kg)

EU-Konformitätserklärung

EU-Declaration of conformity

Déclaration UE de conformité

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Hersteller *Manufacturer* *Fabricant*	Infors AG Rittergasse 27 CH-4103 Bottmingen
Bezeichnung *Designation* *Désignation*	Inkubationsschüttler Incubation shaker Incubateur agité
Typ *Type* *Type*	Minitron
Ab Release *From release* *A partir du version*	2.1
Ab Seriennummer *From serial number* *A partir du numéro de série*	S-000129923

Dieses Gerät entspricht den grundlegenden Anforderungen der Richtlinien
This device is in compliance with the essential requirements of directives
Cet appareil est conforme aux exigences essentielles des directives

Maschinenrichtlinie 2006/42/EG	*Directive on machinery 2006/42/EC*	*Directive relative aux machines 2006/42/CE*
EMV-Richtlinie 2014/30/EU	*EMC directive 2014/30/EU*	*Directive CEM 2014/30/UE*
RoHS-Richtline 2011/65/EU	*RoHS directive 2011/65/EU*	*Directive RoHS 2011/65/UE*

Aussteller Konformitätsbeauftragter
Issuer *Representative for conformity*
Editeur *Responsable de la conformité*

R.Winkler
(COO)

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