Operating manual

Multitron Pro

Incubation Shaker

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INFORS HT

Infors AG
Headoffice, Schweiz
Rittergasse 27
CH-4103 Bottmingen
T +41 (0)61 425 77 00
F +41 (0)61 425 77 01
headoffice@infors-ht.com
service@infors-ht.com

Infors GmbH
Dachauer Str. 6
D-85254 Einsbach
T +49 (0)8135 8333
F +49 (0)8135 8320
infors.de@infors-ht.com

Infors UK Ltd
The Courtyard Business Centre
Dovers Farm, Lonesome Lane, Reigate
Surrey, RH2 7QT, UK
T +44 (0)1737 22 31 00
F +44 (0)1737 24 72 13
infors.uk@infors-ht.com

Infors Sarl
2, rue du Buisson aux Fraises
Bâtiment D13
F-91300 Massy
T +33 (0)1 69 30 95 04
F +33 (0)1 69 30 95 05
infors.fr@infors-ht.com

Infors Benelux BV
Fabriekstraat 38
7005 AR Doetinchem
P.O. Box 613
NL-7000 AP Doetinchem
T +31 (0)314 36 44 50
F +31 (0)314 37 80 76
infors.bnl@infors-ht.com

Infors Canada
8350 rue Bombardier
Anjou, Quebec
Canada H1J 1A6
T +1 514 352 5095
F +1 514 352 5610
infors.ca@infors-ht.com

Infors Bio-Technology (Beijing) Co., Ltd.
Room 505C, Building 106
Lize Zhongyuan
Wangjing New Industrial Zone
Chaoyang District, Beijing
100102 P.R. of China
T +86 10 51652068
F +86 10 64390585
info@infors-ht.com.cn

Infors South East Asia
16, 1st Floor, Taman City
MY-51200 Kuala Lumpur
Malaysia
T +603 625 771 81
F +603 625 067 48
info@infors-ht.com.my

Contact details of our local dealers worldwide can be found on our website

www.infors-ht.com

Engineering and production in Switzerland

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1 General Information

1.1 About this Manual

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

This manual is a component part of the equipment. It must be kept near to the equipment and must be accessible to the operators at all times. The operators must read thoroughly and fully understand this manual before commencement of any work.

Adhering to all the points, advice and instructions concerning safety and operation in this operating manual is a pre-condition for safe working.

Furthermore, local rules for accident prevention and general safety regulations relevant to the equipment's field of application may be in force.

This manual contains pictures which aid general understanding and can differ from the actual equipment as supplied.

NOTICE!

Application notes are available for several issues.

They are provided as PDF-Downloads on the website of the manufacturer.

1.2 Symbols

Safety Instructions

Safety instructions are labeled using symbols. All safety instructions begin with a word that signifies the degree of hazard.

Strictly follow all safety points and act with due caution to avoid accidents, damage to equipment, personal injuries and loss of property.

DANGER!

… points out an immediate, dangerous situation that leads to death or severe injuries unless avoided.

WARNING!

… points out a potentially dangerous situation that may lead to death or severe injuries unless avoided.

CAUTION!

… points out a possibly dangerous situation that leads to slight or minor injuries unless avoided.

CAUTION!

… points out a possibly dangerous situation that leads to damage to property unless avoided.

Hints and Recommendations

NOTICE!

… highlights useful hints and recommendations as well as information for safe and efficient use of the equipment.

Specific Safety Instructions

The following safety instructions are used to call attention to particular hazards.

DANGER!
Danger of fatal electric shock!
…signifies danger by electric current. Non-observance of safety instructions may lead to a severe or fatal physical injury.

WARNING!
Danger of infectious substances!
… signifies danger by infectious substances (e.g. liquids which contain bacteria or viruses). Non-observance of safety instructions may lead to serious or fatal infections.

1.3 Limitation of Liability

All information and instructions in this manual comply with current standards and regulations, as well as the current state of technology & the manufacturer's knowledge and experience.

The manufacturer will not be held responsible for losses arising from:

- Non-observance of the points listed in the operating manual
- Incorrect and inappropriate use of the equipment
- Unqualified personnel using the equipment
- Arbitrary modifications
- Unauthorised technical changes
- Arbitrary repair
- Utilisation of unauthorised spare parts

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

Obligations stated in the delivery contract, general conditions of contract, the manufacturer's delivery conditions and the current legal regulations at the time of conclusion of the contract will apply.

1.4 Copyright Protection

This operating manual is protected by copyright and exclusively intended to be used for in-house purposes.

To pass this manual on to a third party, to copy or duplicate it – in part or as a whole – and to exploit or communicate its content by transmission outside the workplace is not allowed unless authorised in written form by the manufacturer.

Contravention will lead to liability for damages. All rights are reserved.

1.5 Spare parts

WARNING!
Safety risk due to incorrect spare parts!

Inappropriate or faulty spare parts may impair safety and/or may lead to damage, malfunction or complete breakdown

Therefore:

– Use only original spare parts from the manufacturer.

Spare parts may be purchased from an authorised dealer or direct from the manufacturer. See address on page 2

1.6 Terms of Guarantee

The terms of the guarantee are included in the manufacturer's general conditions of business contract to supply.

1.7 Customer Service

Our customer service is at your disposal for technical advice. See contact details on page 2.

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

1.8 Declaration of Conformity

The incubation shaker Multitron Pro complies in terms of Directive 2006 / 42 EC on machinery with the following relevant regulations:

- Directive on machinery 2006 / 42 / EC
- EMC Directive 2004 / 108 / EC

2 Safety

This section outlines all important safety aspects for optimal personnel protection and for the safe and error-free operation of the equipment.

Non-observance of the operational descriptions and safety instructions listed in the operating manual may lead to serious hazards.

2.1 Responsibility of the operator

The equipment is used in industrial domains, institutes and academic workplaces. Therefore an operator is individually liable with regard to statutory duties relating to operational safety.

All regulations concerning health & safety, accident prevention and environmental protection of the workplace must be complied with alongside all safety instructions in this manual. In particular:

- The operator must be informed about the current industrial safety regulations. He must carry out a risk assessment to identify additional hazards due to special working conditions related to the equipment's area of application. They must declare these hazards in the form of directives for the equipment's operation.
- The operator must ensure that these directives comply with current legal regulations and adapt them as necessary.
- The operator must clearly regulate and define responsibility for installation, operation, maintenance and cleaning.
- The operator must ensure that all employees using the equipment have read and understood the operating manual. Beyond that, he must provide training and inform personnel at regular intervals regarding potential dangers.
- The operator must provide the employees with the necessary protective equipment.

Furthermore, the operator is responsible for the equipment's maintenance in correct operational condition. Therefore, the following applies:

- The operator must ensure that the maintenance frequency, as stated in the operating manual, is adhered to.
- The operator must ensure that all safety devices are checked regularly for efficiency and integrity.

2.2 Requirements for qualified personnel

WARNING!
Risk of injury when used by anyone inadequately qualified!

Inappropriate use of the equipment may lead to serious physical injury and material damage.

Therefore:

– All operations must be executed by qualified personnel only.

The following qualifications for different operations are listed in the operating manual:

- **Qualified electrician**
  is capable of carrying out work on electrical systems, identifying and avoiding possible hazards independently due to their professional standing, experience, skills and knowledge of relevant standards and regulations.
  The qualified electrician is familiar with the site on which they are operating and knows the relevant standards and regulations.
- **Qualified personnel**
  are capable of carrying out the assigned work, identifying and avoiding possible hazards independently due to their professional standing, experience, skills and knowledge of relevant standards and regulations.
- **Qualified personnel in biology, biotechnology or chemical engineering**
  are capable of carrying out work in the field of biology, biotechnology or chemical engineering alongside the chemical or biological process chain due to their professional standing, experience, skills and knowledge of relevant standards and regulations.
  This includes regulations concerning health and environmental protection, safety at work, plant safety and taking quality management into account at work. They are capable of identifying and avoiding possible hazards independently. The qualified personnel in biology, biotechnology or chemical engineering are familiar with the site on which they are operating and know the relevant standards and regulations.

2.2.1 Unauthorised persons

WARNING!
Danger for unauthorised persons!

Unauthorised persons are those who do not fulfill the criteria described here and so may not appreciate any of the dangers related to operation.

Therefore:

- Keep unauthorised people away from the area of operation.
- Challenge and remove any such persons from the area of operation, if in doubt.
- Halt operation as long as unauthorised personnel remain in the area of operation

2.3 Conventional use of the equipment

The equipment is designed and constructed only for conventional uses as described here.

The equipment is conventionally used only as an incubation shaker for (depending on the equipment version and selected options) microorganisms, cell culture and photo sensitive cells.

Conventional use of the equipment also includes following all instructions in this operating manual.

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

WARNING!
Danger by misuse!

Misuse of the equipment may lead to dangerous situations.

In particular, desist from using the equipment in any of the following ways:

- Producing explosive gases e.g. methane, hydrogen etc.
- Producing overpressure in the cultivation vessel(s) caused by biologic activity.
- Uncontrolled cultivation of toxic or pathogenic organisms.

All claims due to loss or damage arising from non-conventional use of the equipment will not be considered.

The following containers for cultivation are allowed:

- Erlenmeyer flasks up to 5000 mL made of borosilicate glass, e.g. Schott Duran® glass, or made of synthetics, e.g. polycarbonate such as e.g. Corning® etc.
- Fernbach flasks up to 3000 mL made of borosilicate glass, e.g. Schott Duran® glass, or made of synthetics, e.g. polycarbonate such as e.g. Corning® etc.
- Other possibilities are:
  - Test tubes
  - Centrifuge tubes
  - Microtitre plates
  - Deep-well plates

NOTICE!

The cultivation vessel(s) must be fixed to the tray with the appropriate holding devices (clamps, adhesive matting, test tube rack etc.) corresponding to the shaking speed of the equipment.

CAUTION!
Risk of loss of property caused by increased abrasion due to incorrect loading of the tray!

Drive and mechanical parts of the shaking table may be damaged if other type of flasks as permitted or larger working volumes as permitted are used.

Therefore:

– Working volume must not be more than 1/3 of the total volume of the flask.
– Do not use flow diffusing inserts in the flasks.
– Reduce the loading or the shaking speed until the equipment runs smoothly, if loud noises or strong vibrations occur!

2.4 Personal protective equipment

It is essential to wear personal protective equipment to minimise health hazards

- Always wear the personal protective equipment which the particular activity requires.
- Always follow instructions available in the workplace, regarding the use of personal protective equipment

Strictly to be worn

Strictly to be worn for all activities:

Protective clothes

To protect against contamination and carryover of viable organisms. Must be tight-fitting and only slightly tear proof work clothes with tight sleeves and no loose material.

Protective cap

To protect against contamination and carryover of viable organisms.

Protective gloves (chemical resistant)

To protect hands from aggressive substances.
Check gloves are impermeable before use. Clean gloves before taking them off and store in a well-ventilated location after use.

Safety goggles

To protect the eyes against liquid splashes

Safety shoes

To protect against loose materials falling and slipping on substances coating the floor.

2.5 Particular hazards

The following section contains additional risks which were identified on the basis of a risk assessment.

- Observe all safety instructions and warning notices in this and the following sections, in order to reduce health hazards and to avoid dangerous situations.

Electric current

DANGER!
Danger of fatal electric shock!

There may be fatal danger by touching components connected to a mains power supply (single or 3-phase). Damage to insulation or components may have fatal consequences!

Therefore:

- Immediately turn off the electrical supply when the insulation is damaged and initiate a repair.
- Qualified electricians only must be used to make these repairs on the electrical system.
- Disconnect electrical components from the mains supply and check whether it is electrically isolated before making any repairs.
- Turn off the electrical supply and lock off any isolation switch before commencing maintenance, cleaning or repairing.
- Do not bypass fuses or take them out of operation. Adhere to the correct rates (in Amps) when replacing fuses.
- Keep components which are electrically powered away from humidity, as excessive moisture may lead to short circuit.
- Do not expose equipment to inappropriate environmental temperatures outside the stated operating range.
- Never open the housing covers of the basic unit and control panel when the electrical supply is turned on.

Biohazard

WARNING!
Biohazard!

Noncompliance with biological safety regulations increases the health risk of the operator and the risk of lower equipment functionality.

Therefore:

- Strictly follow all biological safety regulations
- Decontaminate and clean every part that comes in contact with any infectious biochemical substances.

Safety

Dangerous gases

WARNING!
Risk of explosion, risk of asphyxiation and high risk of danger to the health due to dangerous gases!

Non-compliance with safety regulations regarding the use of dangerous gases such as e.g. O_2, N_2, CO_2 or inappropriate handling contains a risk of explosion or asphyxiation and a high health risk for the user depending on the type of gases used.

Therefore:

– Strictly adhere to safety regulations regarding the use and handling of dangerous gases.
– Strictly follow the instructions in this operating manual regarding gas supply and handling of gases and exhaust gas.

Moving parts

WARNING!
Risk of injury due to moving parts.

Parts that are rotating or moving linearly can cause serious injuries.

Therefore:

– Do not reach into moving parts nor work on or near moving parts.
– Do not open covers while the equipment is operating.
– Pay attention to the stopping time:
Make sure that all parts have stopped moving before opening any covers.
– Wear close-fitting protective work clothing in the danger zone.

Dirt and materials lying about

CAUTION!
Risk of slipping due to dirt and materials lying about!

Dirt and materials lying about may lead to slipping and present a health hazard e.g. possible infection.

Therefore:

– Always keep the work place clean and tidy.
– Remove all materials not required immediately.

2.6 Step to take in the event of hazardous situations and at accidents

Preventive measures

- Always be prepared for accidents and fire!
- Have first aid facilities readily at hand (first aid box, blankets etc.) and fire extinguisher
- Familiarize personnel with accident notification, first aid and rescue facilities.
- Keep access routes clear for ambulance.

Steps to take in case of an accident

- Immediately switch off the equipment and unplug the mains cable.

NOTICE!

Instructions given by in-house safety protocols are to be followed if additional isolation switches for the power supply have been installed locally.

- Initiate first aid measures
- Remove people away from the danger zones (care with handling!).
- Inform responsible personnel on site
- Alert emergency medical services, if appropriate.
- Clear access routes for ambulance

2.7 Environmental protection

CAUTION!
Danger for the environment caused by mishandling!

Mishandling environmentally hazardous substances, especially incorrect disposing, may cause severe damage to the environment.

Therefore:

– Always observe the points stated below.
– Immediately take appropriate action should environmentally hazardous substances be released into the environment accidentally. Inform the responsible local authority, if in doubt.

The following environmentally hazardous substances are used:

Genetically modified organisms and genetically modified materials

Organisms and genetically modified materials must not gain access to the environment. They must be disposed of in accordance with local regulations.

2.8 Adhesive labels / signs / symbols

The following symbols and information labels are located in the working area. They refer to the local surrounding the area where they are applied.

WARNING!
Risk of injury by illegible symbols!

Stickers and labels can get dirty and unrecognizable by other means over the course of time.

Therefore:

– Keep all safety, warning and operating instructions in a clearly legible state.
– Replace damaged labels and stickers immediately.

Biohazards

Warns against infectious biochemical substances (e.g. liquids which contain bacteria or viruses) present in the working area.

Some procedures must be executed on objects or in rooms which contain bacteria, yeasts or other parasites. These substances may become perilous not only to medical and laboratory personnel, but also to cleaners when handled incorrectly.

Non-authorised persons must not have access to work areas in which bio hazardous or infectious materials are handled.

Immediately call a doctor if suspicion of infection arises.

Hot surfaces

Hot surfaces such as heated parts of any equipment, flasks or material and hot liquids are not always clear to see. Do not touch without protective gloves.

3 Technical data

3.1 Dimensions

Front view of 3 units stacked with low base frame and closed door

Fig. 1: Dimensions in mm

Technical data

Front view of 3 units stacked with low base frame and open door

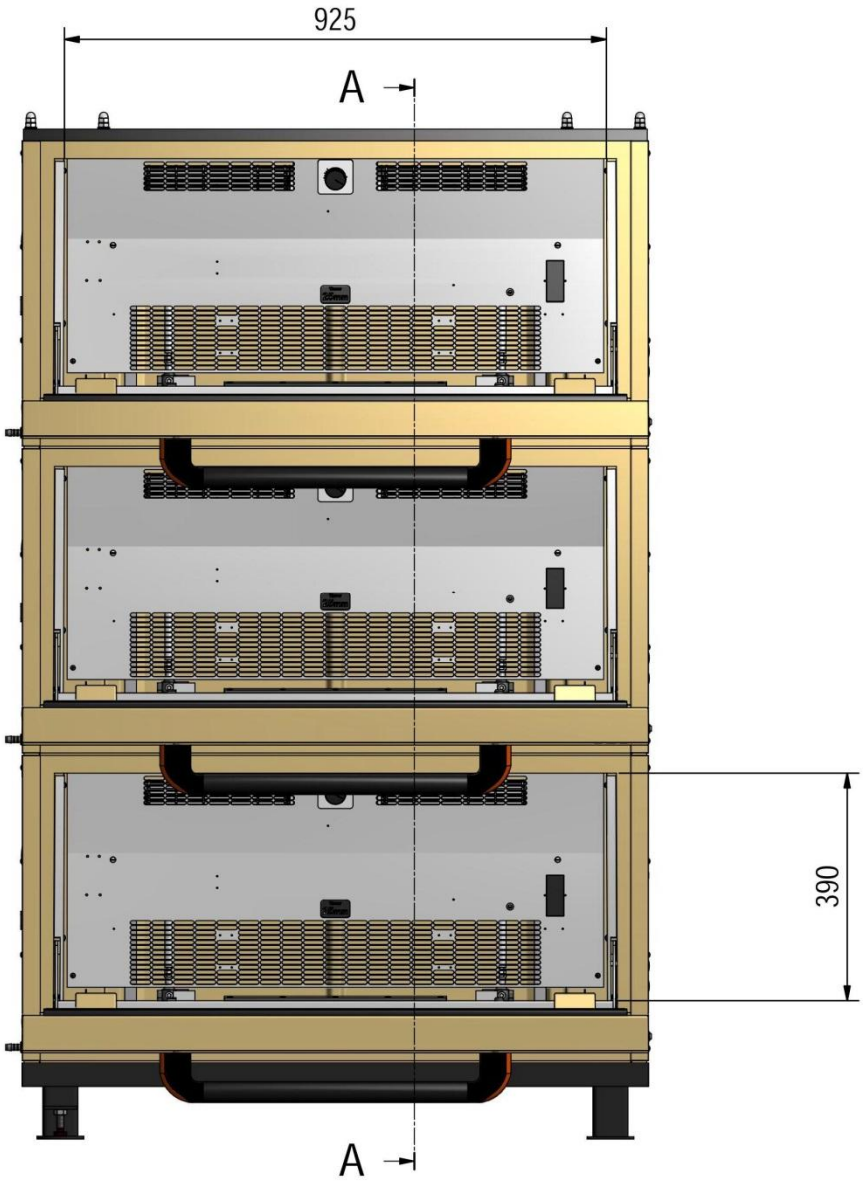


Fig. 2: Dimensions in mm

Side view of 3 units stacked with low base frame and closed door

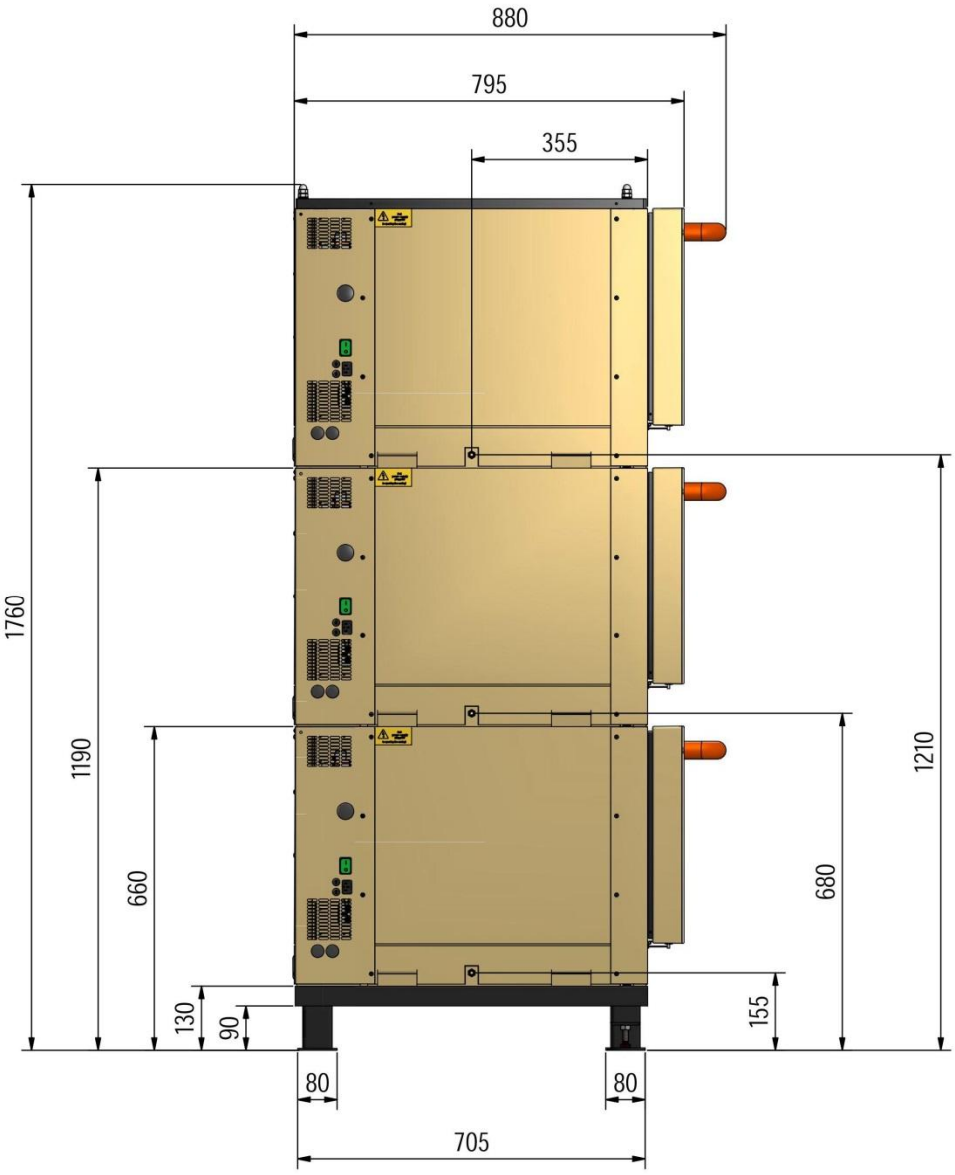


Fig. 3: Dimensions in mm

Technical data

Side view of 3 units stacked with low base frame and open door

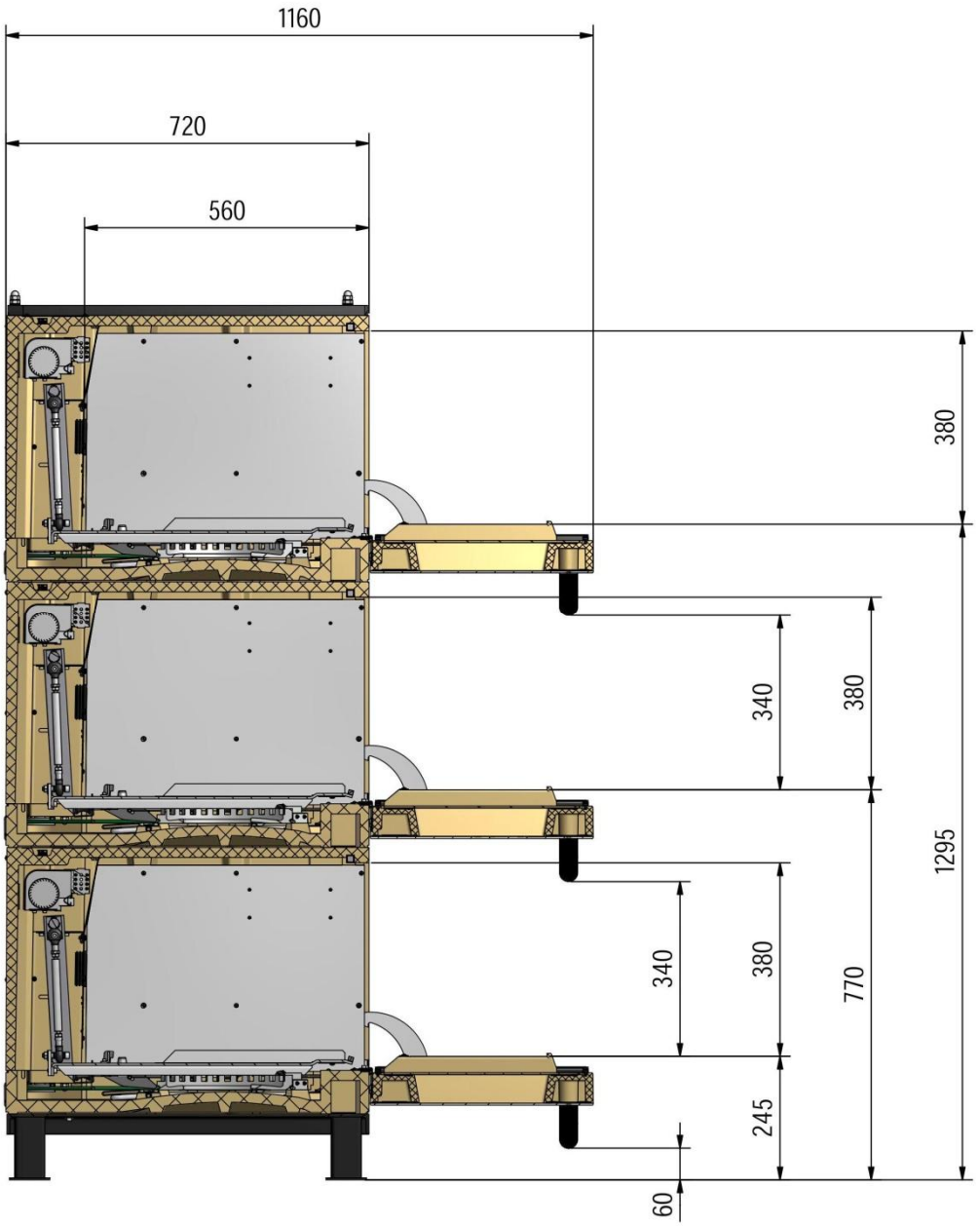


Fig. 4: Dimensions in mm

Incubation chamber

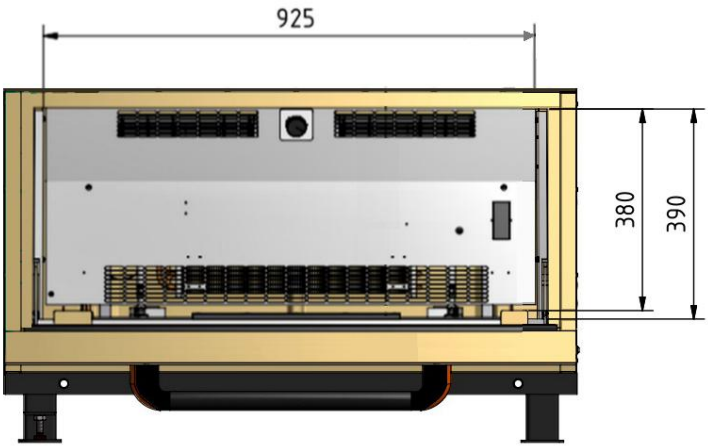


Fig. 5 Dimensions in mm

Base unit

Description	Value	Unit
Width	1070	mm
Single unit height	520	mm
2-unit staple height	1040	mm
3-unit staple height	1560	mm
Base unit (with door handle) depth	880	mm
Base unit (with open door) depth	1160	mm
Base depth	715	mm

Incubation chamber

Description	Value	Unit
Width	925	mm
Depth	550	mm
Hight	387	mm
Hight with illumination inside	337	mm
Volumn	~200	L

Technical data

Base frame

Description	Value	Unit
Rubber feet	30	mm
Trolley	90	mm
Frame low	130	mm
Frame high	310	mm

Cooling units

Description	Value	Unit
Side cooling width	245	mm
Top cooling width	1070	mm
Top cooling heigth	290	mm

Direct steam humidification

Description	Value	Unit
Direct steam humidification depth	80	mm

CO_2 gassing

Description	Value	Unit
Width	30	mm

CO_2 pressure reducing unit

Description	Value	Unit
Width	40	mm

ShakerBag gassing

Description	Value	Unit
Width	115	mm

Illumination daylight / photosynthesis

Equivalent to base unit

Illumination algae

Description	Value	Unit
Illumination width	1260	mm

3.2 Weights

Base unit

Description	Value	Unit
Single unit 25mm throw	95	kg
Additional weight 50 mm throw	13	kg
1 units stacked 25mm throw	98	kg
2 units stacked 25mm throw	202	kg
3 units stacked 25mm throw	305	Kg

Approved load 25 throw (incl. tray)

Description	Value	Unit
Standard unit with 25 mm throw:		
■ up to 350 rpm	9 to 19	kg
■ over 350 rpm	12 to 16	kg

Approved load 50 throw (incl. tray)

Description	Value	Unit
■ up to 250 rpm	9 to 19	kg
■ over 250 rpm	12 to 16	kg

Technical data

M-tray

Description	Value	Unit
Tray	4.50	kg
Adhesive matting «Sticky Stuff»	0.50	kg
Clamp 25 mL	0.02	kg
Clamp 50 mL	0.02	kg
Clamp 100 mL	0.03	kg
Clamp 250 mL	0.06	kg
Clamp 500 mL	0.10	kg
Clamp 1000 mL	0.15	kg
Clamp 2000 mL	0.26	kg
Clamp 2800 mL (F3)	0.30	kg
Clamp 3000 mL	0.30	kg
Clamp 4000 mL	0.35	Kg
Clamp 5000 mL	0.45	Kg

Perforated tray

Description	Value	Unit
Perforated tray	3.5	kg

Base frame

Description	Value	Unit
Rubber feet	6	kg
Trolley	10	kg
Base frame 130 mm	26	kg
Base frame 310 mm	27	kg

Technical data

Cooling units

Description	Value	Unit
Bottom / top cooling (per unit)	65	kg
Side cooling (per unit)	37	kg
External cooling	2.5	kg

Direct steam humidification

Description	Value	Unit
Direct steam humidification	4.5	kg

Gassing ShakerBag Option

Description	Value	Unit
Gassing ShakerBag	3	kg

Tray ShakerBag Option

Description	Value	Unit
ShakerBag Tray	12	kg

Gassing unit CO_2

Description	Value	Unit
Gassing unit CO_2	1	kg

Illumination

Description	Value	Unit
Illumination unit Daylight/Photosynthesis	12	kg
Illumination algae Daylight/Photosynthesis	12	kg

3.3 Connection values

Electrical (single unit)

Type 230V 50/60 Hz

Description	Value	Unit
Voltage	230	V
Power consumption max.	880	W
Power consumption stand-by	6	W
Current max.	3.8	A
Individual fusing	16	A
Frequency	50/60	Hz
2 unit fuses 5 x 20 mm, time-lag	10	A

Type 115V 60 Hz

Description	Value	Unit
Voltage	115	V
Power consumption max.	880	W
Power consumption stand-by	6	W
Current max.	7.7	A
Individual fusing	16	A
Frequency	60	Hz
2 unit fuses 5 x 20 mm, time-lag	16	A

Electrical Top cooling 900 Watts

Type 230 V 50 Hz

Description	Value	Unit
Voltage	230	V
Power consumption max.	540	W
Current max.	4.2	A
Individual fuses	16	A
Frequency	50	Hz
2 unit fuses 5 x 20 mm, time-lag	10	A

Type 230 V / 60 Hz

Description	Value	Unit
Voltage	230	V
Power consumption max.	690	W
Current max.	4.6	A
Individual fuses	16	A
Frequency	60	Hz
2 unit fuses 5 x 20 mm, time-lag	10	A

Type 115 V / 60 Hz

Description	Value	Unit
Voltage	115	V
Power consumption max.	570	W
Current max.	7.5	A
Individual fuses	16	A
Frequency	60	Hz
2 unit fuses 5 x 20 mm, time-lag	16	A

Technical data

Electrical Top cooling 1200 Watts

Type 230 V 50 Hz

Description	Value	Unit
Voltage	230	V
Power consumption max.	650	W
Current max.	2.8	A
Individual fuses	16	A
Frequency	50	Hz
2 unit fuses 5 x 20 mm, time-lag	10	A

Type 230 V / 60 Hz

Description	Value	Unit
Voltage	230	V
Power consumption max.	800	W
Current max.	3.5	A
Individual fuses	16	A
Frequency	60	Hz
2 unit fuses 5 x 20 mm, time-lag	10	A

Type 115 V / 60 Hz

Description	Value	Unit
Voltage	115	V
Power consumption max.	800	W
Current max.	6.9	A
Individual fuses	16	A
Frequency	60	Hz
2 unit fuses 5 x 20 mm, time-lag	16	A

Electrical Side cooling 380 Watts

Type 230 V 50 Hz

Description	Value	Unit
Voltage	230	V
Power consumption max.	220	W
Current max.	1.2	A
Fuses	None	
Frequency	50	Hz
2 unit fuses 5 x 20 mm, time-lag	10	A

Type 230 V / 60 Hz

Description	Value	Unit
Voltage	230	V
Power consumption max.	220	W
Current max.	1.2	A
Fuses	None	
Frequency	60	Hz
2 unit fuses 5 x 20 mm, time-lag	10	A

Type 115 V / 60 Hz

Description	Value	Unit
Voltage	115	V
Power consumption max.	200	W
Current max.	2.6	A
Fuses	None	
Frequency	60	Hz
2 unit fuses 5 x 20 mm, time-lag	16	A

Technical data

Electrical Direct steam humidification

Type 230V 50/60 Hz

Description	Value	Unit
Power consumption, max.	125	W
Current	0.4	A

Type 115V 60 Hz

Description	Value	Unit
Power consumption, max.	125	W
Current	0.9	A

Electrical Heated door

Description	Value	Unit
Voltage	24	V
Power consumption	18.8	W
Current	0.8	A

Electrical CO_2 Gassing

Description	Value	Unit
Power consumption	4.5	W

Electrical Gassing ShakerBag Option

Type 230V 50/60 Hz

Description	Value	Unit
Electrical Power	25	W
Power consumption max.	0.1	A

Type 115V 50/60 Hz

Description	Value	Unit
Electrical Power	25	W
Power consumption max.	0.2	A

Electrical Illumination daylight / photosynthesis

Type 230V 50/60 Hz

Description	Value	Unit
Voltage	230	V
Power consumption	180	W
Current	0.8	A

Type 115V 60 Hz

Description	Value	Unit
Voltage	115	V
Power consumption	180	W
Current	1.6	A

Technical data

Electrical Illumination algae daylight / photosynthesis

Type 230V 50/60 Hz

Description	Value	Unit
Voltage	230	V
Power consumption	250	W
Current	1.1	A

Type 115V 60 Hz

Description	Value	Unit
Voltage	115	V
Power consumption	250	W
Current	2.2	A

Electrical Mobile Pt100 sensor

Description	Value	Unit
Voltage	24	V

Electrical UV-sterilisation

Description	Value	Unit
Power consumption	11	W

3.4 Specifications

General information

Description	Value
Material housing	PU, safety glass
Material chamber	Stainless steal
Material table	Aluminum, anodized
Mounting table	4 x M5x16, hexagon socket
Fuses	
230 V, 50/60 Hz	2 x 20 mm 10 Amperes time-lag
115 V, 60 Hz	2 x 20 mm 16 Amperes time-lag
Hose nozzle	
Ø inner diameter nozzle	8 mm
Ø inner diameter hose	10 mm

Temperature

Description	Value
Power 2 cross flow blowers with heating	700 W
Air circulation	360 m^3/h
Control	Electronic PID-controller
Sensor	Pt100
Operating range	+4 °C up to +80 °C, typically up to 65 °C
Control accuracy	± 0.2 °C
Measuring accuracy	± 0.15 °C
Control accuracy capillary thermostat	± 2.5 °C
Capillary thermostat	Adjustable, standard setting ex works 70 °C

Technical data

Heating bi-metal control	Approx. at 80 °C
Overheat protection	84 °C, fuse

Temperature range

No cooling	
	6 °C over ambient temperature up to 65 °C

With cooling	
Side cooling	20 °C under ambient temperature up to 65 °C
Top cooling	12 °C under ambient temperature up to 65 °C
External cooling	Depending on temperature of cooling liquid and ambient temperature

Direct steam humidification	
	Up to 40 °C

CO_2 gassing	
	Up to 60 °C

ShakerBag Option gassing	
	Up to 40 °C

Technical data

Shaking

Description	Value
Drive	External rotor motor
Power consumption	75 W
Current 230V 50 / 60 Hz	0.63 A
Current 115V 60 Hz	1.15 A
Motion	orbital
Control accuracy	1% at maximum speed
Rotation direction	Clockwise
Range	20 – 400 rpm

Shaking Variable throw

Description	Value
Speed 20 – 350 rpm	
Control accuracy	± 4 rpm
Speed 351 – 400 rpm	
Control accuracy	± 2%

Throw 25 mm speeds

Description	Value
Single unit	400 rpm
Base 13 cm	
2 units stacked	■ bottom: up to 400 rpm ■ top: up to 350 rpm
3 units stacked	■ bottom: up to 400 rpm ■ middle: up to 350 rpm ■ top: up to 350 rpm
Base 31 cm	

Technical data

2 units stacked	■ bottom: up to 400 rpm ■ top: up to 250 rpm

Throw 50 mm speeds

Description	Value
Single unit	■ 50 mm throw: 400 rpm
2 units stacked	■ bottom: up to 350 rpm ■ top: up to 250 rpm
3 units stacked	■ bottom: up to 350 rpm ■ middle: up to 250 rpm ■ top: up to 250 rpm
Base 31 cm	
2 units stacked	■ bottom: up to 350 rpm ■ top: up to 250 rpm

NOTICE!
For higher speeds contact the supplier!

Side cooling 380 W

Power supply Voltage/Frequency	Power Consumption	Rating
230 V / 50 Hz	1.2 A	220 W
230 V / 60 Hz	1.2 A	220 W
115 V / 60 Hz	2.6 A	200 W

Top and bottom cooling 900 W

Power supply Voltage/Frequency	Power Consumption	Rating
230 V / 50 Hz	2.3 A	540 W
230 V / 60 Hz	3 A	690 W
115 V / 60 Hz	5 A	570 W

Cooling liquid volume

Description	Value
1 unit stacked	9 L
2 units stacked	10 L
3 units stacked	11 L

Top and bottom cooling 1200 W

Power supply Voltage/Frequency	Power Consumption	Rating
230 V / 50 Hz	2.8 A	650 W
230 V / 60 Hz	3.5 A	800 W
115 V / 60 Hz	5 A	800 W

Cooling liquid volume

Description	Value
1 unit stacked	9 L
2 units stacked	10 L
3 units stacked	11 L

External cooling

Description	Value
Pressure inlet	2 - 4 bars
Outer diameter Ø hose nozzle	10 mm

Adhesive matting «Sticky Stuff»

For operating the adhesive matting «Sticky Stuff» only high quality flasks with flat-bottom are allowed.

Following materials are permitted:

- Borosilicate glass (3.3) – flasks, e.g. Schott Duran® glass
- Polycarbonate – flasks, e.g. Corning®

The use of all other materials or quality levels is in the responsibility of the user.

CAUTION!
Danger of damage of property by released or broken flasks when using inapplicable flasks.

Flasks of bad quality or deficient contact surface may be accidentally released from the adhesive matting when shaking or may break at removing process.

Therefore:

– Use only recommended flasks
– Use only flasks that are intact and free of scratches

NOTICE!

The following speed values are only valid for flasks with 20% filling level.
Adhesive matting and flasks have to be totally intact, dry and fat-free.

Type 50 mm throws

Description	Value
Temperature range	16 – 60 °C
Size	200 x 200 mm
Max. rotations Erlenmeyer flasks Borosilicate glass (3.3)	25 – 750 mL: 200 rpm
	1000 mL: 250 rpm
	2000 mL: 250 rpm
	3000 mL: 300 rpm
	5000 mL: 250 rpm
Max. rotations Erlenmeyer flasks Polycarbonate	125 – 3000 mL: 200 rpm
Max. rotations Fernbach flasks Polycarbonate	3000 mL: 250 rpm

Type 25 mm throws

Description	Value
Temperature range	16 – 60 °C
Size	200 x 200 mm
Max. rotations Erlenmeyer flasks Borosilicate glass (3.3)	25 – 750 mL: 250 rpm
	1000 mL: 300 rpm
	2000 mL: 300 rpm
	3000 mL: 350 rpm
	5000 mL: 300 rpm
Max. rotations Erlenmeyer flasks Polycarbonate	125 – 3000 mL: 250 rpm
Max. rotations Fernbach flasks Polycarbonate	3000 mL: 300 rpm

Technical data

Direct steam humidification

Description	Value
Inlet pressure	Max. 0.3 bars
Supply	constant
Hose nozzle	8 mm
Control range	20 – 85% rH
Accuracy	± 0.3% rH at 20 °C and 54% rH
Measuring method	capacitive
Control method	Inlet valve
Hose	8 mm Legris-connection
Water consumption reference value	10 g/h at 37 °C, 80% rH per unit
Water quality	Hardness < 0.01 mmol/L $CaCO_3$, equivalent
	Conductivity < 20 µS/cm
	Dissolved solids < 10 mg/L

Approachable values of humidity

Temperature	Maximum humidity
27 °C	85 %rH
33 °C	85 %rH
37 °C	85 %rH

Path through

Description	Value
Unit	Roxtec EzEntry 4 Mini
Diameter pass through	4 x 3.5 – 16.5 mm
Torque screws	3 – 5 Nm

Specification Manual mass flow meter

Description	Value	Unit
Power consumption	135	mA
Operating temperature	0 up to 50	°C
Measure accuracy	± 2	% FS
Control accuracy	± 0.001	L_n/min

Gassing ShakerBag Option

20L disposable bag / Air

Description	Value
Inlet pressure	Max. 0.5 bars
Supply	constantly
Connection	8 mm
Hose	Pressure resistant
Flow	2.00 L_n/min
Lead time	60 min
Inner diameter exit gas hose Ø	14.5 mm

Technical data

10L disposable bag / Air

Description	Value
Inlet pressure	Max. 0.5 bars
Supply	constantly
Connection	8 mm
Hose	Pressure resistant
Flow	1.00 L_n/min
Lead time	60 min
Inner diameter exit gas hose Ø	14.5 mm

2L disposable bag / Air

Description	Value
Inlet pressure	Max. 0.5 bars
Supply	constantly
Connection	8 mm
Hose	Pressure resistant
Flow	0.20 L_n/min
Lead time	60 min
Inner diameter exit gas hose Ø	14.5 mm

ShakerBag Tray

Description	Value
Tray capacity for disposable bags	3 x 2 L 2 x 10 L 1 x 20 L
Heat resistance	Up to 65 °C
Cleaning	Mild detergent
Disinfection	Standard disinfectants
Sterilisation	Not possible

CO_2 gassing

Gassing unit

Description	Value
Inlet pressure	Maximum 0.5 bars
Supply	constantly
Flow (clocked)	120 – 480 NL/h (rotameter recommended)
Consumption	Approx. 13L/h (reference value)
Warm-up period	15 min
Temperature range	Up to 60 °C
Humidity range	0 – 100% rH not condensing
Connection inner diameter hose	6 mm
Hose	Pressure resistant
Measuring range	0 – 20% CO_2
Control range	0 – 19.5% CO_2
Response time	20 s
Measuring method	Infrared
Control method	Inlet valve

Technical data

Accuracy at 25 °C	± 0.02% CO_2 + 2% FS
Dependency temperature	0.1% FS/°C
Dependency pressure	0.1% FS/mbars
Long-term stability	< ± 5% FS/2 years

CO_2 curtain

Description	Value
Material	PVC, UV-stabilized
Heat resistance	Up to 65 °C

CO_2 pressure reducing unit

Description	Value
Inlet pressure max.	20 bars
Supply	constant
Rotameter Flow	1 – 6,7 NL/min
Accuracy	± 4% FS
Loss of pressure max.	20 mbar

Gassing tube

Description	Value
Outer diameter	Ø 10 mm
Length	330 mm
Control	none

Illumination

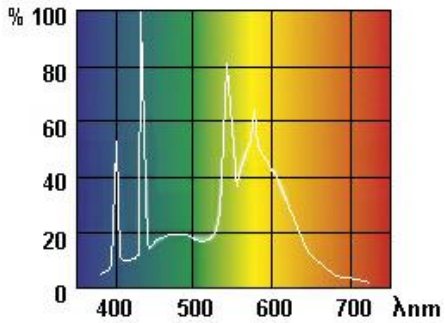


Fig. 6

Daylight

Description	Value
Fluorescent lamp T8 socket G13	15 Watts
Color temperature	4000 K
Life cycle	9000 h
Starter single connection (115V / 230V) Life cycle 8000h	FS 22
Length	438 mm

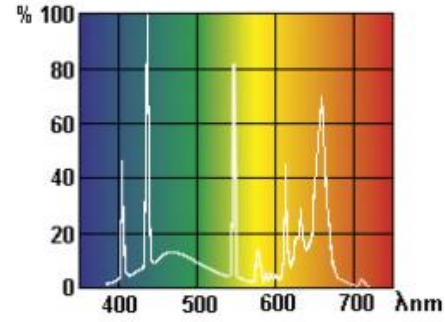


Fig. 7

Photosynthesis

Description	Value
Fluorescent lamp T8 socket G13	15 Watts
Color temperature	8500 K
Life cycle	9000 h
Starter single connection (115V / 230V) Life cycle 8000h	FS 22
Length	438 mm

Illumination algae

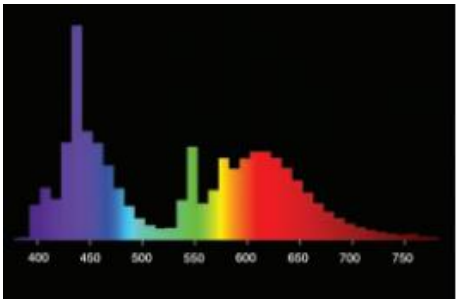


Fig. 8

Daylight

Description	Value
Fluorescent lamp L 36/77 socket G13	36 Watts
Luminous flux at 25 °C	1400 lm
Length	1200 mm
Life cycle	13.000 h

Mobile Pt100-Sensor

Description	Value
Control	Electronic PID-Controller
Sensor	Pt100
Control accuracy	0.2 °C
Measure accuracy	0.15 °C

UV-sterilization of process air

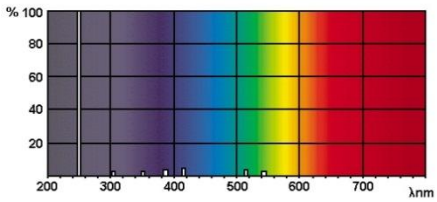


Abb. 9

Description	Value
UV-sterilization lamp 5 Watts socket G23	5 Watts
Wave length UV-C	200 – 280 nm
Maximum emission	253.7 nm
Life cycle	9000 h
Output UV-C radiation	1.1 Watts
Intensity after 5000 h	80%
Output total	11 Watts
Power consumption total	0.18 A

3.5 Operating conditions

Description	Value
Ambient temperature max.	With / without cooling 30 °C
Ambient temperature max.	■ without cooling: 8 °C below required minimum incubation temperature ■ with cooling: side cooling: 15 °C top cooling: 12 °C upon required minimum incubation temperature
Relative humidity max.	With / without cooling: 85% rH

3.6 Emissions

Description	Value	Unit
Noise emission	<70	dB(A)

3.7 Utilities

CAUTION!
Risk of loss of property due using of inappropriate utilities!

Using wrong utilities may cause loss of property.

Therefore:

– Only use manufacturer prescribed utilities, listed in the following table.

Description	Valid substances
Cooling liquid Secondary circuit Top cooling External cooling	Permitted for food and pharmaceutical fields Freezing < -40 °C Corrosion copper: < -0.6 g/m^2 Temperature range: -40 °C up to 150 °C
Water quality direct steam humidification	Distilled water Deionized water Demineralized water Reverse-osmosis water (for details see appendix)
Cleaning agents generally	Mild cleaning agents
Disinfectants generally	Quaternary ammonium compounds
Disinfectants door pane polycarbonate	Quaternary ammonium compounds
Cleaning agents adhesive matting	Mild cleaning agents
Disinfectants adhesive matting	Quaternary ammonium compounds

3.8 Identification plate

Fig. 10

The identification plate is placed in the middle of the front side underneath the front door.

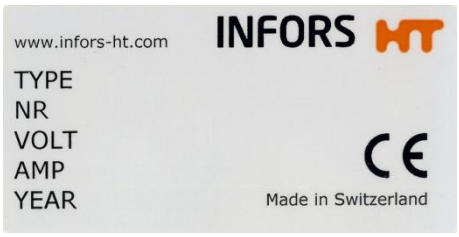


Fig. 11

It contains the following information:

- Name and internet address of the manufacturer
- TYPE = Model Type
- NR = Serial number
- VOLT = Nominal voltage
- AMP = Current consumption
- YEAR = Year of manufacture
- CE-marking

3.9 Interface communication protocol

For communication with other equipment a serial interface is available.

The communication protocol can be ordered via info@infors-ht.com.

4 Setup and function

Options of Equipment

NOTICE!

All optional features or optional components of the equipment are not part of the delivery of the standard machine!

4.1 Base unit

Housing

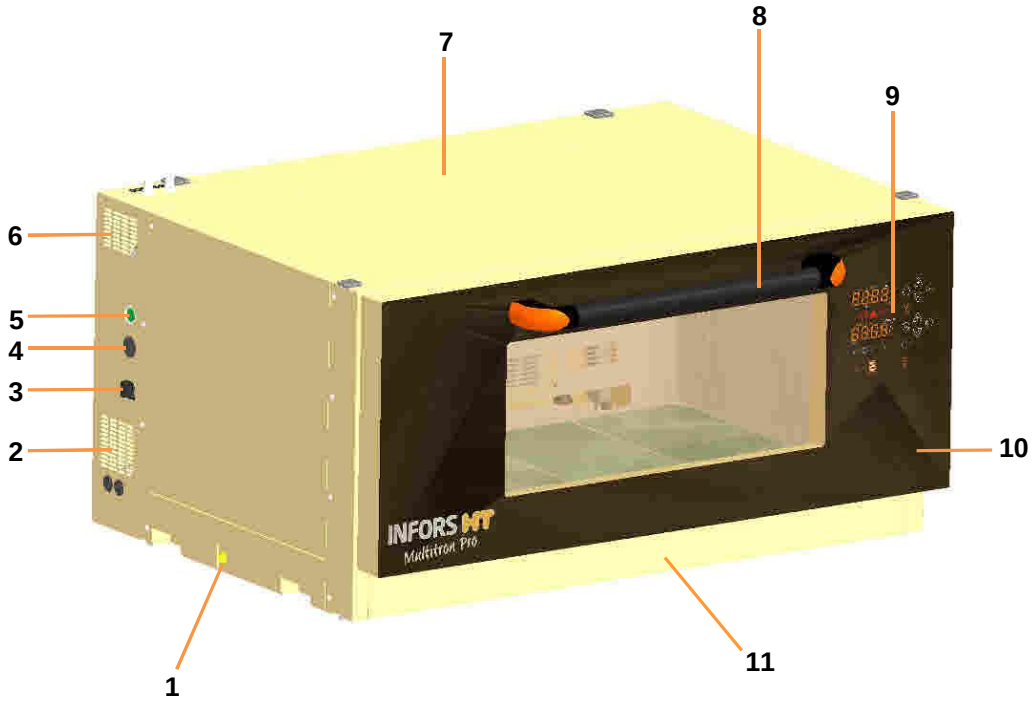


Fig. 12

1 Drain hole
2 Ventilation holes
3 Mains connector with fuses
4 Blind opening
5 Main switch
6 Ventilation holes
7 Housing
8 Door handle
9 Operating panel
10 Door
11 Identification plate

The incubator shaker is constructed as an insulated plastic housing with a sealed floor pan and a door.

Setup and function

The following elements are located on the housing:

- Main switch
- ON/OFF control lamp
- Blind opening
- Drain hole (the drain nozzle is supplied unmounted)
- Serial interface
- Power connector (with fuses) for an angle plug
- Door
- Ventilation holes

Door

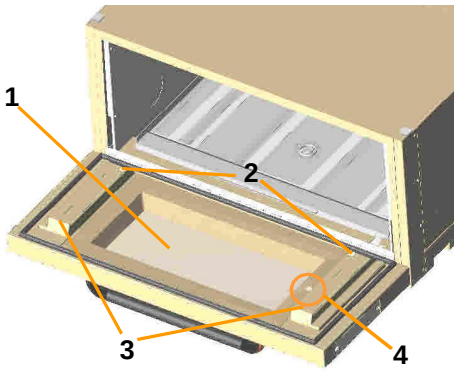


Fig. 13

The following elements are located on the door:

1 Window
2 Roller bearings
3 Glide rails
4 LED for incubation chamber

Incubation chamber

The walls of the incubation chamber are made of stainless steel.

The following elements are located inside the incubation chamber:

1 Capillary thermostat with temperature controller
2 Ventilation outlets (2 cross-flow fans with heating)
3 Pt100 sensor (behind the INOX rear wall) to measure the temperature.

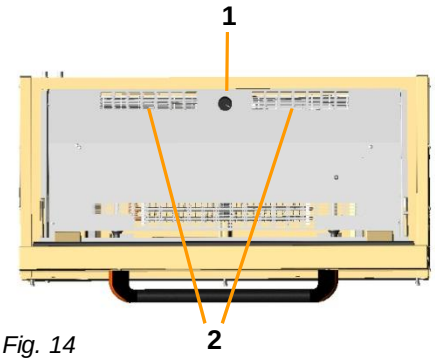


Fig. 14

There is a safety fuse located between the cross-flow fans behind the rear wall. It protects against overheating.

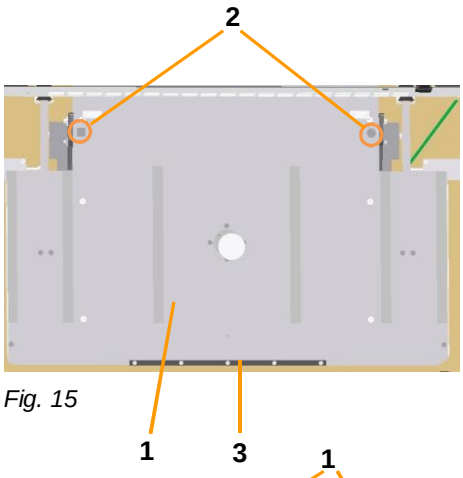


Fig. 15

1 Table
2 Cones (to lock the tray)
3 Stop bar

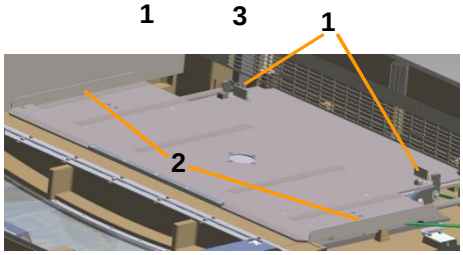


Fig. 16

1 Rear stops
2 Guide rails

Fig. 17

Locking hooks

Setup and function

The following elements are located underneath the table:

1 Tray ejector
2 Drive belt
3 Counterweight

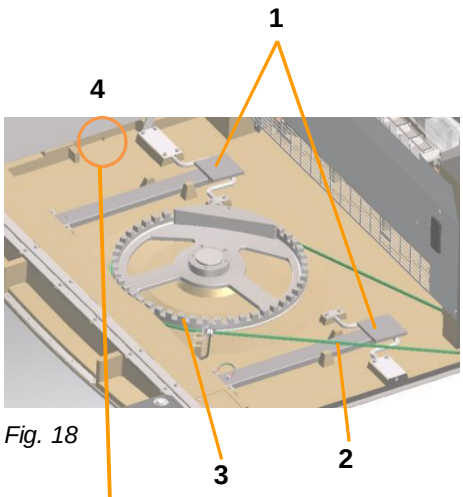


Fig. 18

4 Drain hole

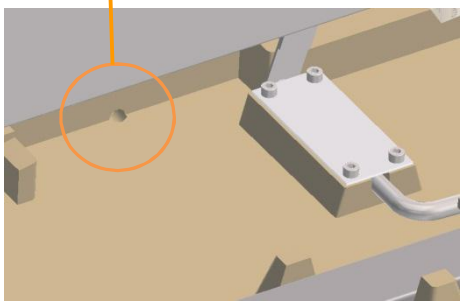


Fig. 19

Optional (on rear wall of incubation chamber):

CO_2 sensor (on the left on the rear wall panel)

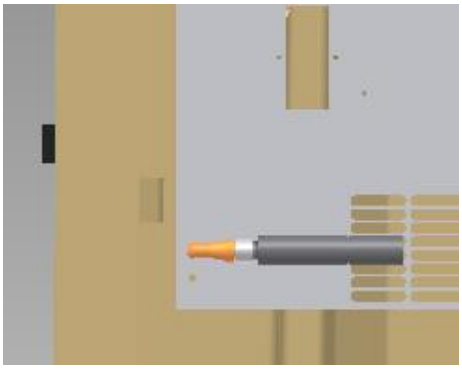
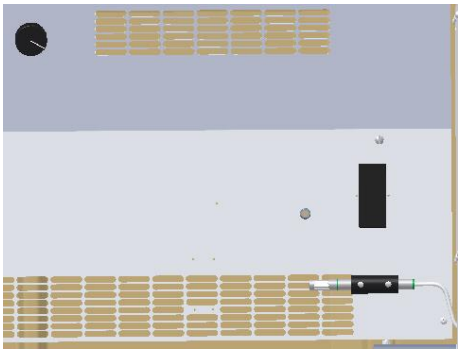
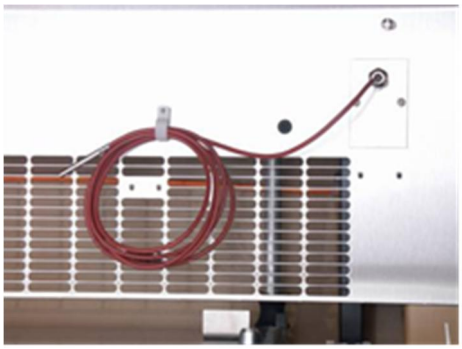


Fig. 20



Humidity sensor (on the right on the rear wall panel)

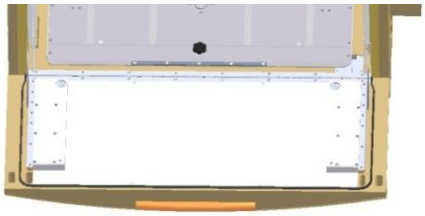
Fig. 21



Mobile Pt100 sensor

Fig. 22

Transport lock



The table and the counterweight are secured with a star knob screw during transport to stop them moving uncontrollably.

This lock is located in the front section of the table.

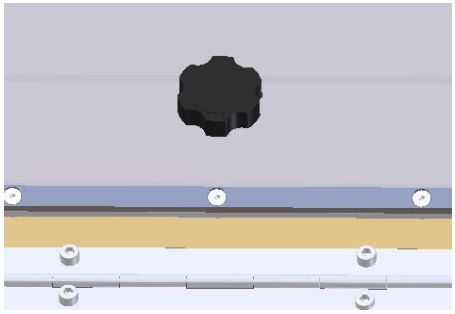


Fig. 23

NOTICE!

Please keep the star knob screw in a safe place for future use.
Do not relocate the unit without engaging the transport lock first.

4.2 Basic Functions

Shaking

The table rotates with a speed of 20 to 400 RPM. The counterbalancing weight is located underneath the table. Depending on the model (fixed throw or variable throw), the orbital throw is 12.5 mm, 25 mm or 50 mm.

The loading weights must lie within the specified range. Loading weights above or below this range prevent the table moving smoothly and thus increase wear of the bearings and joints.

The loading weights depend on the position of the deck in the stack, the throw and the rotation speed.

NOTICE!

The loading weights and maximum speeds are given in the chapter "Technical Data".

Temperature control

The temperature is controlled via two cross-flow fans, which are each equipped with a downstream heating element. The temperature is measured and controlled with a Pt100 temperature sensor. The two cross-flow fans are each equipped with a thermostat to prevent overheating. It switches off the heating at 80 °C.

The incubation shaker is doubly protected against overheating:

- Capillary thermostat with rotary knob
  (standard setting from 65 °C)
- Melting fuse (84 °C)

NOTICE!

Please contact the manufacturer's service center if the melting fuse has blown.
The heating is out of order and can only be reinstated by replacing the melting fuse.

Control system

The incubator shaker is equipped with a microprocessor control system. It is used to control, monitor and program the unit.

Each deck of a stack can be operated from each operating panel.

An integrated timer function allows programming of time cycles. Various displays and alarm functions are integrated into the control system.

Operation

The operating panel in the door of the incubator shaker is used to activate the parameters and set the target values.

The incubator shaker is equipped with a tray lock that secures the tray to the table. When the door is fully open, the locking hooks on the table release the tray. The tray ejectors underneath the table lift the tray out of the locking cones on the table.

The tray is pulled out of the incubation chamber over glide rails and the embedded roller bearings located on the interior side of the door. 2 Cylindrical pins (stops) in the glide rails limit the end position of the extended tray. The fully extended tray rests partly on the door and partly on the table.

The table is stopped as soon as the door is opened by more than 30°. The door can only be opened completely after the table has stopped moving. The table restarts automatically as soon as the door is closed by more than 45°.

All activated parameters are stopped as soon as the door is opened by more than 30°. They are re-activated as soon as the door is closed by more than 45°.

4.3 Messages

An alarm system is integrated into the unit to monitor its functions.

The incubation shaker differentiates between:

- Alarm:
  Setpoint value not reached (usually due to an operating error)
  Display: High, Low, RESTARTED, warning symbol

and

- Error messages:
  Fault due to a defect component or blocked table
  Display: ERROR, Er1, Er2, warning symbol

NOTICE!

For evaluation and troubleshooting of interferences: please refer to Chapter 9 Interferences.

An alarm is triggered when a parameter does not reach the setpoint value within defined time.

The alarm is automatically cancelled when the parameter reaches the setpoint value.

There are three ways of issuing an alarm:

- visually
- acoustically
- analog signal

Visual alarm

Value below setpoint: Low

Value above setpoint: High

Restart after power failure

Acoustic alarm

PIEP – PIEP – PAUSE – PIEP – PIEP

An error message is triggered when the incubation shaker ha a fault.

This is the case when a component is defect or communication between sensor and control is interrupted.

Visual error message

The displays show various error messages. Please refer to chapter Interferences.

Message ERROR lights and warning symbol blinks.

Acoustic error message

PIEP – PAUSE – PIEP

Warning symbol

The warning symbol lights at any operations. Additionally it lights when as alarm or error is triggered. The warning symbol supports the user to operate the incubation shaker properly.

4.4 Serial interface

The unit is equipped with an RS 232 serial interface.

RS 232, 9-PIN

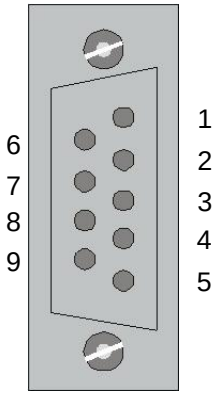


Fig. 24

PIN assignments			
1 + 6	NORMAL STATE	2	RX (RECEIVE)
1 + 7	ALARM and POWER FAILURE	3	TX (TRANSMIT)
8	RESERVE	4	RESERVE
9	RESERVE	5	GND

Alarm contacts

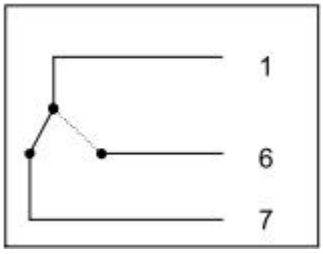


Fig. 25

4.5 Option Analog Interface

The unit is equipped with an analog interface DB 15.

DB 15, female, 15-PIN

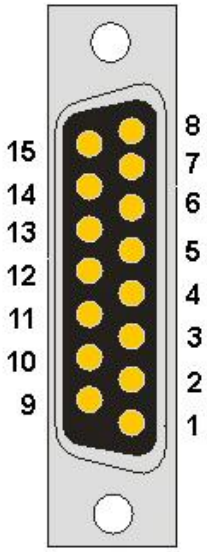


Fig. 26

PIN assignments				
15	GND	8	RESERVE	
14	GND	7	RESERVE	
13	GND	6	RESERVE	
12	GND	5	RESERVE	
11	GND	4	CO2	0 – 10%
10	GND	3	HUMIDITY	0 – 100%
9	GND	2	TEMP	0 – 100 °C
		1	RPM	0 – 500 RPM

Signal strength 0 – 10V

4.6 Option bases

The incubator shaker can be equipped with the following bases:

Fig. 27

- Rubber feet, 3 cm (bench-top model, standard)

Fig. 28

- Trolley, base frame 13 cm plus castors (optional)

Fig. 29

- Base frame, 13 cm (optional)

Fig. 30

- Base frame, 31 cm (optional)

4.7 Operating panel

The incubation shaker is operated using the operating panel integrated into the glass door.

The operating panel comprises the following elements:

- Function keys to enter parameter values
- Displays for parameters, values, messages and unit selection.

With the upper group of function keys parameter temperature, CO_2 Illumination and phase 1 are operated.

With the lower group of function keys parameter RPM, Humidity, O_2 and phase 2 are operated.

Selection of parameters is operated with the scroll function key.

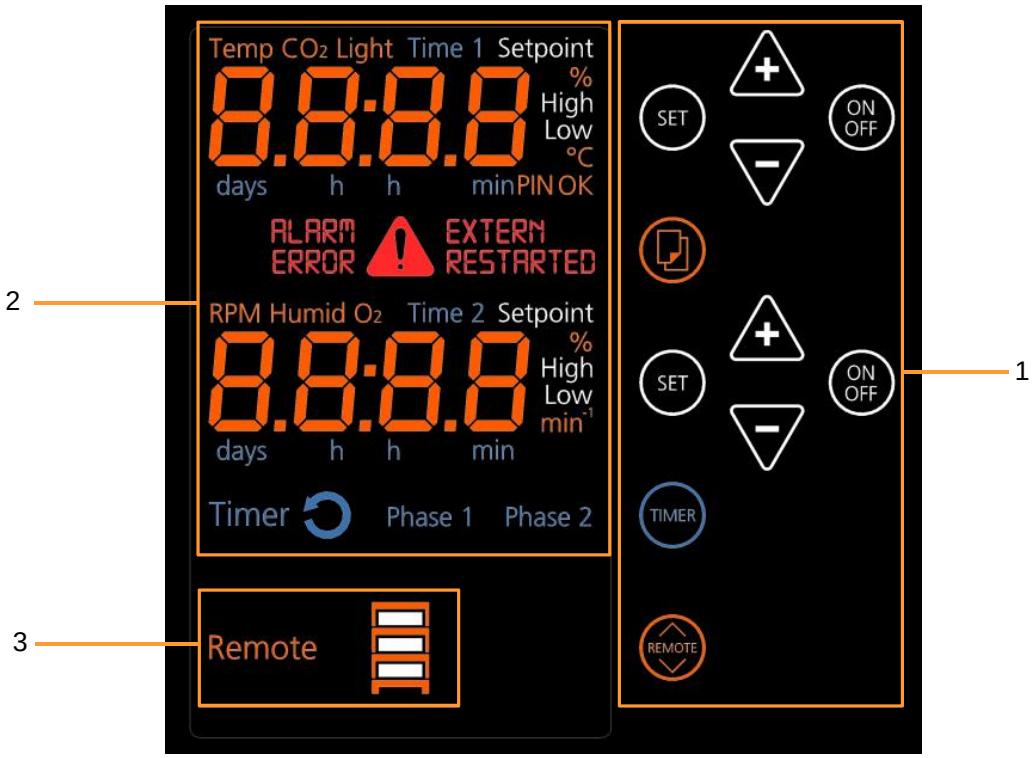


Abb. 31

1 Function keys to enter parameter values.
2 Displays parameter, timer and messages.
Displays parameter values, parameters and units.
Diplays messages
Displays timer functions
Diplays Setpoint, High, Low
3 Display unit selection and remote access.

Parameter symbols and units lit orange when active.
Values and messages in the displays lit orange when active.
Warning symbol and warning messages lit red when active.
Function of timer lit blue when active.
Setpoint, High and Low lit white when active.

4.7.1 Operating panel symbols

Speed symbol

Indicates that the shaking speed RPM (rotation per minute) can be set.

Temperature symbol

Indicates that the temperature can be set.

Humidity symbol

Indicates that the humidity can be set.

Gassing symbol

Indicates that the gassing can be set.

Illumination symbol

Indicates that the illumination can be set.

Remote symbol

Indicates that the unit is being set externally.

Setpoint symbol

Indicates that a parameter can be set.

High symbol

Indicates that a current parameter value is too high.

Low symbol

Indicates that a current parameter value is too low.

Timer symbol

Indicates that timer function can be operated (duration of Time1 and Time 2).

Cycle symbol

Indicates, that both timer are active.

Phase 1 symbol

Indicates, that the equipment is operating in timephase 1.

Phase 2 symbol

Indicates, that the equipment is operating in timephase 2.

Time 1 symbol

Indicates, that programming mode of timer is active and Time 1 is selected.

Time 2 symbol

Indicates, that programming mode of timer is active and Time 2 is selected.

EXTERN symbol

Indicates, that the equipment is accessed by remote.

RESTARTED symbol

Indicates, that the equipment had a power supply interruption.

ALARM symbol

Indicates, that a current value of a parameter is in the alarm limits.

ERROR symbol

Indicates, that an interference occurred.

WARNING symbol

Indicates, that the equipment is in a special mode except the normal operating mode.

4.7.2 Operating panel displays

Unit selector functional display

The unit selector shows which unit of a stack is currently configurable with the respective operating panel.

e.g. middle unit is selected – lights up white.

Upper display

The 4-digit display shows setpoints and current values of the temperature parameter, CO_2 parameter, Light, values of the time phase 1, warnings and error messages and informations of the equipment.

Lower display

The 4-digit display shows setpoints and current values of the RPM parameter, humidity parameter, O_2 parameter, values of the time phase 2, warnings and error messages and informations of the equipment.

Messages

Messages are displayed between upper and lower display.

Warning sign blinks when a message is displayed.

4.7.3 Operating panel keys

ON/OFF function key

Switches parameters and timer on or off.

SET function key

Activates the edit mode of parameters or timer.

Option function key

Scrolls through the installed parameters.

PLUS function key

Increases the value of the selected parameter or time phase.

MINUS function key

Decreases the value of the selected parameter or time phase.

TIMER function key

Activates the edit mode of the timer.

REMOTE function key

Switches between the controls systems of the individual units in stacked systems.

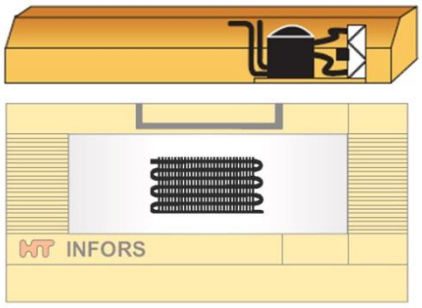
4.8 Option cooling system

The incubator shaker is equipped with a cooling system so that cultivation can be carried out in a defined climate.

The heat exchanger of all cooling systems is located behind the rear wall of the incubation chamber.

The following cooling systems are available:

Top-mounted cooling system, 900 watts / 1200 watts



The cooling unit is located in a housing mounted on top of the incubator shaker.

It can cool up to three incubators.

The cooling unit has a separate power supply.

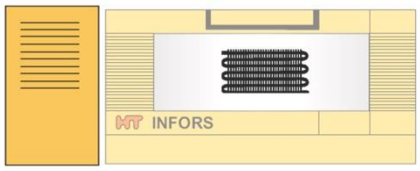
The mains switch is located on the left-hand side of the mounted housing.

The cooling unit has a twin-circuit system with a coolant tank.

The coolant tank is located in the mounted housing.

Fig. 32

Side-mounted cooling system, 380 watts



The cooling unit is located in a housing mounted on the side of the incubator shaker.

It can cool only one incubator.

The incubator shaker supplies power to the cooling unit.

The cooling unit is a closed single-circuit system.

Fig. 33

External cooling system

CAUTION!
Risk of material damage to the circulating pump of the external cooling unit.

The circulating pump of the external coolant system may be damaged if it is not connected correctly.

Therefore:

– The cooling register must be connected to the external coolant system with a bypass.

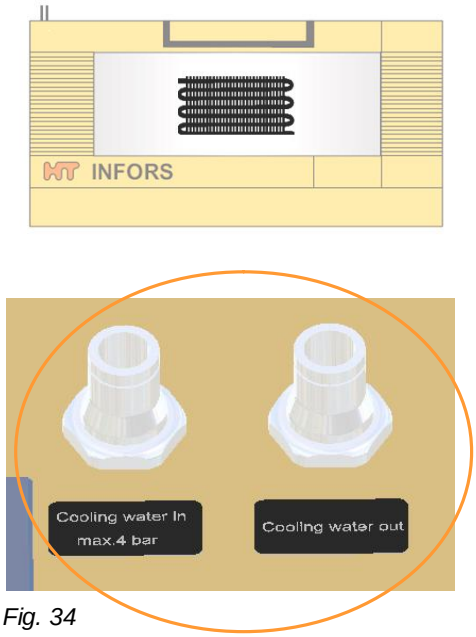


Fig. 34

The cooling unit is supplied with cooling liquid from the in-house cooling system.

A control valve opens when necessary to allow coolant to flow through the cooling register.

The inlet and outlet of the coolant circuit are each equipped with a male hose nozzle with an outside diameter of 10 mm.

They are located on the upper left-hand side of the top of the incubator shaker.

The cooling unit does not require a power supply.

4.9 Option «Sticky Stuff» adhesive matting

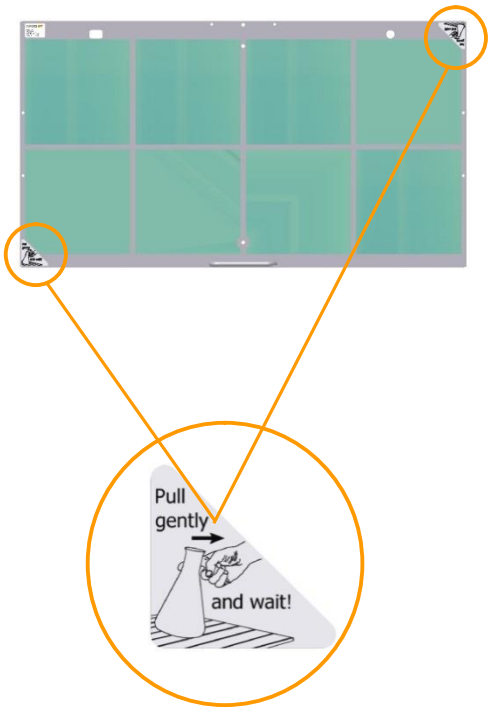


Fig. 35

The «Sticky Stuff» adhesive matting is a very sticky mat that lines the tray. It can be detached from the tray and replaced.

The adhesive matting can also be used on perforated trays.

The adhesive matting provides secure purchase for cultivation flasks with a large base.

The tray is labeled on two diagonally opposed corners with an information sticker on how to remove the cultivation flasks.

These stickers must not be removed under any circumstances.

4.10 Option Direct Steam Humidification

The incubator shaker is equipped with a Direct Steam Humidification.

The Direct Steam Humidification is switched on or off via the operating panel.

A humidity sensor, located on the rear wall of the incubation chamber, measures the humidity.

Please note the following points:

- The Direct Steam Humidification operates in one direction only. It increases the humidity, but does not decrease it.
- The Direct Steam Humidification only operates correctly at temperatures up to 40 °C.
- The temperature parameter must be switched on.
- The cooling system switches off automatically when the Direct Steam Humidification is switched on.

NOTICE!

An optional control program is available for simultaneous operation of the humidification and the cooling system.

- If the illumination is switched on, the maximum humidity may not reach 85% rH under all conditions.

Fig. 36

The Direct Steam Humidification is mounted on the rear of the housing.

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

There are two types of water supply:

- unpressurised from a water tank
- pressurised to max. 0.3 bars from a pressurised pipeline

4.11 Option CO_2 gassing

The incubator shaker is equipped with a CO_2 gassing unit.

This comprises:

- A controlled CO_2 gassing device
- A transparent safety curtain inside the chamber (the gassing unit can be operated without the curtain fitted)

Setup and function

Controlled CO_2 gassing device

Fig. 37

The inlet nozzle is located on the right-hand wall of the housing.

The CO_2 supply is provided with a control valve. There is a CO_2 sensor inside the chamber that transmits the measured CO_2 content to the control unit.

The CO_2 gassing unit is operated via the operating panel.

Transparent safety curtain

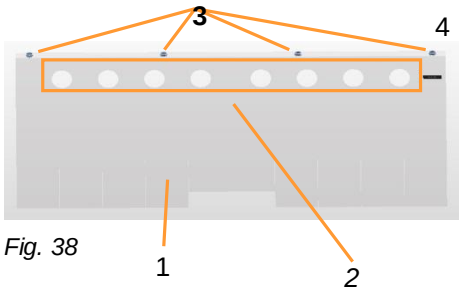


Fig. 38

1 PVC safety curtain
2 Circulation holes for humidification(optional)
3 Snap fasteners
4 Marking

Fig. 39

Snap fastener

Fig. 40

Label "outside"

The curtain is made of transparent PVC sheeting, 0.75 mm thick.

There are four snap fasteners on the upper front edge of the incubation chamber to attach the curtain.

The lower edge of the curtain has 8 slits to facilitate handling of the tray.

The curtain is marked "outside" so that it can be fitted correctly.

The transparent curtain is attached to the upper front edge of the housing by means of the 4 snap fasteners.

The curtain prevents large amounts of CO_2 escaping when the door is opened.

NOTICE!

The safety curtain keeps the CO_2 gas inside the incubation chamber:

- *approx. 60% on opening the door*
- *approx. 40% on pulling out the tray*

There are two types of safety curtain:

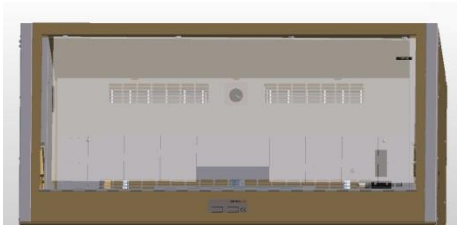


Fig. 41

- CO_2 – closed

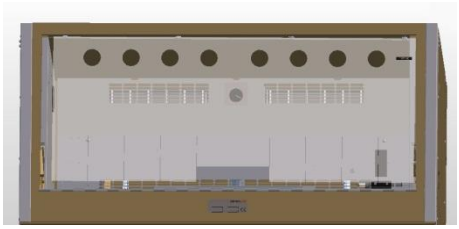


Fig. 42

- CO_2 + humidification – with 8 circular holes (Ø 45 mm) in the upper section

4.12 Option Reduction Station for CO_2 gassing

The reduction station for the CO_2 gassing is located on the right-hand wall of the housing.

It consists of an adjustable rotameter with a control range of 120 – 480 Nl/h.

Fig. 43

Flow rate

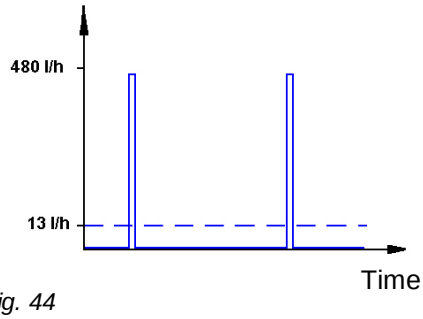


Fig. 44

The adjacent diagram shows the gas feed cycle for the CO_2 supply.

Effective flow rate

Mean flow rate

4.13 Optional Illumination

A unit with sockets for fluorescent tubes is mounted on the ceiling of the incubation chamber.

NOTICE!

Owing to the diminished height of the incubation chamber, the maximum volume of the culture flasks is 2 l.

Tubes with different light spectra can be used:

- daylight tubes
- photosynthesis tubes

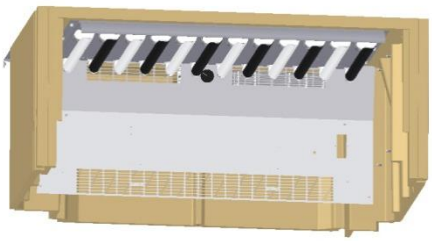


Fig. 45

The illumination unit is mounted on the ceiling of the incubation chamber.

The tubes have sockets at both ends (G13).

The tubes can be switched on and off in pairs, as required.

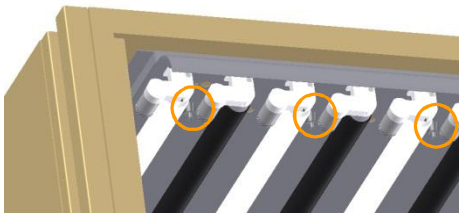


Fig. 46

This is carried out using the switch located on the ceiling between the switchable tubes.

4.14 Option “Algae” Illumination

The illuminants are introduced through the side walls of the incubator shaker housing. The power supply and control elements are located on the right-hand and left-hand sides of the housing.

The illumination is switched on and off using the operating panel of the incubator shaker.

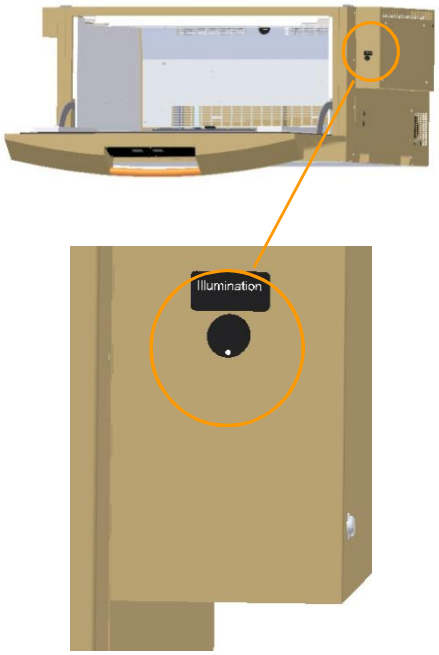


Fig. 47

The walls of the incubation chamber have a white coating.

The illumination is equipped with a dimmer.

Fig. 48

The inside of the door is lined with a white panel.

It is used to exclude light and improve light distribution within the incubation chamber.

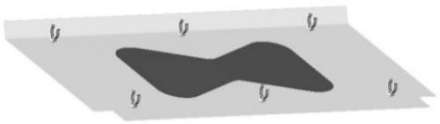


Fig. 49

A Plexiglas panel with a light diffuser sheet is clipped on over the illuminants.

4.15 Option Pass-through

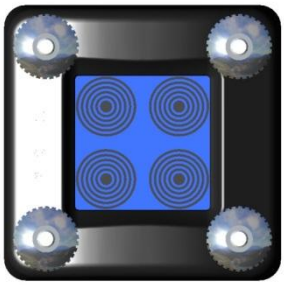


Fig. 50

The incubator shaker is equipped with a pass-through.

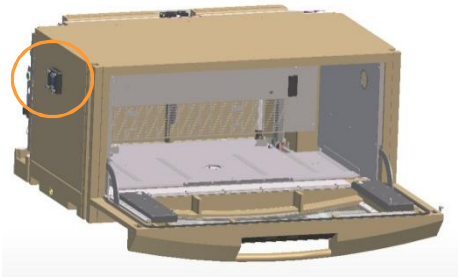


Fig. 51

It is integrated into the left-hand wall of the housing.

The pass-through reduces loss of heat, moisture and gases when hoses or cables are routed into the incubation chamber.

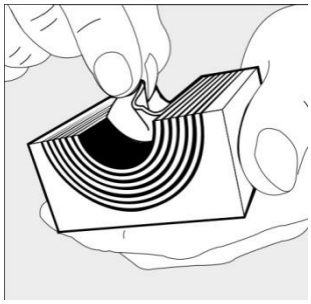


Fig. 52

The pass-through consists of divisible elements that can be removed in layers to adjust the opening to fit the diameter of the hose or cable (see chapter "Installation and initial operation – Fitting the hose/cable pass-through).

A red cylindrical plug and a bag of Roxtec lubrication gel are included to the shipping.

Close the opening with the plug after removing the layers of the modules.

4.16 Option Mobile Pt100 sensor

The incubator shaker can be additionally equipped with a mobile temperature sensor that extends the functionality of the integrated temperature sensor.

The mobile Pt100 sensor is integrated into the control system as a cascade, i.e. the mobile Pt100 sensor delivers additional temperature data measured in the liquid.

Measurement and control are still carried out via the integrated temperature sensor.

NOTICE!

The cascade control can be disabled. This involves disconnecting the mobile Pt100 sensor from the measuring unit by a qualified specialist from the equipment manufacturer.

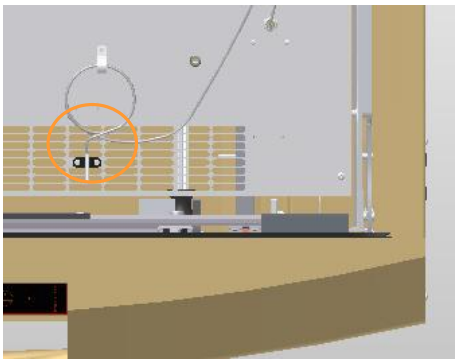


Fig. 53

The mobile temperature sensor is inserted into a holder on the rear wall of the incubation chamber.

It can be used

- in a reagent flask
- underneath disposable culture bags.

During operation, the mobile temperature sensor must be placed in a reference flask containing water or, if incubation is carried out in a disposal culture bag, it must be placed in its intended position underneath the bag.

The temperature is controlled automatically in the cascade mode, i.e. the value measured by the mobile temperature sensor is the actual temperature of the liquid. This value is used as a reference variable for controlling the temperature inside the incubator. This has two advantages:

- Control is more precise because the temperature is measured directly in the liquid. It eliminates the uncertainty associated with measuring in air due to heat transfer from the air to the liquid.
- In the event of temperature jumps, e.g. for thermal induction of protein expression, the target value in the liquid can be reached much faster and more accurately.

In case of a temperature jump upwards or downwards, the controller will alter the temperature of the incubator well beyond the setpoint value to speed up heat transfer from the air to the liquid and vice versa. Before the target value is reached in the liquid, the temperature in the incubation chamber is automatically adjusted to the setpoint value to avoid values beyond the setpoint.

CAUTION!
Risk of damage to the sensor cable due to abrasion by moving parts.

If the mobile temperature sensor is used on the moving table, the sensor cable may be abraded and damaged due to contact with moving parts.

Therefore:

– Ensure that the mobile temperature sensor does not come into contact with moving parts.

Please note the following points:

- If a mobile temperature sensor is installed, it must always be
  - immersed in liquid in the reference flask

or:

  - placed in its intended position underneath a culture bag.
- When the mobile temperature sensor is inserted into its holder, it measures the air temperature. This may cause cycling of the temperature control system.
- If the mobile temperature sensor is used to measure the temperature of the liquid in a reference flask, this reference flask must have the same size and must contain the same volume as the culture flasks. The use of culture flasks with different sizes is not possible because the heat transfer differs depending on the volume. If culture flasks are used whose size and volume differ significantly from those of the reference flask, this may cause the temperature to be considerably higher or lower than the setpoint value before the target temperature is eventually reached in the liquid.

4.17 Option Adjustable counterweight

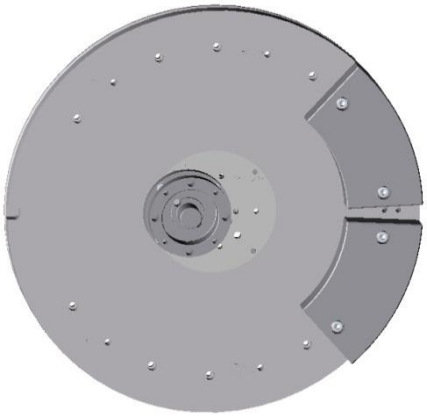


Fig. 54

The unit is equipped with a variable throw.

The eccentric displacement of the axle allows the eccentric throw to be set to three positions:

- 12.5 mm
- 25 mm
- 50 mm

The counterweights are also adjustable to reduce vibrations during operation.

If the tray weight is more than 12 kg (loaded, including holders) and at higher speeds, the counterweights can be set to the position HL (heavy load).

The positions for mounting the two weights are marked:

- Throw 12.5 / HL 25
- Throw 25 / HL 50
- Throw 50

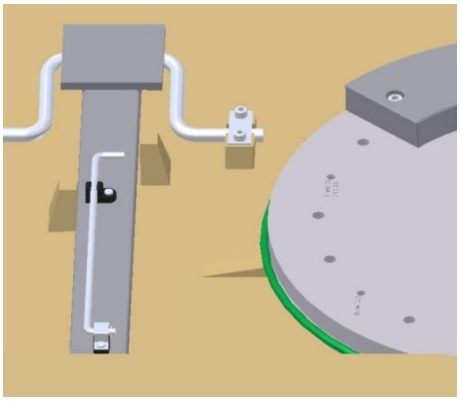


Fig. 55

Underneath the table, there is a prop on the left-hand tray ejector. It is used to secure the table in the highest position while the counterweights are being fitted. The prop is hung onto the rail on the underside of the table.

4.18 Option UV sterilisation of the air supply

The air supply to the incubator is sterilized using two units with UV lamps that are installed between the rear wall of the housing and the lining of the incubation chamber.

The UV sterilisation lamps emit high-energy UV radiation with a wavelength of 253.7 nm. The air drawn in by the cross-flow fans is fed through this light trap. The UV radiation kills any microorganisms in the air supply.

The picture on the left shows the position of the UV sterilisation units behind the stainless steel lining of the incubation chamber.

The UV sterilisation units are not visible.

Fig. 56

The switch for the air sterilisation unit is located on the left-hand side wall.

The switch for units with side-mounted cooling is located on the front panel of the cooler housing.

Fig. 57

5 Transport, packaging and storage

5.1 Safety instructions for transport

Inappropriate transportation

CAUTION!
Damage due to inappropriate transportation!

Inappropriate transportation may cause considerable loss of property.

Therefore:

– Handle packed items with care and caution when unloading on delivery, as well as during in-house transportation.
– Remove packaging finally only when the equipment is ready to be brought into use.

5.2 Transport inspection

Immediately verify delivery on receipt for completeness and freedom from any transit damage.

Proceed as follows when transit damage is physically identifiable:

- Do not accept delivery or under reserve only.
- Note extent of loss on transport documentation or delivery note.
- Initiate complaint.

NOTICE!

Complain regarding a defect as soon as it is identified. Claims for damages can only be made within the effective terms for presenting complaints according to the manufacturer's general conditions of contract

5.3 Packaging

CAUTION!
Risk of material damage – particularly the window – due to scratches caused by using sharp-edged or pointed tools when opening the packaging.

Therefore:

– Do not use pointed tools to open the packaging.

Packaging

Only environmental friendly packaging materials are used.

The unit and its accessories are packed in a crate (wood and/or corrugated cardboard) on a EURO pallet.

The packaging is intended to protect the individual components against damage during transport, etc. Therefore, do not destroy the packaging and do not remove it just before starting initial operation.

5.4 Transport

CAUTION!
Risk of damage due to extreme localised loads.

An extreme localised load may cause the feet to shear off or leave dents in the base plate.

Therefore:

– Never push the unit.

Owing to its weight, the incubator shaker must never be transported or moved by one person alone.

If the unit has to be relocated over a long distance within the building, it is essential to use a stacker truck or a trolley.

When transporting with a stacker truck, the unit must be set down very carefully in a vertical position on the floor.

Transport on a trolley must be carried out with extreme care.

Never transport the unit without fitting the transport lock first; see "Installation and commissioning – Fitting the transport lock".

Transport of palettes with fork lift.

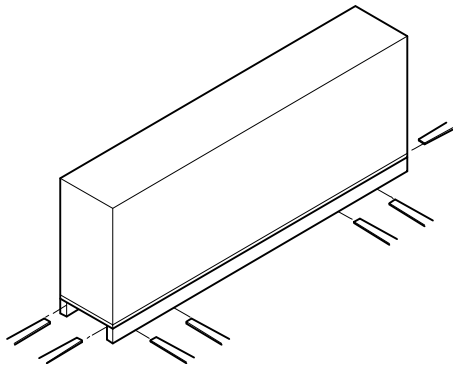


Fig. 58

Packing pieces which are mounted on palettes can be moved by a fork lift in the following circumstances:

- The fork lift must be of appropriate design for the weight of the unit to be transported.
- The driver must be qualified for driving the fork lift.

To hook on:

1. Drive the fork lift with its forks between or under the palette's bars.
2. Move the forks so that they stand out on the opposite side.
3. Ensure that the palette cannot tilt because of an eccentric balance point.
4. Lift the packed item and start to transport it.

5.5 Storage of the incubator shaker

The unit must be stored as follows:

- Do not store outdoors.
- Do not expose to aggressive substances.
- Do not expose to sunlight.
- Avoid mechanical vibrations and shocks.
- If stored for more than 3 months, make regular checks of the general condition of the unit and its packaging. If necessary, refresh or renew the conservation.
- Always decontaminate and clean the unit before putting it into storage (see chapter "Maintenance").
- Store the unit in a clean and dry place that is protected against dust, dirt and all kinds of liquids
- Store the unit in a cool place, not exposed to frost, and with a low humidity.
    - Storage temperature: 15 to 35 °C
    - Relative humidity: max. 60% rH

6 Installation and initial operation

Faulty installation or incorrect initial operation

WARNING!
Danger due to faulty installation or incorrect initial operation!

Installation and initial operation requires qualified and experienced personnel. Faulty installation may lead to perilous situations or severe loss of property.

Therefore:

– Installation and initial operation are to be carried out by the manufacturer's associates only.
– Call the manufacturer when any subsequent translocation is foreseen.
– Prevent arbitrary installation and translocation

6.1 Safety

Personnel

- Installation and initial operation may only be carried out by qualified personnel.

Electrical system

DANGER!
Danger of fatal electric shock!

Contact with electrically powered components is perilous. Energised electrical components may perform uncontrolled movements which can lead to severe injuries.

Therefore:

– Turn off the electrical supply and check whether it is electrically isolated before starting any work.

Inappropriate installation and initial operation

WARNING!
Risk of injury due to inappropriate installation and initial operation!

Inappropriate installation and initial operation may lead to severe damage to persons or loss of property.

Therefore:

– Make sure that enough space is provided for the installation before starting.
– Take care regarding sharp-edged components
– Keep the installation site tidy and clean! Discarded components and tools may be a source of accidents.
– Component parts must be installed professionally.
– Secure component parts so that they cannot fall off or tumble.

6.2 Location requirements for installation

6.2.1 Place of installation

The following requirements must be met for the installation of the unit:

- The equipment must be installed and operated inside a building.
- The unit must not be exposed to direct sunlight.

NOTICE!

The incubator shaker must be protected against hot exhaust air of other equipment with cooling systems.

- Ambient temperature must lie within the following range:
  - Minimum: 1 °C
  - Maximum: 30 °C
  - Without cooling: not more than 5 °C below the minimum incubation temperature
  - With cooling: not more than 20 °C above the minimum incubation temperature
- Protect the unit against mechanical damage (trolleys, being kicked, etc.).
- The installation site must be level, sufficiently stable and able to bear loads.

- There must not be any sources of electrical interference near the unit.
- All interfaces and switches on the unit must be readily accessible.

NOTICE!
The main switch of the incubator shaker must be completely unobstructed and readily accessible.

- Ensure that the workplace is sufficiently illuminated.
- Protect the operating panel against splashed water.
- Protect the outside of the unit against extreme levels of dust and dirt.

NOTICE!
Any other type of installation must first be checked with the manufacturer and requires the written permission of the manufacturer

6.2.2 Minimum distances

The incubator shaker must be set up as follows for operation, handling and repair work:

NOTICE!
Main switch and cable for power supply must be easily and freely accessible.

To provide a good circulation of air following distances are necessary:

- Right side: Minimum 8 cm
- Backside: Minimum 8 cm
- Top: Minimum 10 cm

The dimensions of the different models are given in the chapter "Technical Data".

6.3 Removing the transport lock

Before the unit can be put into operation, the transport lock must be released and removed:

Procedure

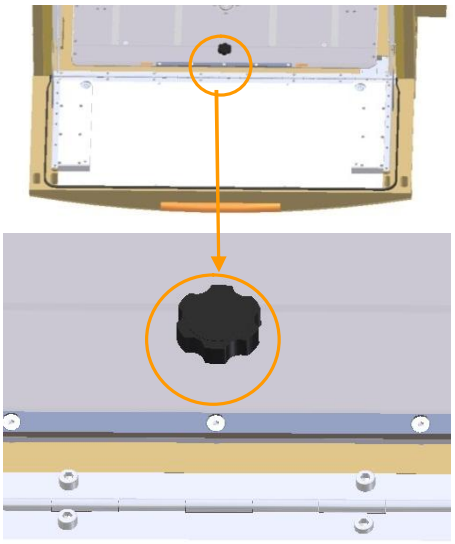


Fig. 59

1. Release and remove the star knob screw.

2. Store the screw and the supplied tools together for future transports.

6.4 Mounting the drain nozzle

Before commissioning, the supplied hose nozzle must be screwed into the drain hole:

Procedure

1. Unscrew the blanking plug from the drain hole.

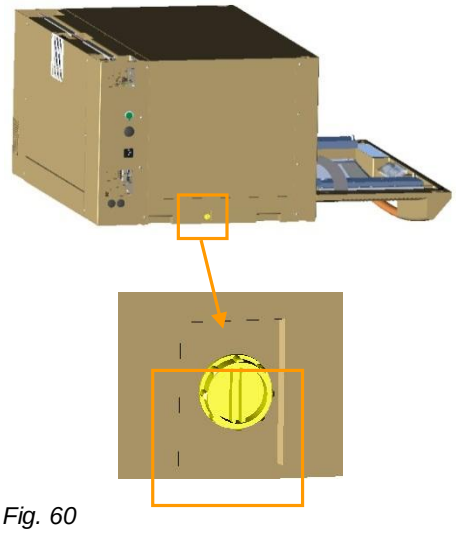


Fig. 60

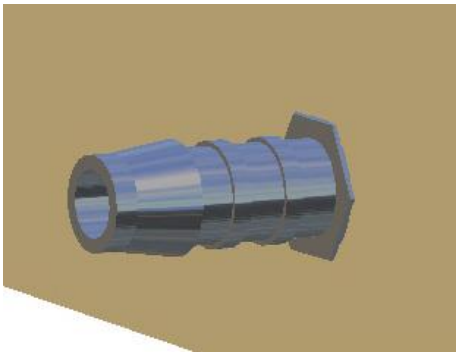


Fig. 61

2. Screw in the hose nozzle.

NOTICE!

To drain condensate or rinsing fluids, mount one end of a hose onto the nozzle and place the other end in a suitable container.

6.5 Switching on the unit

Connect the unit to the power supply with the power plug.

NOTICE!

It is essential that each unit is connected via an electrical socket that has its own 16 ampere fuse.

Fig. 62

The main switch of the unit is located to the rear of the left-hand side wall. It is an ON/OFF push-button switch that must be switched on for all operating modes.

- Unit OFF = switch is not illuminated
- Unit ON = switch is illuminated

CAUTION!

Risk of material damage if the door is forced downwards when the unit is switched off.

The door mechanism may sustain damage if it is forced completely open when the incubator shaker is switched off.

Therefore:

– Do not force the door completely open when the incubator shaker is switched off.

NOTICE!

Frequent ON/OFF switching of the unit may damage the electronic components.

The unit only needs to be switched off if it will not be used for a while (> 1 day).

The setpoint values of the parameters remain stored for approx. 1 month.

The power consumption in the standby mode is approx. 6 watt per hour.

6.6 Installing the incubator shaker

CAUTION!
Risk of material damage due to uncontrolled movement of the unit.

The unit may start moving around uncontrollably if it is placed on a slippery surface.

Therefore:

– Place a non-slip mat under each foot.

CAUTION!
Risk of material damage due to uncontrolled movement

If the unit has not been leveled properly it may move around uncontrollably if it starts to vibrate.

Therefore:

– If the unit shows any signs of vibration or unusual movements, level it again.

Rubber feet

The bench model cannot be leveled out. It must stand on a firm, flat surface.

Trolley

NOTICE!

The trolley cannot be leveled out. Remove both front castors out of the frame before starting initial operation.

Procedure

1. Lift the incubator shaker with a stacker truck.
2. Pull the front castors out of the frame.

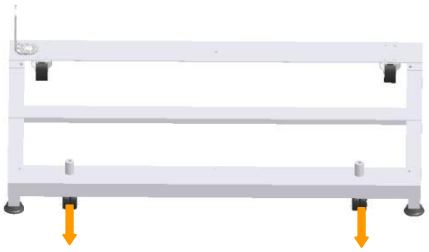


Fig. 63

3. Set the unit down again carefully.

Installation and initial operation

Base frame

Units with a base frame must be leveled using the adjustable feet.

The unit must be leveled on initial installation or if it is relocated.

NOTICE!

If the incubator shaker is resting on a slippery surface, place a non-slip mat under each foot.

Procedure

1. Release the locknut of the leveling foot.

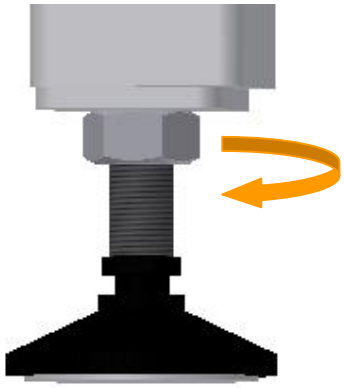


Fig. 64

2. Set the shaking speed of all units in the stack to 50 rpm.
3. Start the shakers.
4. Check the stacked units for vibrations or uneven operation.
5. In the event of vibrations or uneven operation, adjust the leveling foot upwards or downwards with an open-end wrench (19 mm) until the stacked units operate smoothly.
6. Check the smooth running of the units in increments of 50 rpm.
7. Adjust the leveling foot if the unit vibrates or does not operate smoothly.
8. Release the locknut of the leveling foot.

6.7 Setting the capillary thermostat

The capillary thermostat oft he incubation chamber has a default setting of 70 °C. This is 5 °C above the maximum operating temperature oft he unit, e.g. 65 °C.

The absolute tolerance oft he thermostat is 2.5 °C.

Procedure

1. Set the thermostat to 70 °C.

2. Shut the door of the unit.

3. Switch on the unit.

4. Press option key to select the temperature parameter.

The temperature parameter lights up.

5. Press Set key.

Setpoint lights up.

6. Press the PLUS key until the maximum operating temperatur (e.g. 50 °C) is set.

7. Press the ON/OFF key to switch on the temperature control system.

8. Wait until the upper desplay has reached the setpoint value (e.g. 50 °C).

9. Open the door.
10. Turn the thermostat down slowly until there is an audible click at the actuation point of the thermostat.
11. Set the thermostat 5 °C higher.

NOTICE!

The thermostat must be set a few °C higher than the maximum operation temperature to allow a continuous control.

The thermostat is now set. The maximum operating temperature now corresponds to the specified setpoint shown in the display.

6.8 Setting the adjustable counterweight

The counterweight with a variable throw is equipped with two detachable weights that can be flexibly mounted.

These weights are positioned according to the throw and the load.

The throw can be altered with an adjustable axle.

CAUTION!

Risk of material damage due to use of too high shaking speed!

The incubation shaker may move due to vibrations caused by too high shaking speeds and may cause damage at the site.

Therefore:

– Never set speed value over given values of the specifications in chapter „Technical Data“.
– Place equipment on an anti-slip matting
– Inform operator about throw settings

6.8.1 Changing the throw

Change the throw as follows:

Procedure

1. Remove the 4 Allen screws from the table.

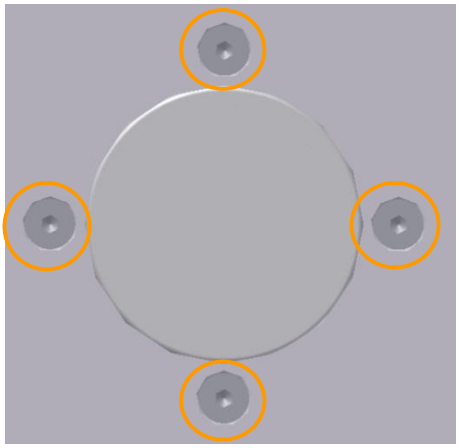
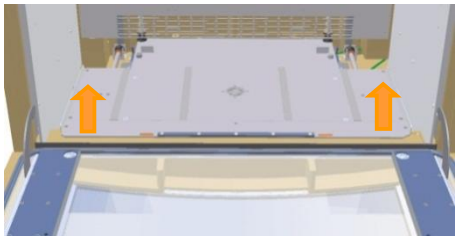
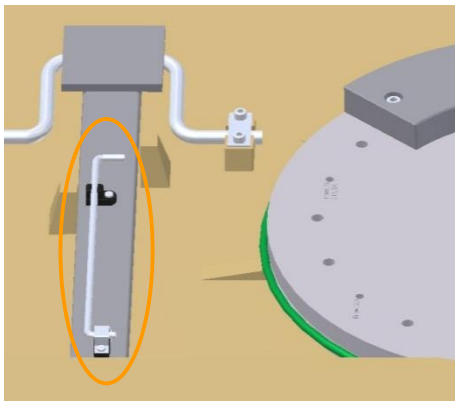


Fig. 65



2. Lift the table.

Fig. 66



3. Support the table with the prop.

Fig. 67

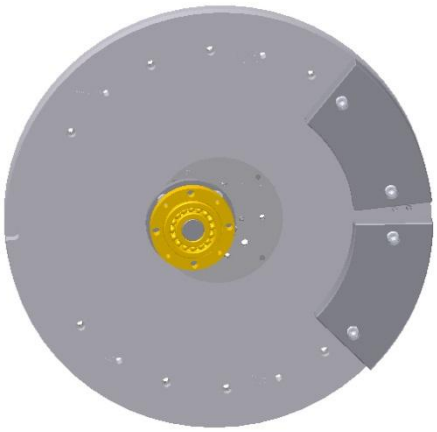


Fig. 68

4. Remove the bearing sleeve and self-aligning ball bearing (highlighted in yellow) from the adjustable axle.

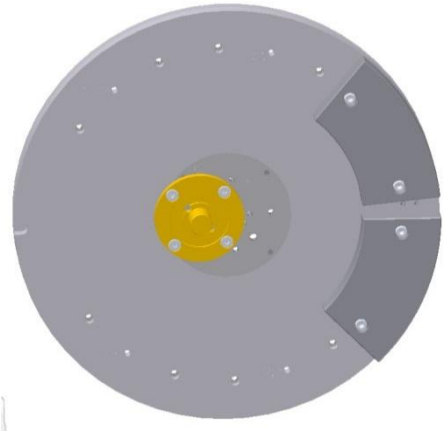


Fig. 69

5. Remove the 4 Allen screws from the adjustable throw axle.

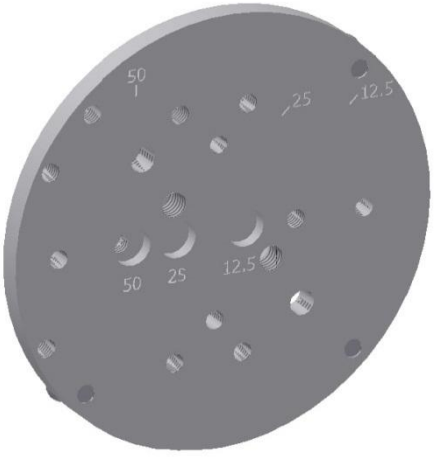


Fig. 70

6. Insert the throw axle into the desired throw position.

   - 12.5 mm
   - 25 mm
   - 50 mm

   The marking on the edge of the throw axle must line up with the marking on the counterweight. The different throws are engraved on the counterweight.

7. Attach the adjustable throw axle to the counterweight using the 4 Allen screws.

NOTICE!

Tighten the 4 Allen screws crosswise and uniformly,

8. Fit the self-aligning ball bearing and bearing sleeve on the axle.

6.8.2 Adjusting the detachable counterweights

Procedure

1. Remove the Allen screws securing the detachable counterweights.

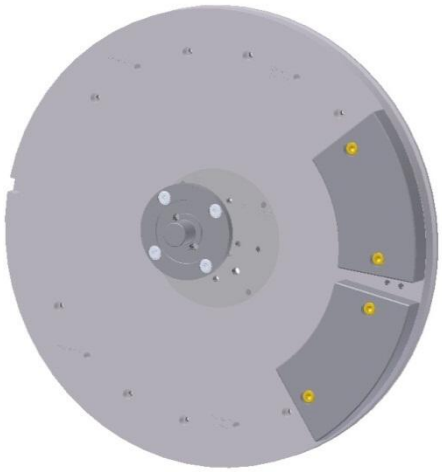


Fig. 71

2. Remove the detachable weights from the counterweight.
3. Insert the cylindrical pins in the desired counterweight positions.
4. Place the detachable counterweights in their desired positions on the counterweight.
5. Screw in the Allen screws to secure the detachable counterweights.

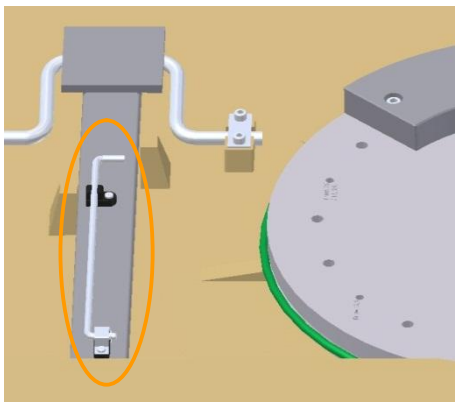


Fig. 72

6. Hold the table with one hand and press the prop into its holder.

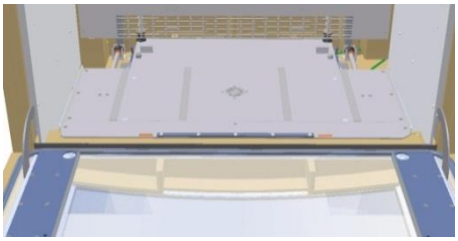


Fig. 73

7. Fit the table onto the drive axle.

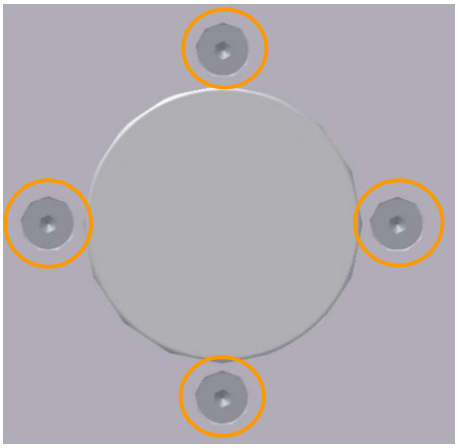


Fig. 74

8. Insert the 4 Allen screws of the table and tighten cross-wise.

6.9 Switching on the cooling system

NOTICE!

The nominal cooling capacity can only be reached if the ambient temperature at the cooling aggregate is below 30 °C.

Ensure sufficient air circulation.

See chapter "Installation".

- Side-mounted cooling system
  The side-mounted cooling system can be put into operation without any previous preparatory work.
- External cooling system
  The cooling register must be connected to the external cooling system via a feed hose and a return hose.
- Top-mounted cooling system
  The top-mounted cooling system must be filled with cooling liquid before it is put into service.

The supplied cooling liquid is diluted. The mixture has a mixing ratio of 9:2 (distilled water : coolant).

CAUTION!
Risk of material damage due to the use of an unsuitable cooling liquid.

The copper piping of the cooling system can be damaged by corrosion if an unsuitable cooling liquid is used.

Therefore:

– Use only copper-compatible cooling liquids suitable for use in the food and pharmaceutical sectors
– Pay attention to the level of cooling liquid in the tank

6.10 Filling with cooling liquid

CAUTION!
Risk of material damage due to dry-running of the pump and insufficient cooling.

If cooling systems with a coolant circuit (top-mounted or base cooling systems) are not filled with the supplied coolant before initial operation, this will have a negative effect on the cooling efficiency and will damage the pump if it runs dry.

Therefore:

– Before initial operation, fill the coolant system with the separately supplied coolant (Antifrogen L, copper-compatible and approved for use in the food and pharmaceutical industries; based on propylene glycol / 1,2-propandiol) (See also the warning sticker on the unit)

NOTICE!

The cooling liquid is not physiologically harmful. Nevertheless, avoid contact with skin and eyes. If swallowed, drink plenty of fresh water and seek medical advice, if necessary.

6.10.1 Top-mounted cooling system

The top-mounted cooling system must be filled with the supplied cooling liquid before it is put into operation.

Auxiliary tool

- Funnel

Procedure

1. Remove the cap from the filler port of the coolant tank.

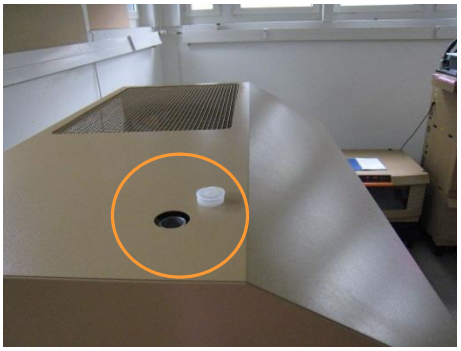


Fig. 75

2. Take the cooling liquid canister out of the incubator.
3. Place the funnel in the filler port.
4. Pour in the cooling liquid.

Fig. 76

5. Replace the cap of the filler port.

6.11 Connecting the external cooling system

NOTICE!

If it is certain that the feed temperature does not drop below +4 °C, it is not necessary to use an antifreeze.

The male nozzles for the inlet and outlet of the external coolant system are labeled.

The labels are located on the top panel or on the rear wall of the incubator shaker.

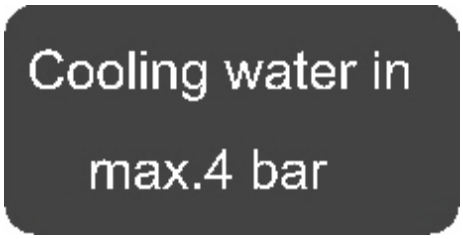


Fig. 77

Label of cooling liquid inlet

Fig. 78

Label of cooling liquid outlet

Connect the in-house cooling system as follows:

Procedure

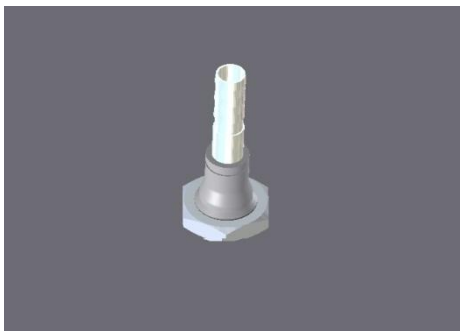


Fig. 79

1. Push the cooling feed hose onto the male inlet nozzle.

2. Secure the cooling feed hose with a hose clamp.

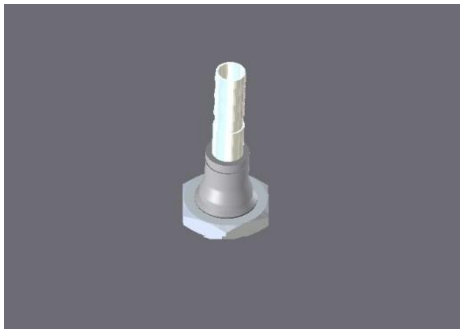


Fig. 80

3. Push the cooling return hose onto the male outlet nozzle.

4. Secure the cooling return hose with a hose clamp.

6.12 Connecting the Direct Steam Humidification

CAUTION!
Risk of material damage due to build up of lime scale through use of tap water.

Lime scale may build up in the evaporator and the incubation chamber through the use of tap water.

Therefore:

– Use only the recommended types of water for humidification.

Before starting initial operation the Direct Steam Humidification, it must be connected to an unpressurised water tank or to a pressurized water supply.

The inlet pressure must not exceed 0.3 bars.

NOTICE!

Place the water tank on the floor to avoid damaging the equipment and the electronics.
The water tank must fulfill the following conditions:

- closed
- *capable of being sterilized*
- *equipped with a filter for pressure compensation*
- *sufficient filling for one cycle*
- *located <2 m away from the incubator shaker*
- *Altitude <1.60 m above floor, if not placeable on the floor.*

Approved types of water (see Appendix):

- Distilled water
- Deionized water
- Demineralized water
- Reverse osmosis water

The Direct Steam Humidification is equipped with a Schott quickfit connector.

The feed hoses must be mounted on the Schott connectors as follows:

Direct mounting of hoses

Procedure

1. Cut the end of the hose cleanly.
2. Insert the hose as far as it will go into the quickfit connector.

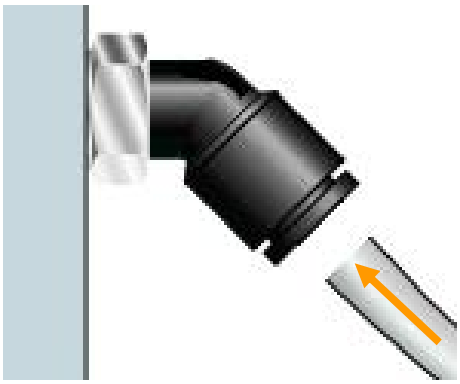


Fig. 81

Mounting the hose nozzle plus hose

Instead of mounting the hose, a hose plus a male nozzle can be inserted into the Schott quickfit connector.

Procedure

1. Insert the male hose nozzle into the Schott quickfit connector.
2. Push the hose onto the hose nozzle.
3. Secure the hose with a hose clamp.

6.13 Connecting the CO_2 gas supply

Fig. 82

The inlet hose nozzle for the CO2 supply is located on the right-hand wall of the housing.

The gassing unit is equipped with a control valve and a CO2 sensor.

The CO2 sensor is located on the left-hand side of the rear wall of the incubation chamber.

The gassing unit is operated via the operating panel.

The in-house supply of air or gas to the unit must meet the following requirements:

Requirements for air/gas supply

- Constancy of the air/gas supply
- The air/gas must be clean, dry, oil- and dust-free.

Requirements for the hose

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

6.14 Connecting the gassing pipe

The in-house supply of air or gas to the unit must meet the following requirements:

Requirements for air/gas supply

- Constancy of the air/gas supply
- The air/gas must be clean, dry, oil- and dust-free.

Requirements for the hose

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

7 Operation

7.1 Safety

Personnel

- The incubator shaker may only be operated by qualified chemistry, biology or bio-technology technicians or by personnel who have been appropriately instructed by qualified chemistry, biology or bio-technology technicians.
- All work associated with preparations for cultivation and the cultivation process must be carried out by qualified chemistry, biology or bio-technology technicians or by personnel who have been appropriately instructed by qualified chemistry, biology or bio-technology technicians.

Inappropriate operation

WARNING!
Risk of injury due to inappropriate operation!

Inappropriate operation may lead to severe physical injury or loss of property.

Therefore:

– Strictly follow the instructions stated in this operating manual.

CAUTION!
Risk of burns on touching hot surfaces.

There is a risk of burns from hot surfaces if the table and/or cultivation flasks are touched when the unit is operating at temperatures above 50 °C.

Therefore:

– Always wear safety gloves.

CAUTION!
Risk of injury due to broken glass or shards from glass cultivation flasks.

Broken or splintered cultivation flasks can injure hands and eyes.

Therefore:

– Always wear safety glasses.
– Always wear suitable safety gloves.
– Always use undamaged cultivation flasks.

7.2 Switching on the unit

The unit is switched on with the green button located on the side of the housing.

- ON = button is illuminated.
- OFF = button is not illuminated.

The initialization phase of the unit is shown on both displays.

The unit is not ready for operation until this phase is complete.

The initialization information disappears automatically when the initialization is complete.

Both displays show the version of the control type, e.g. Std for standard.

Following the version of firmware is displayed, e.g. Firmware 3.02.

Finally the access mode for the service mode is active for a few seconds (for authorized personnel only).

Displays change to operating mode subsequently.

Parameters temperature and RPM are shown in the displays.

The operation mode of the parameters are shown (OFF or the current value).

7.3 General operation

The unit is operated either directly using the operating panel oft he unit or externally.

The warning sign lights up when the unit is operated.

If the unit is operated externally, the EXTERN sign lights up.

The unit can be operated externally using any of the operating panels on the stack of units.

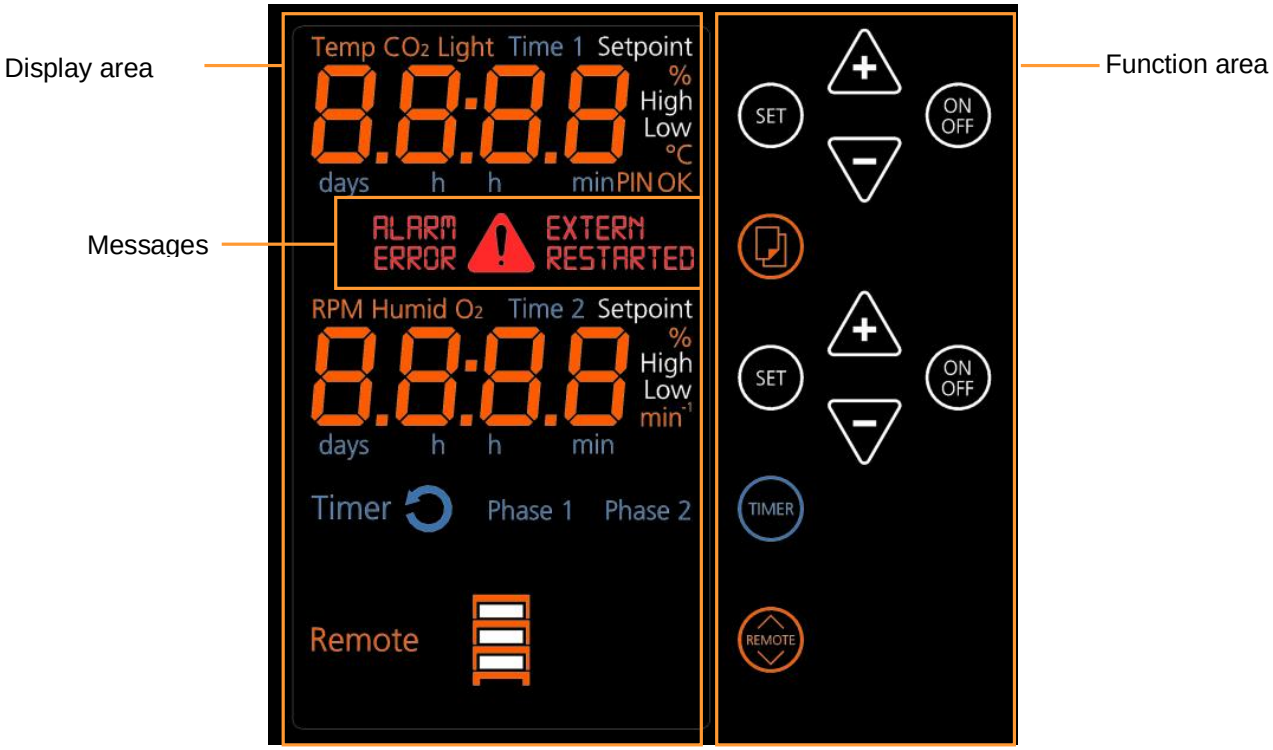


Fig. 83

Display area

In the display area there are two alpha-numeric displays with 4 characters, parameter signs, function signs and unit symbols.

Alpha-numeric display with 4 characters:

This displays show parameter values, alarm messages, error messages and unit modes.

Operation

Function area

In the function area there are keys to operate the incubation shaker.

Following function keys are available:

OPTION
Selects a parameter.

REMOTE
Selects a unit in the stack.

SET
Activates the edit-mode of a parameter or of the timer.

PLUS

MINUS
Increases or reduces the value of a parameter or timer.

ON/OFF
Switches the selected parameter or timer on or off.

TIMER
Activates the timer mode.

Following functions are operable via the operating panel:

Switching on the interior light

The interior light is switched on by pressing any key once. It turns off automatically after 1 minute.

Switching on parameters

The installed parameters are selected by repeatedly pressing the option key.

If the parameter is switched off, the display shows OFF.

NOTICE!

Parameters that are not installed cannot be displayed!

Parameter Temperature, CO_2, illumination and time phase Time 1 are operated with the upper group of function keys.

Parameter RPM, Humidity, O_2 and time phase Time 2 are operated with the lower group of function keys.

The SET key activates the edit mode of a parameter or timer.

The ON/OFF key switches a selected parameter or timer on or off. The parameter sign lights up, when parameter is switched on.

The display shows the current value of the parameter when the parameter is switched on.

Setting parameter values

Pressing the SET key the parameter value can be edited. If parameter is in edit mode, SETPOINT lights up.

Holding the PLUS or MINUS key initially increases or respectively decreases the parameter value in small increments and subsequently with the next biggest increment.

- Increments:
  - RPM: 1 RPM – 10 RPM
  - Temperature: 0.1 °C – 1 °C
  - Humidity: 0.1 %rH – 1 %rH
  - CO_2: 0.1 % - 1 %
  - Timer: 1 min – 10 min – 30 min - 1 h– 12 h

NOTICE!

The setpoint values of the parameters do not have to be confirmed. They are accepted after entry without confirmation.

The parameter can be switched on with the ON/OFF key.

The control system returns to the operation mode when no key is pressed for a longer time (approx. 5 sec.).

Message SETPOINT is off.

Setting the timer

Pressing the TIMER key activates the set-up mode of the timer function.

With the upper group of the function key, Phase 1 can be operated. Pressing the SET key, activates the set-up mode of the timer.

Pressing the option key repeatedly, selects phase 1 or phase 2 of the timer.

Finally set all required parameters and switch them on.

NOTICE!

All set parameters in Phase 2 only will be activated, if Phase 1 in the timer is switched on.

Finally the setting mode of the time is closed, when the option key is pressed. All settings will be saved without an additional confirmation.

Setting timer for a multiple-changeover (cycling)

If Phase 1 and Phase 2 of the timer are switched on, the incubation shaker alters between operating mode of Phase 1 and Phase 2 with the set time interval.

If Time 1 and Time 2 are switched on, the cycle symbol lights blue.

7.4 Operating the timer

7.4.1 Displaying the time

In the upper display the time of Phase 1 (Time 1) is shown.

In the lower display the time of Phase 2 (Time 2) is shown.

The duration will be displayed as follows:

Display time

- From 1 up to 59 minutes

- From 1 hours 00 minutes up to 23 hours 59 minutes

- From 1 day 0 hours up to 9 days 23 hours

7.4.2 Continuous operation without timer

The timer is switched off.

The timer function symbol does not light up.

The shaker operates continuously with the preset parameters.

7.4.3 Setting the timer

The timer can be used to change over between two operating modes. This can be a single changeover to continuous changeover.
Time 1 and Time 2 can be set with the TIMER key.

In operating mode Time 1 all parameters are set, that are active in Phase 1.

In operating mode Time 2 all parameters are set, that are active in Phase 2.

NOTICE!

Do not activate the timer in Time 2. This starts the programmed cycle.

CAUTION!
Using the «Sticky Stuff» adhesive matting, there is a risk of loss of property due to condensation caused by sudden drops in temperature!

Do not program jumps in temperature with the timer, while using «Sticky Stuff» adhesive matting.

This may lead to condensation and thus cause the cultivation flasks to detach from the adhesive matting!

Therefore:

– Never program temperature jumps with the timer.

7.4.4 Setting the timer for a single changeover

The timer can be used for a single changeover of the cultivation parameters after a specific time.

For setting the timer for a single change proceed as follows:

Procedure

1. Press TIMER key.

Time 1 and Time 2 light up blue.

To operate Time 1 use the upper function keys.

To operate Time 2 use the lower function keys.

2. Press option key to select Time 1.

3. Press SET key.

4. Press PLUS key to set time for Phase 1.

5. Press ON/OFF key to switch on Time 1.

Timer 2 is switched off.

6. Press option key to select parameter.

7. Press SET key.

8. Press PLUS or MINUS key to set setpoint.

9. Press ON/OFF key to switch parameter on.

NOTICE!

For a single changeover, the timer must be switched off in Phase 2!

10. Press option key to confirm programming.

The shaker now operates until end of preset time in operating mode of Phase 1.

Function symbol TIMER lights blue and Phase 1 blinks blue.

After end of Time 1, operating mode of Phase 2 is active.

Function symbol TIMER does not light.

Operating mode Phase 2 blinks blue.

The unit is operating with operation mode of Phase 2 until the unit is switched off manually.

7.4.5 Setting the timer for multiple changeovers (cycling)

Procedure

1. Press TIMER key.

Time 1 and Time 2 light up blue.

To operate Time 1 use the upper function keys.

To operate Time 2 use the lower function keys.

2. Press option key to select Time 1.

Time 1 lights up blue.

3. Press SET key.

4. Press PLUS key to set time for Phase 1.

5. Press ON/OFF to switch Time 1 on.

6. Set setpoint of parameters for Time 1 as described in chapter „Starting a work cycle“

7. Press option key to select Time 2.

Time 2 lights up blue.

8. Press SET key.

9. Press PLUS key to set time for Phase 2.

10. Press ON/OFF to switch Time 2 on.

11. Press option key to select parameter.

12. Set setpoint of parameters for Time 1 as described in chapter „Starting a work cycle“

13. Press option key to finish programming of the timer.

When both time phases are active, the cycle symbol lights up.

Settings are saved now. Operation mode of Phase 1 and Phase 2 are blinking when they are active.

7.4.6 Display the remaining runtime of the timer

The following timer modes can be displayed during the first timer interval (Phase 1) of the incubation process:

- Remaining runtime by pressing the TIMER key.
- Remaining runtime by pressing the TIMER key and then pressing the SET key.

7.5 Selecting a unit in a stack

In the standard operating mode, the currently selected unit ist hat to which the operating panel belongs.

For example, the lowest unit in a stack of 3 is always the „bottom unit“.

For stacked units, any of the operating panels in the stack can be used to control each unit individually or all units.

NOTICE!

The units in a stack are assigned from the bottom to top.

Symbol for selection a unit

The symbol on the operating panel for selecting units shows that all 3 units are selected for remote access.

External operation of a unit

NOTICE!

The timer function cannot be operated from remote!
Units that are under operation of the timer cannot be accessed by remote!

All units must be switched on using the main switch so that they can be selected via the control system.

Procedure

1. Press REMOTE key to select a unit.

Bottom unit is selected.

Operation

Middle unit is selected.

Top unit is selected.

All units are selected.

EXTERN and the warning symbol light up.

Set parameters of incubation shaker (see chapter „Operation“ – „Starting a working cycle“)

Displays of the remote accessed incubation shaker show the values and parameters of the unit, from which the remote access occurs.

2. Press option key to select parameter.

3. Press SET key.

4. Press PLUS or MINUS key to set setpoint.

5. Press ON/OFF key to switch on the parameter.

6. Press REMOTE key to finish remote access.

EXTERN does not light on any unit.

7.6 Starting a work cycle

The parameters have to be set and activated before a work cycle can be started.

The respectively selected parameters light up on the operating panel.

NOTICE!

Ensure that the flasks shaken are fixed securely. Watch flask from the start of the shaking operation until setpoint is reached.

Procedure

1. Press option key to select parameter.

E.g.: Parameter temperature is selected.

Temperature sign and unit °C light up.

If parameter is ON, upper display shows the current value, e.g. 30,0 °C.

If parameter is OFF, upper display shows OFF and setpoint alternating.

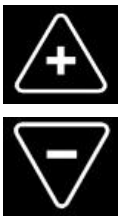
NOTICE!

The setpoint values of the parameter remain stored for approx. 1 month after the unit has been switched off.

Operation

2. Press SET key.

Setpoint lights up.



3. Press PLUS or MINUS key to set the desired value.

> *NOTICE!*
> *The parameter values do not have to be confirmed. They are accepted directly by the control system.*

Setpoint is displayed in the upper display.

If no keys on the operating panel are pressed within 2 seconds, the display alternates between the setpoint value und the operating status OFF.

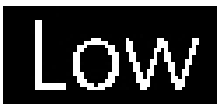
4. Press ON/OFF key to switch parameter on.

Parameter sign lights up.

Select next desired parameter.

If no key is pressed within 2 seconds:

- The upper display changes to the current value of the parameter, e.g. 30.0 °C.
- If this value is above the setpoint, „High“ lights up.
- If this value is below the setpoint, „Low“ lights up.



Switch on illumination parameter

Parameter illumination can only change its mode.

Procedure

1. Switch on illumination „Algae“ on the switch at the housing.

2. Press option to select illumination.

Parameter Light lights up.

3. Press SET key.

4. Press ON/OFF key to switch on parameter illumination.

Alternating display

All parameters will be shown in the displays alternatingly.

The display shows current value, if parameter is switched on. The display shows OFF, if parameter is switched off.

Static: Temperature sign lights.

Upper display shows current value, if switched on. If parameter is switched off, display shows OFF.

7.7 Ending a work cycle

To complete or terminate a work cycle, the corresponding parameter have to be deactivated.

Procedure

1. Press option key to select the parameter.

2. Press SET key.

3. Press ON/OFF key to switch off the parameter.

The display shows OFF.

CAUTION!
Risk of material damage due to automatic start-up of the incubator shaker.

If a work cycle is incorrectly terminated by switching off the unit with the main switch, the unit can restart automatically when it is switched on again. This may damage the incubator shaker and the cultures.

Therefore:

– Never terminate a work cycle using the main switch of the unit
– Do not leave any objects in the incubation chamber when the unit is switched off.
– Always make sure that the tray is inserted correctly.

NOTICE!

Disconnect incubation shaker from power supply when not using the unit for a longer period of time.

7.8 Stopping shaker table

The stopping of the shaker table can be proceeded in two ways:

- Switch off parameter RPM:
  Select parameter RPM with the option key.
  Press SET key.
  Press ON/OFF key.
  Shaker table stops.
- Open door:
  Open door more than 30°.
  Shaker table stops.

7.9 Testing the alarm function

Check the acoustic alarm and/or the correct functioning of the alarm relay as follows:

Procedure

1. Open the door.

2. Set capillary thermostat to a low value, e.g. 30 °C.

3. Shut the door.

4. Press option key to select temperature parameter.

5. The temperature parameter lights up.

6. Press SET key.

Setpoint lights up.

7. Press the PLUS key to set the value of the temperature parameter above the capillary thermostat, e.g. 40 °C.

8. Press the ON/OFF key to switch on the temperature control system.

The capillary thermostat switches the heater off, when 30 °C are reached.

The alarm is triggered with a short delay.

- acoustically
- optically with the warning sign and the ALARM icon.

7.10 Alarm messages

A message or an alarm is usually triggered by an operating error with the incubator shaker.

To call the users attention according to a problem, the warning sign and ALARM icon always lights up.

The message or alarm is automatically cancelled when the setpoint value is reached.

The following messages are displayed:

Alarm message	Possible causes	Trouble shooting	By
Temperature is too low Deviation > 1 °C Temp Low	Door is not fully closed.	Close the door properly.	Operator
	Fan is not operating.	Inform Infors representative.	Qualified technician
	Capillary thermostat is set too low.	Set capillary thermostat to higher temperature.	Operator
Temperature is too high Deviation > 1 °C Temp High	Cooling is not switched on.	Switch on cooling.	Operator
	Fan is not operating	Inform Infors representative.	Qualified technician
	Setpoint is below the technically feasible value.	Increase setpoint value.	Operator
Speed is too low Deviation > 10 rpm RPM Low	Tray is too heavily loaded	Load tray properly	Operator
	Wear on drive belt	Contact Infors representative	Qualified technician
Speed is too high Deviation > 10 rpm RPM High	Control system is defect	Contact Infors representative	Qualified technician
CO_2 concentration is too low Deviation > 1% CO_2 Low	CO_2 valve is closed or blocked	Contact Infors representative	Qualified technician
	CO_2 cylinder is empty	Install new CO_2 cylinder	Operator
	Inlet pressure or flow rate is too low	Increase inlet pressure or flow rate	Operator

CO_2 concentration is too high Deviation > 1% 	CO_2 inlet pressure is too high	Reduce inlet pressure	Operator
CO_2 value is fluctuating, setpoint is not constant 	Inlet pressure or flow rate is too high	Decrease inlet pressure or flow rate	Operator
Humidity is too low Deviation > 10% 	Water reservoir is empty	Fill water reservoir	Operator
	Sterile filter (optional) is blocked, e.g. after dry-running	Exchange sterile filter	Operator
	Temperature is too high	Reduce the temperature setting	Operator
Humidity is too high Deviation > 10% 	Temperature is too low	Increase the temperature setting	Operator
		Open door to let wet air escape.	Operator
	Power failure	No actions required	
	Unit was switched off with activated parameters	No actions required	

7.11 Operating the tray

CAUTION!
Risk of damaging the door and the door mechanism if the opened door is subjected to a surface load of 26 kg or to a large localised load.

A surface load of more than 26 kg or a large localised load on the door can damage both the door itself and the door mechanism.

Therefore:

– Do not place objects weighing more than 26 kg on the door
– Do not sit on the door
– Do not use the door as a support

Inserting the tray

Procedure

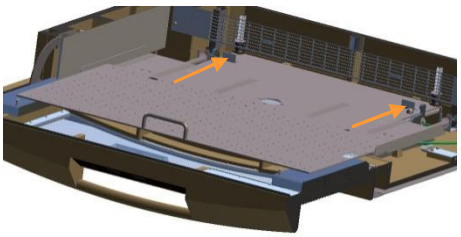


Fig. 84

1. Place the tray on the glide rails of the door.
2. Load the tray or handle the flasks.
3. Push the tray between the guide rails over the front stops until it meets the stops at the back of the incubation chamber.

The tray must click into place behind the front stop.

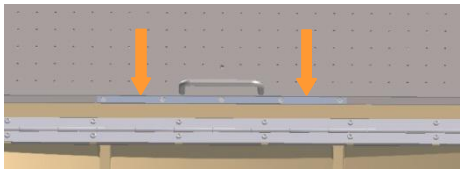


Fig. 85

4. Check whether the tray sits behind the front stop.

Closing the door lowers the tray ejectors and thus lowers the tray into the two cones. At the same time, the locking hooks move forwards to secure the tray to the table.

CAUTION!
Risk of material damage if the tray is not locked.

If the tray is not secured to the table by the locking mechanism, the tray can damage the chamber when the table is moving.

Therefore:

– Only start the unit when the tray is securely locked to the table.

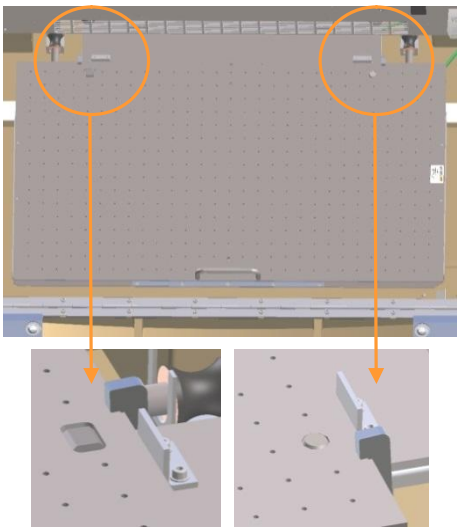


Fig. 86

6. Check whether the locking hooks are firmly securing the tray when the door is being closed

Withdrawing the tray

Procedure

1. Stop the incubator shaker.

> *NOTICE!*
> *The incubator shaker can be stopped either by switching off the speed rpm or by half-opening the door and waiting until the table has come to a complete stop.*

2. Open the door to its full extent.

The safety mechanism automatically disengages the hooks when the door is opened and lifts the tray out of the cones at the rear.

> *NOTICE!*
> *If the tray cannot be pulled out, check whether the door is completely open.*
> *Press the door down to its full extent.*

3. Lift the tray by the handle.
4. Pull the tray over the front stop.
5. Pull the tray over the glide rails on the opened door.

Operation

Unlocking the tray manually

If there is a fault (power failure or mechanical problem) and the door cannot be completely opened, the tray can also be removed manually (by two people, if possible).

Procedure

1. Unload the tray.
2. Open the door as far as possible.
3. Person 1: Press both hooks of the locking mechanism backwards.

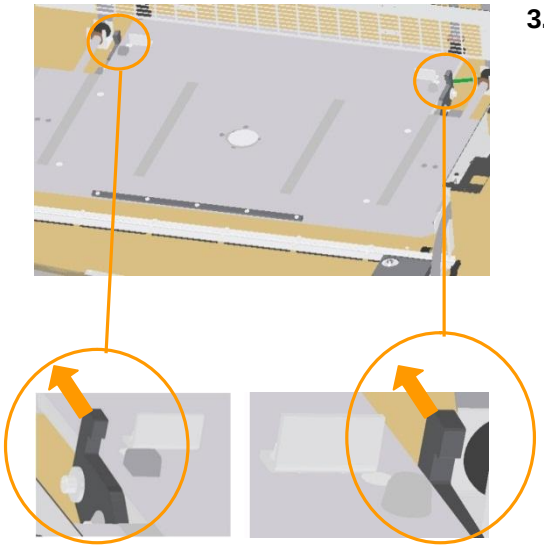


Fig. 87

4. Person 2: Lift the tray out of the locking mechanism.
5. Pull the tray over the front stop on the table.

7.12 Handling the flasks without pulling out the tray

The flasks can also be handled without having to pull out the tray.

The flasks are handled as follows:

Procedure

1. Interrupt the incubator shaker (see chapter *Interrupting operation*)

NOTICE!

The flasks can be handled when the motor has stopped and the door lock has disengaged (metallic clicking noise).

2. Open the door to a maximum of 80°.

NOTICE!

The tray is disengaged when the door is opened by more than 80°.

3. Handle the flasks.
4. Close the door.

The incubator shaker automatically starts operating again with the preset parameters.

7.13 Loading the trays

CAUTION!
Risk of material damage due to excessive wear resulting from uneven loading of trays.

Uneven loading of trays considerably shortens the service life of the suspension mechanism and bearings of the table.

Therefore:

– Always place the flasks symmetrically with respect to the centre of the tray.

The unit must be switched on when loading the table so that the safety lock on door will disengage and the door can be fully opened.

Operation

CAUTION!
Risk of material damage due to collisions between the flasks and the walls of the incubation chamber.

If the flasks extend beyond the edge of the tray, they may be damaged or broken if they collide with the wall of the unit.

Therefore:

– Always position culture flasks on the tray so that they do not extend beyond the edge.

Procedure

1. Open the door of the unit.
2. Pull out the tray over the glide rails up to the stops.
3. Load the tray evenly.
4. Position any optional measuring sensors.
5. Push the tray back all the way to the stop.
6. Close the door.

NOTICE!

If the tray has a low load, it is advisable to place a few flasks filled with water on the tray. This will help the table to run more smoothly.

The incubator shaker is designed for an average load of 12 kg.

The permissible tray loads are given in the chapter "Technical Data".

NOTICE!

Over the short term, heavier or lighter loading weights will not have an acute damaging effect as a result of increased wear of the incubator shaker.

However, if heavier or lighter loads are to be used at high speeds over the long term please contact your INFORS representative.

7.14 Using the «Sticky Stuff» adhesive matting

CAUTION!
Risk of material damage due to the detachment of cultivation flasks from the „Sticky Stuff" adhesive matting due to condensation inside the incubation chamber.

The cultivation flasks may become unstuck from the adhesive matting» if there is condensation inside the incubation chamber.

Therefore:

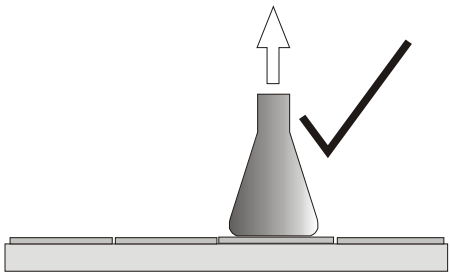
– Ensure that condensation cannot form during humidification.

Loading the «Sticky Stuff» adhesive matting

The «Sticky Stuff» adhesive matting is used underneath cultivation flasks with large, flat bottoms.

Only undamaged, unscratched cultivation flasks may be used on the adhesive matting».

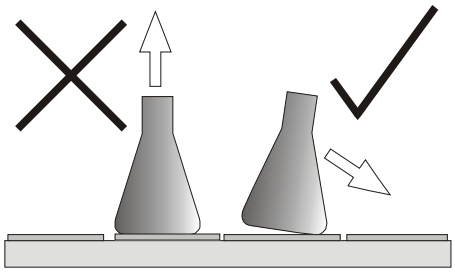
To achieve maximum adhesion to the «Sticky Stuff» adhesive matting, the flasks and matting must be completely undamaged, clean, dry and oil-free.



After placing the flasks on the matting», tilt each flask gently to check that they are adhering firmly.

Unloading the «Sticky Stuff» adhesive matting

Procedure



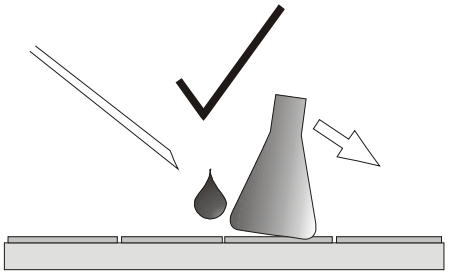
1. Tilt the neck of the cultivation flask gently to one side.
2. Wait until the flask has become detached from the matting».

NOTICE!

Large flasks may take 20 to 30 seconds to become detached.

Very firmly attached flasks can be detached as follows:

Procedure



1. Use a syringe to squirt a few drops of water onto the edge of the cultivation flask.
2. Tilt the neck of the cultivation flask gently to one side.

NOTICE!

Under certain circumstances, Fernbach flasks may be difficult to detach from the adhesive matting. To facilitate removal, part of the adhesive matting can be covered with the supplied protective film.

7.15 Interrupting operation

The unit can be stopped by opening the door. All functions and parameters remain activated.

The door can only be fully opened once the table has stopped moving.

NOTICE!

The door must be held half open while the table is slowing down.
The door lock is only disengaged once the table has stopped moving, provided that the door is not subjected to a load (e.g. by something resting on it).

To reduce operating costs, all parameters are deactivated while the door is open.

When the door is shut, the unit restarts at a closing angle of 45° with the preset parameters and with the interior light switched on for 1 minute for inspection purposes.

7.16 Operating the UV sterilisation

Fig. 88

The push-button switch for the UV sterilisation lamps is located on the left-hand side wall.

- UV sterilisation OFF – push-button switch is not illuminated
- UV sterilisation ON – push-button switch is illuminated

7.17 Operating the Direct Steam Humidification

NOTICE!
The cooling system switches off automatically when the direct steam humidification is switched on!

The Direct Steam Humidification is switched on using the operating panel.

Procedure

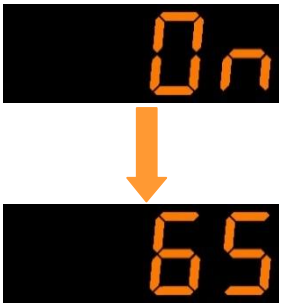
1. Press the option key to select the illumination parameter.

Parameter sign and unit light up.

2. Press SET key.

3. Press PLUS or MINUS key to set value.

4. Press ON/OFF key to switch parameter on.



Display show ON and changes to the current value of the parameter, e.g. 65%.

NOTICE!

A setpoint of 70% rH is sufficient to prevent evaporation.
Under ideal conditions, a setpoint of 85% rH can be used.

NOTICE!

Formation of condensation indicates that the maximum humidity has been reached. The setpoint value must be reduced.

7.18 Operating the cooling system

Top-mounted cooling system 900 watts / 1200 watts

The cooling system has its own power supply. The cooling system is switched on with the green push-button on the left-hand side of the cooling module. The push-button lights up when the cooling system is switched on.

Side-mounted cooling system 380 watts

The incubation shaker supplies power to this cooling system. The cooling system is ready for operation when the incubation shaker is switched on.

External cooling system

The external cooling system is supplied via a pressurised line from the in-house cooling system. The external cooling system is ready for operation when the incubation shaker is switched on.

Activating the cooling parameter

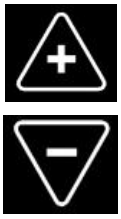
The incubation chamber can be cooled as follows:

Procedure

1. Press option key to select parameter.

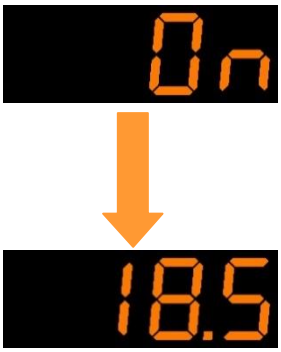
Temperature sign lights up.

2. Press SET key.



3. Press PLUS or MINUS key to set setpoint.

4. Press ON/OFF key to switch parameter on.



The upper display shows ON and then the current value of the parameter, e.g. 18.5 °C.

7.19 Starting illumination

The illumination is switched on using the operating panel.
This requires that the switches for the individual pairs of tubes are turned on.

NOTICE!

The fluorescent tubes generate heat during operation. Therefore, always switch on the cooling system when the illumination is switched on.

Operation

Procedure

1. Press option key to select parameter.

Parameter sign lights up.

2. Press SET key.

3. Press ON/OFF key to switch parameter on.

The display shows ON.

The fluorescent tubes can be turned on or off in pairs with a push button.

The fluorescent tubes are connected pairwise from outwards to inwards.

Fig. 89

- Switch and tube pair 1
- Switch and tube pair 2
- Switch and tube pair 3
- Switch and tube pair 4
- Switch and tube pair 5
- Switch and tube pair 6

7.20 Starting algae illumination

The illumination is switched on using the operating panel.

Procedure

1. Press option key to select parameter illumination.

Parameter sign „Light“ lights up.

2. Press SET key.

3. Press ON/OFF key to switch parameter on.

Display shows ON.

4. Set the light intensity with the rotary knob.

7.21 Operating the CO_2 gassing system

NOTICE!

To prevent excessive consumption of gas, the door, drain hole and path-through (optional) of the incubation shaker must be closed.

NOTICE!

The CO_2 gassing system only works correctly when the temperature control system is switched on.

Operation

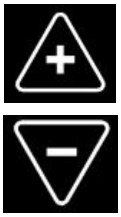
Set the CO_2 gassing system as follows:

Procedure

1. Press option key to select parameter CO_2.

Parameter sign and unit light up.

2. Press SET key.



3. Press PLUS or MINUS key to change setpoint.

4. Press ON/OFF key to switch on parameter.

Display shows current value (e.g. 5.0%).

Using the safety curtain

The safety curtain is attached to the ceiling of the incubation chamber with four snap fasteners.

NOTICE!
The label „Outside“ must face outwards.

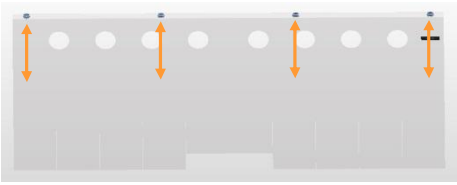


Fig. 90

Detaching the safety curtain

Undo each snap fastener with a gentle tug.

Attaching the safety curtain

Gently press the two halves of the snap fastener together, one by one.

7.22 Setting the pressure reduction station for CO_2 gassing

The pressure reduction station of the CO_2 gassing system is set manually via a rotameter:

Procedure

Fig. 91

Adjusting the flow rate.

- OPEN – turn counter-clockwise.
- CLOSED – turn clockwise.

7.23 Using the gassing pipe

The gassing pipe is an opening for the gas supply. The pressure and flow rate must be selected by the operator for the particular application.

NOTICE!

The temperature control system must be switched on to ensure uniform distribution of gas in the incubation chamber.

7.24 Operating the mobile Pt100 sensor

The temperature can only be accurately measured with the mobile Pt100 sensor using a reference flask.

NOTICE!

The reference flask must have the same size and filling volume as the culture flasks, otherwise the temperature will vary between the flasks.

Positioning the Pt100 sensor

Procedure

1. Take the Pt100 sensor out of its holder.
2. Place the reference flask in the middle of the tray.
3. Immerse the Pt100 sensor in the liquid inside the reference flask.
4. Secure the cable of the Pt100 sensor with a plug of cotton wool in the neck of the reference flask.

7.25 Setting up the pass-through

Fit hoses or cables as follows:

Procedure

1. Remove the knurled screws holding the frame.

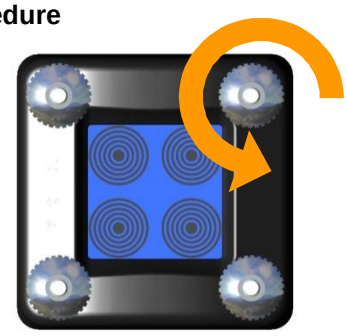


Fig. 92

2. Remove the frame and blue modules from the housing.
3. Press the modules out of the frame

Fig. 93

4. Split the module in half

Fig. 94

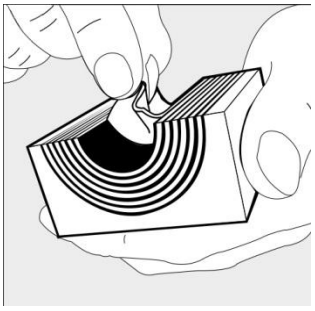


Fig. 95

5. Remove layers from the modules so that the hose or cable fits snugly into the recess

NOTICE!

Keep the removed segments in the supplied bag. They are used to reseal the pass-through.

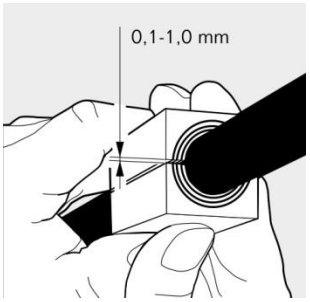


Fig. 96

The halves of the modules must fit together to leave a 0.1 to 1.0 mm gap between them.

This ensures that the fitted bushing seals off the incubation chamber.

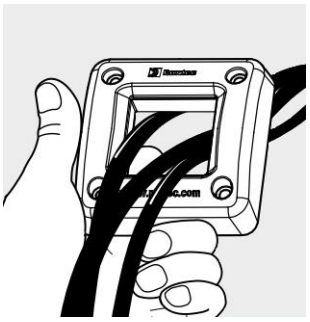


Fig. 97

6. Insert the hose / cable through the opening in the frame.

7. Grease the inner surface of the frame and module halves with installation gel.

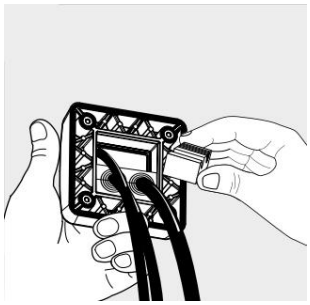


Fig. 98

8. Secure the hose / cable in the module halves.
9. Press the modules back into the frame.

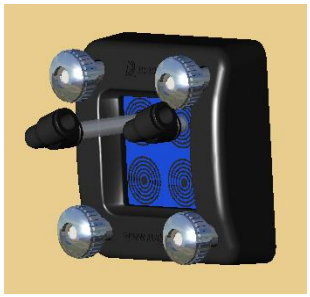


Fig. 99

10. Insert the hose / cable through the opening in the housing.
11. Secure the frame to the housing with the knurled screws.

CAUTION!
Risk of material damage due to abrasion and trapping of hoses and cables.

Hoses and cables may be damaged if they are trapped during shaking or if they are chafed by parts inside the chamber.

Therefore:

– Position cables and hoses so that they cannot come into contact with anything.

8 Maintenance

8.1 Safety

Personnel

- The here described maintenance work can be carried out by the user if not indicated otherwise (see “Maintenance plan”).
- Any work on the electrical system is strictly to be carried out by qualified electricians.

Protective equipment

Always wear the following protective equipment when carrying out maintenance work:

- Safety goggles
- Protective gloves
- Safety shoes

NOTICE!

Further protective equipment which is to be worn when carrying out certain work is indicated separately in this section

Maintenance work, carried out inappropriately

WARNING!
Risk of injury due to maintenance work carried out inappropriately!

Maintenance work carried out inappropriately may lead to severe physical injury or loss of property:

Therefore:

– Make sure that enough space is provided for the work before starting.
– Keep the work site tidy and clean! Discarded components and tools may be a source of accidents.
– Check correct re-assembly if component parts have been previously removed. Re-assemble all components for securing housings etc. correctly and adhere to the stated torque when tightening screws.
– Strictly follow internal safety regulations.

Maintenance

Electrical system

DANGER!
Danger of fatal electric shock!

Contact with electrically powered components is perilous. Energised electrical components may perform uncontrolled movements which can lead to severe injuries.

Therefore:

– Turn off the electrical supply and check whether it is electrically isolated before starting any work.

Biohazard

WARNING!
Biohazard!

Noncompliance with biological safety regulations increases the health risk of the operator and the risk of lower equipment functionality.

Therefore:

– Strictly follow all biological safety regulations

– Decontaminate and clean every part that comes in contact with any infectious biochemical substances.

WARNING!
Risk of harm to health due to contaminated component parts!

There is a risk of harm to health due to viruses and bacteria if contact is made with contaminated component parts.

Therefore:

– Precisely comply with internal instructions for cleaning and decontamination component parts.

8.2 Environmental protection

CAUTION!
Environmental danger by inappropriate handling!

Inappropriate handling of environmentally hazardous substances, especially where disposal is involved, may lead to severe environmental damage.

Therefore:

– Immediately take appropriate action if environmentally hazardous substances are accidentally released into the environment.

8.3 Maintenance plan

The required maintenance for reliable operation is described in the following chapters.

Reduce the maintenance intervals in case increased abrasion is detected during regular checks.

Contact the manufacturer for questions concerning maintenance. For contact details, see page 2.

For proper operation the incubation shaker temporarily needs following maintenance work:

Interval	Maintenance work	To be carried out by
Before each use	Check that the chamber lights are working Replace light bulbs if necessary	Operator
	Option Direct Steam Humidification Check integrity of hoses Replace if necessary Check water level in the tank Top up if necessary	Operator
	Option CO_2 gassing Check gas supply has the correct settings Adjust if necessary Check integrity of hoses Replace if necessary	Operator

Maintenance

	Option Illumination Check fluorescent tubes and starter are working correctly Replace if necessary	Operator
	Option Illumination „Algae“ Check fluorescent tubes and starter are working correctly Replace if necessary	Qualified technician
Once a year	**Option Sterilisation of air supply** Replace UV-Sterilisation lamps (Life cycle 8000 operating hours)	Qualified technician
	Option Cooling System Check the cooling liquid level in the tank Top up if necessary	Qualified technician
	Calibrate measuring devices	Qualified technician
Every 3 years	**Option Cooling System** Replace cooling liquid of top / bottom cooling	Qualified technician
As required	Disinfect unit	Operator
	Option «Sticky Stuff» Clean «Sticky Stuff» adhesive matting	Operator
	Option «Sticky Stuff» Replace «Sticky Stuff» adhesive matting	Operator
	Clean unit	Operator
	Test alarm functions	Operator
	Option Cooling System Clean heat exchanger of top cooling	Qualified technician
	Option Cooling System Clean heat exchanger of side cooling	Operator

8.4 Replacing the fuse

Replace the fuse as follows:

Procedure

1. Unlock the fuse link by pressing the snap lock.

Fig. 100

2. Remove the fuse link.
3. Replace defect fuses.
4. Fit new fuse link.
5. Lock the fuse link by pressing until it clicks into place.

8.5 Cleaning the cooling system

The cooling fins of the condenser must kept free of dust to allow optimum heat dissipation. This requires regular inspections and cleaning.

CAUTION!
Risk of damaging the heat exchanger due to the use of sharp objects.

The copper pipes of the heat exchanger may be damaged by cleaning with sharp objects, thus leading to the escape of coolant.

Therefore:

– Use only a vacuum cleaner to clean the fins and copper pipes of the heat exchanger

Maintenance

Side-mounted cooling system

Procedure

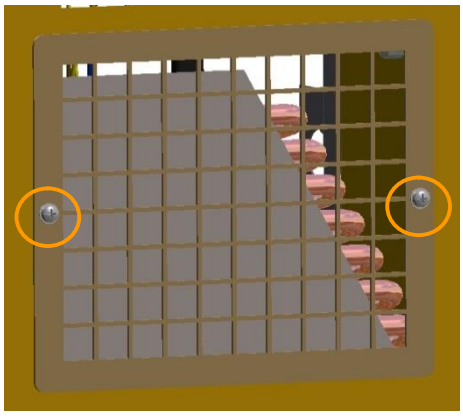


Fig. 101

1. Remove the screws holding the grating.
2. Lift off the grating.
3. Clean the fins with a vacuum cleaner.
4. Reattach the grating with the two screws.

Top-mounted cooling system

Procedure

Fig. 102

1. Visually inspect the heat exchanger of the top-mounted cooling system for dust.
2. If there is a lot of dust, contact the manufacturer's service center.

Coolant

Maintenance of the coolant system must be carried out by the manufacturer's service center.

- Annual check of the coolant level.
- Replacement of the coolant every 3 years.

8.6 Illumination

8.6.1 Replacing fluorescent tubes

Replace defect fluorescent tubes as follows:

Procedure

1. Open the door.
2. Switch off the unit.
3. Rotate the tube by 90°.

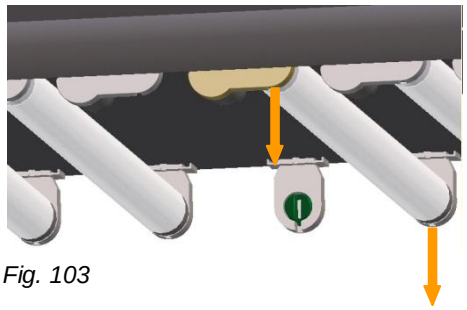


Fig. 103

4. Pull the defect tube downwards out of both sockets.

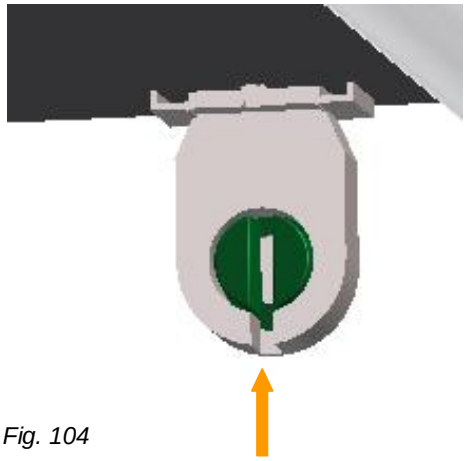
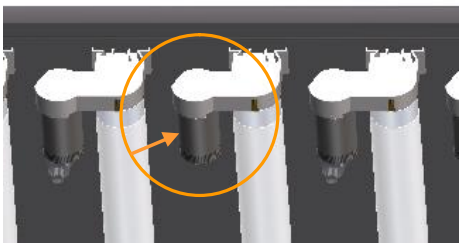


Fig. 104

5. Push the new tube with the contact pins in a vertical position upwards into the sockets.
6. Rotate the tube by 90°.

8.6.2 Replacing the starter



The starters are located on the left-hand side of the front lamp sockets.

Fig. 105

Procedure

1. Open the door.
2. Switch off the unit.
3. Remove the defect starter out of its socket by rotating it by 90° anti-clockwise.
4. Fit the new starter into the socket by rotating it clockwise.

NOTICE!

Fluorescent tubes contain mercury. Dispose of fluorescent tubes according to the local statutory regulations.

8.7 Cleaning the algae illumination

Clean the Plexiglas panel and the tubes as follows:

Procedure

1. Open the door.
2. Switch off the unit and disconnect it from the power supply.
3. Hold onto the front edge of the Plexiglas panel with both hands and pull it downwards uniformly off the tubes.

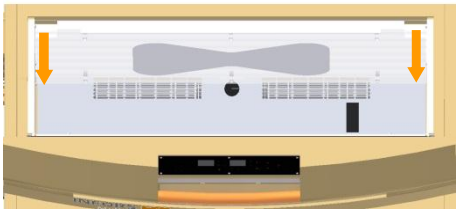


Fig. 106

4. Clean the Plexiglas panel with a soft cloth and a mild household cleaner.
5. Clean the tubes with a soft cloth and a mild household cleaner.
6. Replace the Plexiglas panel with the clips by pressing it gently onto the tubes.

8.8 Replacing the feed hose of the Direct Steam Humidification

Replacing the feed hose

Replace a damaged feed hose of the Direct Steam Humidification as follows:

Procedure

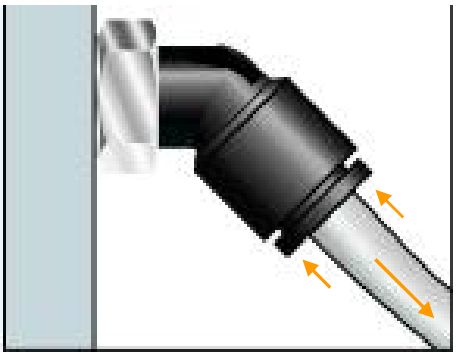


Fig. 107

1. Keeping the O-ring pressed down, pull the hose out of the connector.
2. Push the new hose into the connector (the O-ring does not need to be pressed).

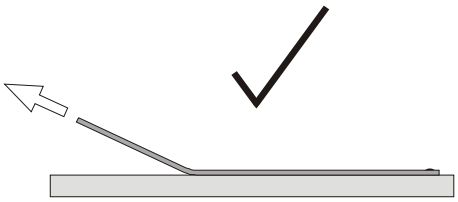
8.9 Replacing the «Sticky Stuff» adhesive matting

NOTICE!

Regular disinfection may reduce the adhesiveness of the «Sticky Stuff» matting.

Replace the adhesive matting as follows:

Procedure



1. Release the adhesive matting on one side of the tray and then pull upwards at an angle.
2. Degrease the tray with acetone.
3. Thoroughly moisten the tray with water.
4. Wet the new matting and place on the tray (see the installation instructions for «Sticky Stuff»).

8.10 Cleaning

8.11 Cleaning the glass door pane

CAUTION!
Risk of material damage due to use of inapplicable cleaning utensils!

Abrasive cleaning utensils, as sponges, cleaning rags, will scratch the safety glass. The breaking and shock resistance will be heavily reduced by micro-scratches!

Therefore:

– Clean glass door pane only with a soft cleaning rag.

Clean inside and outside of the glass door pane with a soft cleaning rag and mild detergent.

The following areas of the incubator shaker must be cleaned regularly:

- Housing
- Chamber
- Floor pan
- Trays
- Cooling systems

CAUTION!
Risk of material damage if the incubation chamber is not cleaned sufficiently.

Moulds or other microorganisms may grow uncontrollably and thus jeopardise successful cultivation and the health of the operator.

Therefore:

– If a flask has broken or culture medium has escaped, clean the chamber thoroughly with a neutral household cleaner.

– Clean with standard disinfectants, if necessary.

CAUTION!
Risk of material damage due to the use of unsuitable cleaning agents.

Aggressive cleaning agents, solvents and scouring cleaning aids (hard sponges, brushes) may scratch and damage the surfaces and have a negative impact on the function of the unit.

Therefore:

– Use only soft cloths.
– Use only mild household cleaners.

8.11.1 Cleaning the housing

Wipe the housing regularly with a soft cloth and a mild household cleaner (e.g. washing-up liquid, neutral cleaner). If necessary, disinfect with a standard disinfectant.

8.11.2 Cleaning the chamber

Wipe the housing regularly with a soft cloth and a mild household cleaner (e.g. washing-up liquid, neutral cleaner). If necessary, disinfect with a standard disinfectant.

8.11.3 Cleaning the floor pan

When cleaning the floor pan after a glass breakage or if culture liquids have escaped, the table can be released from the counterweight and tilted upwards.

Clean the floor pan as follows:

Procedure

1. Open the door.
2. Switch off the unit and disconnect it from the power supply.
3. Remove the Allen screws (4) from the drive hub of the table using the supplied Allen key.

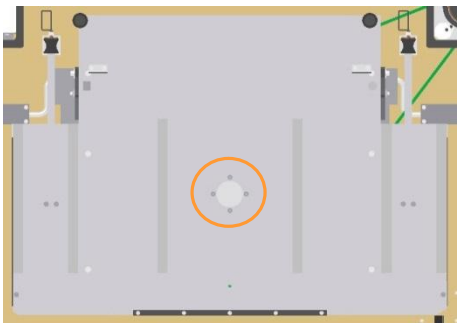


Fig. 108

4. Tilt the table upwards.
5. Remove any foreign objects and debris by hand.

CAUTION!
Risk of material damage to the incubation chamber due to splashed water during cleaning.

If rinsing water is tipped into the chamber without due care, splashed water can come into contact with the electrical system and the fans, thus causing permanent damage.

Therefore:

– Always pour rinsing fluids carefully into the floor pan.
– Always use a large beaker or similar to pour rinsing fluids into the incubation chamber.
– Do not use a pressurised water hose for cleaning.

If necessary:

6. Rinse the floor pan with hot water and a mild household cleaner.

Rinsing fluids must be drained away through the drain hole at the side of the unit.

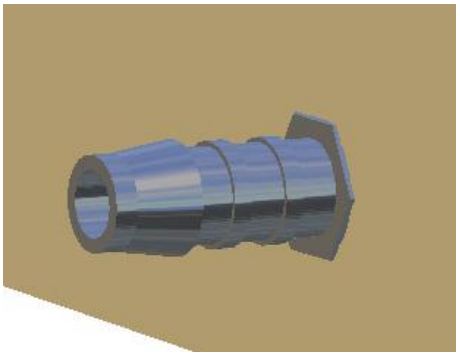


Fig. 109

NOTICE!

If the drain is not connected to the in-house wastewater system, push a hose onto the drain nozzle and let the water run into an appropriately sized container.

7. Rinse the floor pan with water.
8. Thoroughly dry the floor pan with paper towels.
9. Lower the table back onto its axle.
10. Insert the Allen screws and tighten cross-wise with an Allen key.

NOTICE!

If any of these Allen screws are lost or damaged, they must be replaced by original screws. See chapter Technical Data – General specification.

8.11.4 Cleaning the trays

Regularly wipe the trays and their mounted parts (rails, clips, adhesive matting, etc.) with a soft cloth and a mild household cleaner (e.g. washing-up liquid, neutral cleaner). If necessary, disinfect with a standard disinfectant.

8.12 Cleaning the «Sticky Stuff» adhesive matting

The adhesiveness of the mats declines over time due to dust and soiling.

Regenerate the adhesive mats as follows:

- Scrub the surfaces vigorously with a scouring pad and clean warm water or mild soapy water (washing-up liquid).
- Allow to dry overnight.
- Disinfect with quaternary ammonium compounds.

CAUTION!
Risk of material damage due to the use of solvent-based cleaning agents.

The structure and adhesive properties of the «Sticky Stuff» adhesive matting can be destroyed by solvent-based cleaners. Risk of detachment of cultivation flasks from the «Sticky Stuff» adhesive matting during operation of the shaker.

Therefore:

– Use only a mild neutral cleaning agent (e.g. washing-up liquid)
– Use only quaternary ammonium compounds for disinfection

See also the enclosed brief instructions for the «Sticky Stuff» adhesive matting.

NOTICE!

If the adhesiveness of the matting» cannot be restored by cleaning, it must be replaced. Please refer to the chapter "Maintenance – Replacing the «Sticky Stuff» adhesive matting".

8.13 CO2 curtain

Clean the CO_2 curtain as follows:

Procedure

1. Detach the CO_2 curtain in the incubation chamber.
2. Clean the surface with a soft cloth and mild cleaner (washing-up liquid, neutral cleaner).
3. If necessary, disinfect with a standard disinfectant.

8.14 Finishing maintenance work

WARNING!
Risk of injury!

If protective devices on the equipment are not brought back to their original state after maintenance work, this carries a substantial risk of injury at the next time of operation.

Therefore:

– Always restore all protective devices on the equipment back to their original state after finishing maintenance work.

9 Interferences

Possible reasons for interference or a problem and how to resolve it is described in the following section.

Reduce the service intervals if interferences/problems become increasingly common.

Contact the manufacturer in case of developing problems which cannot be resolved by following the above mentioned instructions. For service contact details, see page 2.

Action in case of interferences

The following instructions are to be followed:

1. Immediately switch off the equipment and unplug the mains plug in case of malfunctions which represent an imminent danger to persons or property.

NOTICE!

Instructions given by in-house safety protocols are to be followed if additional isolation switches for the power supply have been installed locally.

2. Investigate the cause of the malfunction.
3. Inform a responsible person about the malfunction/trouble.
4. Depending on the type of malfunction, solve the problem or engage authorised qualified personnel to do so.

NOTICE!

The following trouble shooting guide clearly indicates who is authorised to solve the problems described.

Interferences

Action in case of interferences of incubation shaker

WARNING!
If people and/or equipment are in danger, switch off the incubator shaker immediately and disconnect it from the power supply.

Switch off the unit if the following irregularities occur:

- Loud noises
- Smoke
- Odor
- Strong vibrations

After switching off and disconnecting from the power supply, proceed as follows:

Procedure

1. Avert danger.
2. Remove flasks manually from the tray.

NOTICE!

If the incubator shaker is switched off, the tray cannot be removed because the door lock cannot be disengaged.

3. Remove the tray manually (see chapter "Operation – Operating the tray").

NOTICE!

If the cultivation flasks cannot be removed or if the incubator shaker needs repairing, contact your INFORS representative. (See page 2 for addresses)

9.1 Safety

Personnel

- The here described trouble shooting work may be carried out by the user, if not indicated otherwise (see “Tables of Interferences”).
- Any work on the electrical system is strictly to be carried out by qualified electricians.

Electrical system

DANGER!
Danger of fatal electric shock!

Contact with electrically powered components is perilous. Energised electrical components may perform uncontrolled movements which can lead to severe injuries.

Therefore:

– Turn off the electrical supply and check whether it is electrically isolated before starting any work.

WARNING!
Risk of injury due to inappropriate trouble shooting!

Inappropriate trouble shooting may lead to severe physical injury or loss of property.

Therefore:

– Strictly follow the trouble shooting instructions stated in this operating manual

9.2 Tables of interferences

9.3 Error messages

Error messages are triggered by a mechanical or elctronical interference on the equipment.

To additionally draw attention of the user, an interference is displayed with the warning sign and the ERROR symbol.

The error messages disappear, when the interference was remedied.

General interference

Interferences	Possible causes	Trouble shooting	By
Door cannot be fully opened	Door is subjected to a load	Close the door and open again	Operator
	Unit is switched off	Switch the unit on	Operator
Tray lock does not engage	A foreign body is blocking the locking system	Remove foreign body	Operator
	Foreign body is under the table	Detach table from its axle, tilt it upwards and remove the foreign body.	Operator
	Tray is bent or damaged	Replace the tray	Operator
Tray is not being released	Door is not fully open.	Press the door downwards to its lowest position	Operator
Status display is not illuminated	Unit is switched off	Switch the unit on	Operator
	Power plug has been disconnected	Connect the power plug	Operator
	Fuse has blown	Replace fuse	Operator

Interferences

Interference of shaker drive

Interference	Possible causes	Trouble shooting	By
Shaking function is not working (with error message)   	Table is mechanically blocked	Remove foreign body	Operator
	Torn drive belt	Contact Infors representative	Qualified technician
	Defect motor fuse	Contact Infors representative	Qualified technician
	Defect motor	Contact Infors representative	Qualified technician
	Motor not connected to electronics	Contact Infors representative	Qualified technician
Shaker drive accelerates too quickly or operates too quickly   	Defect motor control unit	Contact Infors representative	Qualified technician
	Speed measurement is malfunctioning	Switch unit off and then on again	Operator

Interferences

CO_2 gassing interference

Interference	Possible causes	Trouble shooting	By
CO_2 concentration is too low Deviation > 1% 	CO_2 valve closed or blocked	Contact Infors representative	Qualified technician
	CO_2 cylinder is empty	Install new CO_2 cylinder	Operator
	Inlet pressure or flow rate is too low	Increase the inlet pressure or flow rate	Operator
CO_2 concentration is too high Deviation > 1% 	CO_2 inlet pressure is too high	Reduce the inlet pressure	Operator
CO_2 value is fluctuating, current value is not constant 	Inlet pressure or flow rate is too high	Reduce the inlet pressure or the flow rate	Operator

Temperature interference

Interferences	Possible causes	Trouble Shooting	By
Temperature higher than 65 °C Error message 	Defect measuring electronics	Contact Infors representative	Qualified technician
Temperature of the unit is too low < 0 °C 	Defect measuring electronics	Contact Infors representative	Qualified technician

Interferences

No value on temperature display 	Pt100 sensor or sensor cable is defect	Contact Infors representative	Qualified technician
Temperature in flask with mobile Pt100 is too high (> 65 °C) 	Defect measuring electronics	Contact Infors representative	Qualified technician
Temperature in flask with mobile Pt100 is too low (< 0 °C) 	Defect measuring electronics	Contact Infors representative	Qualified technician
No value on temperature display 	Pt100 sensor or sensor cable is defect	Contact Infors representative	Qualified technician
Temperature too high. No error message	Cooling is not switched on	Switch on cooling	Operator
	No power supply to cooling system	Check fuse of cooling system, replace if necessary	Operator
		Connect unit to power supply	Operator

Interferences

Temperature is not reaching the desired value	Heating is not switched on	Activate the temperature parameter	Operator
	Setpoint value is too low	Increase setpoint value	Operator
	Capillary thermostat is set too low (must be at least 10 °C above the setpoint value)	Set capillary thermostat to higher temperature	Operator
	Heating fan is not working	Contact Infors representative	Qualified technician
	Door is not completely closed	Close the door properly	Operator
	Top-mounted cooling: cooling fins are dusty	Contact Infors representative	Qualified technician
	Side-mounted cooling: cooling fins are dusty	Clean cooling fins	Operator

Humidity interference

Interference	Possible causes	Trouble shooting	By
Water supply to the Direct Steam Humidification is interrupted; humidity parameter has been automatically deactivated.  	Water reservoir is empty	Fill water reservoir	Operator
	Air pocket between wet filter and reservoir	Replace wet filter with a dry one	Operator
	Valve is defect	Contact Infors representative	Qualified technician
 	Transmission error of the humidity sensor or the temperature sensor	Restart software (switch unit OFF and then ON)	Operator
	Steam generator is defect	Contact Infors representative	Qualified technician
	Inlet pressure is too high	Reduce inlet pressure (max. 0.3 bars)	Operator

Interferences

Illumination interference

Interference	Possible causes	Trouble shooting	By
Illumination (algae) is not working	Illumination is not switched on	Switch on the illumination	Operator
	Illumination parameter is not activated	Activate the illumination parameter in the control system	Operator
	Lamp ballast is defect	Contact Infors representative	Qualified technician
	Tube is defect	Contact Infors representative	Qualified technician
Illumination (algae) is not working  	Control is defect	Contact Infors representative	Qualified technician
Daylight illumination is not working	Illumination parameter is not activated	Activating the illumination parameter	Operator
	Tubes have not been turned on with the switch inside the chamber	Switch on	Operator
	Lamp ballast is defect	Contact Infors representative	Qualified technician
	Tube is defect	Replace tube	Operator
	Starter is defect	Replace the starter	Operator
Daylight illumination is not working  	Control is defect	Contact Infors representative	Qualified technician

9.4 Interference Illumination broken tube

CAUTION!

Damage to health due to inhalation or skin absorption of mercury.

Therefore:

- Avoid skin contact
- Ventilate the room for 30 minutes
- Wear safety gloves
- Collect shards and dust with an adhesive tape
- Pick up pieces of fluorescent tube with a cleaning cloth
- Seal contaminated clothing, gloves, pieces of tube and cleaning equipment so that they are airtight
- Ensure they are disposed of correctly

If a fluorescent tube has broken, proceed as follows:

Procedure

1. Switch off the unit.
2. Disconnect the unit from the power supply.
3. Remove fluorescent tube and shards out of the incubation chamber.

For optional illumination (fluorescent tubes)

4. Remove the fluorescent tube out of the lamp socket.
5. Fit a new fluorescent tube.

For optional algae illumination (installed through the housing wall)

The defect fluorescent tube must be exchanged by a qualified technician (in-house technician, manufacturer's service team).

9.5 Returning for repair

The operator must return the equipment 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.

The following must be observed if this is the case:

- The equipment or the component part which is to be repaired must be entirely decontaminated before sending to the manufacturer.
- The operator is obliged to firstly fill in and sign a decontamination agreement and decontamination form and either send it together with the written request for the repair work to the licensed dealer before returning the faulty equipment to the manufacturer or, **at the latest**, together with the faulty equipment on return to the manufacturer.
- These forms can be obtained from the licensed dealer or the manufacturer, contact details can be found on page 2 of this manual.

10 Disassembly

The equipment must be disassembled and disposed of in an environmentally-friendly manner if it is not in use anymore.

10.1 Safety

Personnel

- Disassembly may only be carried out by qualified personnel.
- Qualified electricians only may carry out work on the electrical system.

Inappropriate disassembly

WARNING!
Risk of injury due to inappropriate disassembly!

Residual energy and sharp-edged components of the equipment or tools may cause injuries.

Therefore:

– Before starting the disassembly process, ensure that there is sufficient space for the whole procedure
– Take care regarding sharp-edged components.
– Keep the work place tidy and clean! Discarded components and tools may be a source of accidents.
– Professionally disassemble units: Take note of the high dead weight of some parts. Use hoists, if necessary.
– Secure units to avoid them falling or tumbling down.
– Call the manufacturer in case of any lack of clarity.

Electrical system

DANGER!
Danger of fatal electric shock!

Contact with energised electrical units/components is perilous. Electrical components which are energised may be subject to uncontrolled movements and may lead to most severe injuries.

Therefore:

– Definitely switch and cut off the electrical supply before starting the disassembly-

Disassembly

Biological safety

WARNING!
Danger to biological safety!

Non-compliance with all biological safety regulations signifies an increased health risk to the user and the functionality of the equipment.

Therefore:

– Strictly follow all biological safety regulations

– Decontaminate and sterilize every part including any peripheral in- and outlet that comes in contact with any infectious biochemical substances (e.g. liquids which contain bacteria or viruses).

10.2 Disassembly

Prior to disassembly:

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

Clean and disassemble component parts professionally with regard to any local regulations concerning employment and environmental protection.

10.3 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.

CAUTION!
Environmental damage or loss due to inappropriate disposal!

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

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

11 Examples

11.1 Delay a speed change

EXAMPLE

The incubator shaker is to operate at a speed of 250 rpm and a temperature of 40 °C. After 10 minutes, the speed is to be reduced to 100 rpm and the temperature control is switched off.

The unit then operates continuously with these parameters until other values are entered.

Procedure

1. Press TIMER key to start timer function.

Time 1 and Time 2 light up blue.

Operate Time 1 with the upper function keys.

Operate Time 2 with the lower function keys.

2. Press upper SET key to edit timer settings.

Time 1 and Setpoint light up blue.

3. Press PLUS key to set time to 10 minutes for Phase 1.

4. Press ON/OFF key to switch on time for Phase 1.

Time 2 is switched off.

5. Press option key to select parameters for phase 1.

Phase 1 lights up blue.

Examples

6. Press upper PLUS or MINUS key to set parameter Temp to 40 °C.

7. Press ON/OFF key to switch on parameter Temp.

8. Press lower PLUS or MINUS key to set parameter RPM to 250.

9. Press ON/OFF key to switch on parameter RPM.

10. Press option key to select parameters of phase 2.

Phase 2 light up blue.

11. Press PLUS or MINUS key to set parameter RPM to 100.

12. Press ON/OFF key to switch on parameter RPM.

13. Press option key to finish timer settings.

Current active phase blinks blue.

The incubation shaker starts with the settings of phase 1.

After 10 minutes the speed slows down to 100 RPM and the heating is switched off.

11.2 Switch-on delay

EXAMPLE

The incubator shaker is to start after a delay of 5 minutes and then operate with a speed of 250 rpm and a temperature of 37.5 °C until other values have been entered.

Procedure

1. Press TIMER key.

Time 1 and Time 2 light up blue.

Operate Time 1 with the upper function keys.

Operate Time 2 with the lower function keys.

2. Press SET key for timer settings.

Setpoint and Time 1 light up blue.

3. Press PLUS key to set Time 1 to 5 minutes.

4. Press ON/OFF key to switch on Time 1.

Time 2 is switched off.

5. Press option key to select parameters of Phase 1.

Phase 1 lights up blue.

6. Switch off all parameters of Phase 1.

Examples

7. Press option key to select parameters of Phase 2.

Phase 2 lights up blue.

8. Press upper PLUS or MINUS key to set parameter Temp to 37.5 °C.

9. Press ON/OFF key to switch on parameter Temp.

10. Press lower PLUS or MINUS key to set parameter RPM to 250 RPM.

11. Press ON/OFF key to switch on parameter RPM.

12. Press option key to finish timer settings.

Current active phase blinks blue.

Incubation shaker starts after 5 minutes with current settings.

11.3 Cyclic operation

EXAMPLE

The unit continuously alternates between two operating states.

This can be used e.g. to simulate a day/night rhythm with the illumination.

The Multitron operates with two alternating phases:

Phase 1	
Speed	250 rpm
Temperature	40 °C
Time	10 minutes

Phase 2	
Speed	100 rpm
Temperature	37 °C
Time	7 minutes

The unit operates continuously with these parameters until other values are entered.

Procedure

1. Press TIMER key.

Time 1 and Time 2 light up blue.

Operate Time 1 with the upper function keys.

Operate Time 2 with the lower function keys.

2. Press upper SET key for settings of TIME 1.

Setpoint and Time 1 light up.

Examples

3. Press upper PLUS key to set time to 10 minutes.

4. Press ON/OFF key to switch on Time 1.

5. Press SET key for settings of TIME 2.

Setpoint and Time 2 light up.

6. Press lower PLUS key to set time to 7 minutes.

7. Press ON/OFF key to switch on Time 2.

8. Press option key to select parameters.

Phase 1 lights up blue.

9. Press upper PLUS or MINUS key to set parameter temp to 40 °C.

10. Press ON/OFF key to switch on parameter Temp.

11. Press lower PLUS or MINUS key to set parameter RPM to 250.

12. Press ON/OFF key to switch on parameter RPM.

Examples

13. Press option key to select Phase 2.

Phase 2 lights up blue.

14. Press upper MINUS key to reduce parameter Temp to 37 °C.

15. Press ON/OFF key to switch on parameter Temp.

16. Press lower MINUS key to reduce parameter RPM to 100.

17. Press ON/OFF key to switch on parameter RPM.

18. Press option key to finish timer settings.

Cycle symbol lights up blue.

Current active phase blinks blue.

Incubation shaker starts with settings of phase 1 and alternates with the set cycle.

12 Appendix

12.1 Circuit diagram

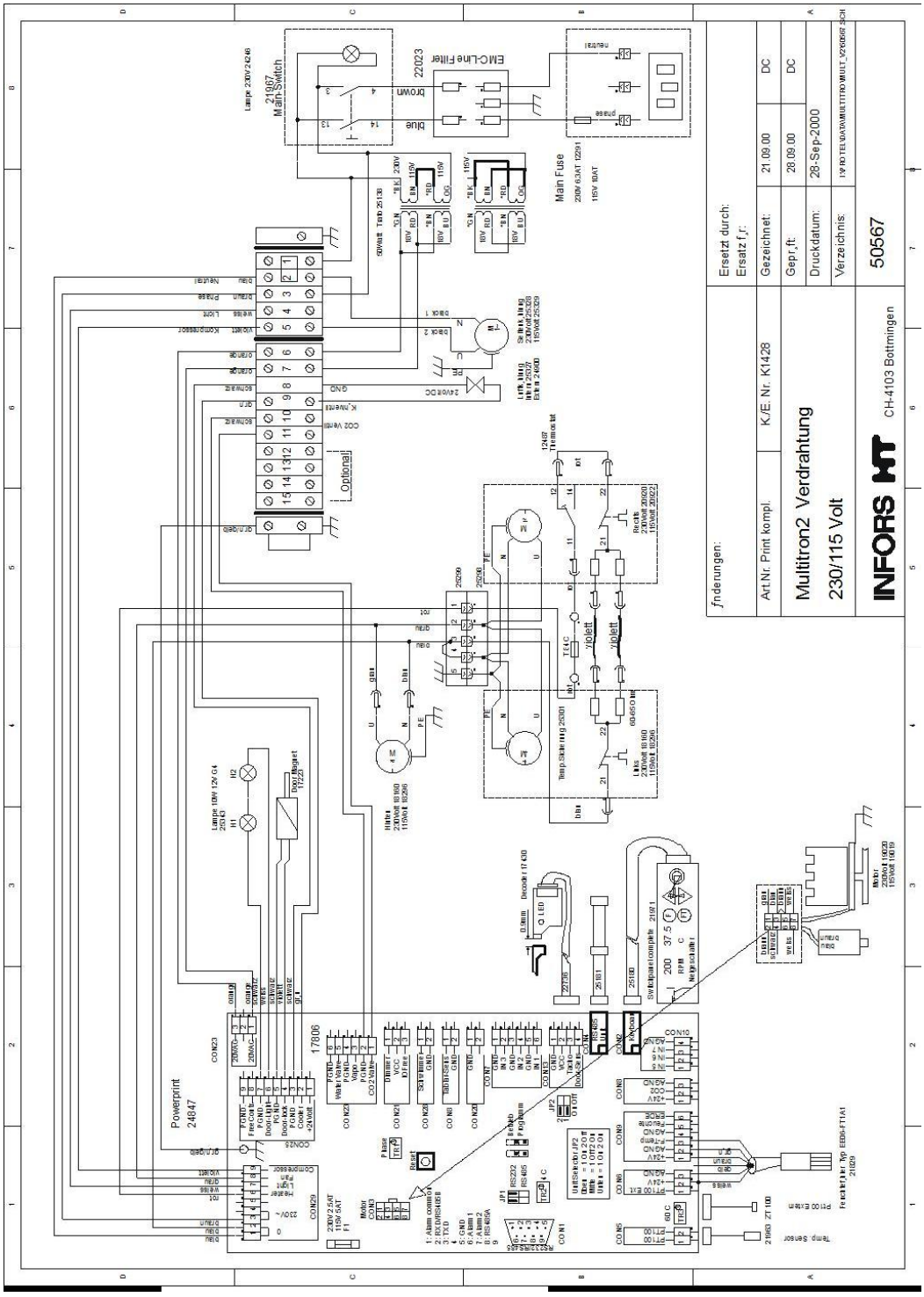


Fig. 110

12.2 Additional information of the use of sterile filters

A steam system is sterile by definition. Nevertheless, in case that non-sterile water is used, we recommend integration of a sterile filter as an additional precaution (not included):

- PALL AcroPackTM 20 with SUPOR membrane 0,2 µm pore size (0,8 µm pre-filter), sterile

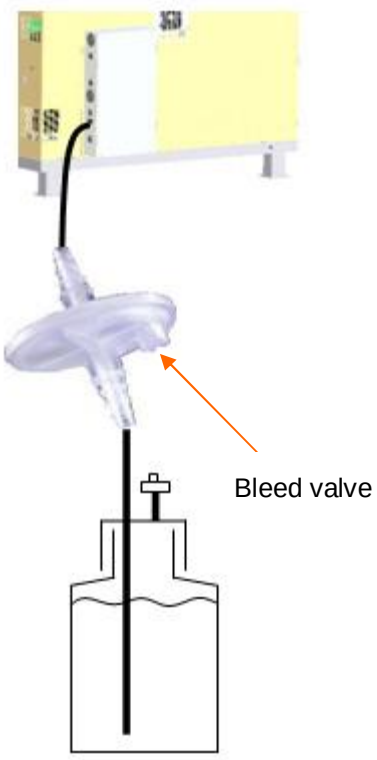


Fig. 111

The filter may be integrated into the water supply tube at any point between the reservoir and the water inlet, preferably close to the water inlet.

The bleed valve of the filter must be oriented towards the water reservoir.

The transparent plastic bell installed on the filter can be discarded.

Operation of the system with sterile filter is identical as described before.

The supplier's specification of 5 L of liquid volume is valid for processing of particle-laden biological liquids. If used for distilled water that is practically particle-free, the life-time of the filter is much higher, depending on the quality of the water. It is not possible, however, to specify the lifetime exactly, please refer to the supplier's specification for information about integrity testing.

NOTICE!

A new PALL AcroPack™ 20 filter will let air pass easily. Once the filter is wet, air cannot pass anymore. This means that if the reservoir has run empty, the filter will prevent self-priming of the system. In this case, the filter must be removed and placed in a drying oven (max temp. 131 °C for 30 min, lower temperature recommended) until the membrane is dry again or the filter should be replaced by a new filter.

12.3 Purifying Methods

Method	Description
Distillation	Distilled water is often defined as bottled water that has been produced by a process of distillation. This water is practically free of salts, organic compounds and microorganisms (electrical conductivity of not more than 10 µS/cm and total dissolved solids of less than 10 mg/L). Distillation involves boiling the water and then condensing the steam into a clean container, leaving most solid contaminants behind. Because this process is **energy-consuming** and ecologically questionable, demineralized water is preferred for most applications.
Deionization / Demineralization	Deionized water, also known as demineralized water (DI water, DIW or de-ionized water), is water that has had its mineral ions removed, such as cations from sodium, calcium, iron, copper and anions such as chloride and bromide. Deionization is a physical process which uses specially-manufactured ion exchange resins which bind to and filter out the mineral salts from water. Because the majority of water impurities are dissolved salts, deionization produces a high purity water that is generally similar to distilled water, and this process is quick and without scale buildup. However, deionization does not significantly remove uncharged organic molecules, viruses or bacteria, except by incidental trapping in the resin. Additionally sterilized demineralized water is often sold as equivalent to distilled water.
Water softening	Water softening is the act of reducing the dissolved calcium, magnesium, and to some degree manganese and ferrous iron ion concentration in hard water. A common water softener is sodium carbonate (Na_2CO_3).

Appendix

Reverse Osmosis	Reverse Osmosis is a process that is used to remove a wide range of salts to give water of high purity. Osmosis is a natural process involving fluid flow across a semi-permeable membrane barrier. Reverse osmosis changes the direction of the water flow due to application of pressure on one side of the membrane. The rejection rate of contaminants/salts from the water is generally in the region of 90 to 99.5% depending upon the type of membrane used and water to be treated. This means that a typical mains water supply of around 500 to 700 µS/cm conductivity, when passed through a Reverse Osmosis plant will give water of a conductivity of around 10 µS/cm. Greater purity can be achieved with a final “polishing” of the water if required.

12.4 Roxtec EzEntry 4 Mini

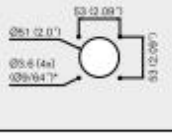
Roxtec

Installation Instructions
Roxtec EzEntry™

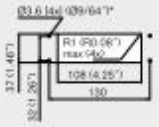
Roxtec EzEntry™ holecut

1

EzEntry™ 4 mini and 4
Hole dimensions (mm)

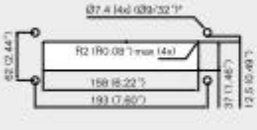


EzEntry™ 10
Hole dimensions (mm)



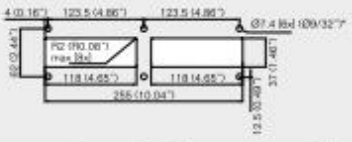
EzEntry™ 10 fits standard multipin connector knock-out.

EzEntry™ 16
Hole dimensions (mm)

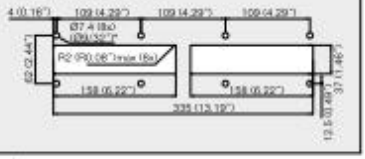


EzEntry™ 16 fits FL 21 knock-out.

EzEntry™ 24
Hole dimensions (mm)



EzEntry™ 32
Hole dimensions (mm)



Drill bit size when using nuts

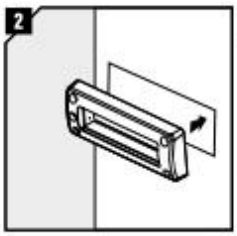
4 mini	4.5 mm	3/16"
4	4.5 mm	3/16"
10	4.5 mm	3/16"
16	9 mm	11/32"
24	9 mm	11/32"
32	9 mm	11/32"

Cut a rectangular opening for the frame, according to the dimensions above.
* Recommended drill bit size.

Roxtec EzEntry™ 4, 10, 16, 24 and 32 installation

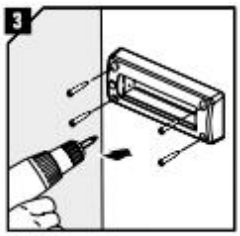
To install the Roxtec EzEntry™, you need the frame, the sealing modules, the lubricant and the fasteners.
(When installing the EzEntry™ 16 on a structure thinner than 2 mm or 0.079 inches, you also need a counter frame.)
The only tool you need is the included set of hex keys. For installation of Roxtec EzEntry™ 4 mini, see page 2.

2



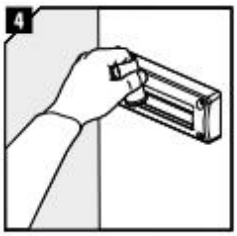
Insert the frame into the opening.

3



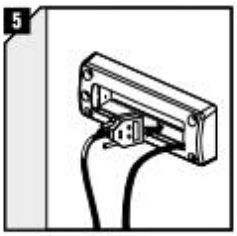
Attach the frame firmly, using the enclosed screws.

4



Lubricate the inside surfaces of the frame with Roxtec Lubricant. Make sure to lubricate the corners.

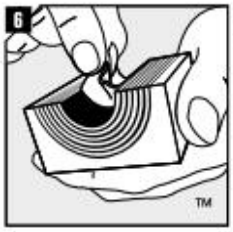
5



Feed the cables through the frame opening.

Page over

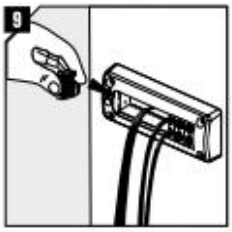
Appendix



Adapt the module to the cable size. Peel off layers until you achieve the gap seen in picture 7.

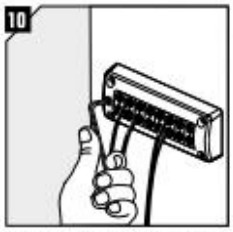
Achieve a 0.1-1.0 mm gap between the two halves when held against the cable.

Lubricate all modules thoroughly, both on the inside and the outside surfaces, before installation.

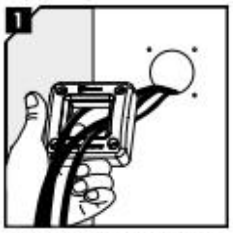


Insert the modules according to the installation plan (Packing Plan).

Roxtec EzEntry™ 4 mini installation



Tighten the integrated compression unit with a hex key to seal the transit.*



Lubricate the inside of the frame and the modules with Roxtec Assembly Gel. Feed the cables through the frame.

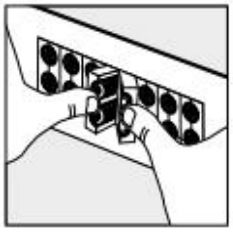
Insert all modules from the back of the frame and install all cables before attaching the frame to the structure.

EzEntry™ 4 mini is compressed and sealed when you tighten the screws.

Tips & recommendations

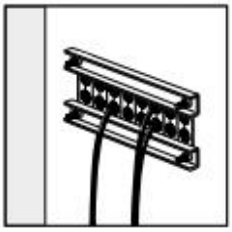
Precompress

If more space is needed to install the last module, use a tool to pre-compress the modules in the frame. For information about the Roxtec compression tools, please visit www.roxtec.com/installers-section.



Angle the modules

To simplify the insertion of the last module, angle module halfs and press them into the frame simultaneously.



For EzEntry™ 16, please observe:

If the structure is thinner than 2 mm or 0.079 inches, a counter frame is mandatory when installing EzEntry™ 16. The two parts are mounted on the backside of the wall, facing the "long" frame parts.

***Recommended torque for compression screw**

EzEntry 4 = 3-5 Nm
EzEntry 10 = 5-7 Nm
EzEntry 16 = 5-7 Nm
EzEntry 24 = 5-7 Nm
EzEntry 32 = 5-7 Nm

Disassembly instruction

Reverse installation order

DISCLAIMER

"The Roxtec cable entry sealing system ("the Roxtec system") is a modular-based system of sealing products consisting of different components. Each and every one of the components are necessary for the best performance of the Roxtec system. The Roxtec system has been certified to resist a number of different hazards. Any such certification, and the ability of the Roxtec system to resist such hazards, is dependent on all components that are installed as a part of the Roxtec system. Thus, the certification is not valid and does not apply unless all components installed as part of the Roxtec system are manufactured by or under license from Roxtec ("authorized manufacturers"). Roxtec gives no performance guarantee with respect to the Roxtec system, unless (i) all components installed as part of the Roxtec system is manufactured by an authorized manufacturer and (ii) the purchaser is in compliance with (a), and (b), below.

(a) During storage, the Roxtec system or part thereof, shall be kept indoors in its original packaging at a temperature not exceeding +32°C/+158°F and not below -40°C/-40°F.

(b) Installation shall be carried out in accordance with Roxtec installation instructions in effect from time to time.

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Roxtec

Roxtec International AB
Box 540, 371 23 Karlskrona, SWEDEN
PHONE +46 455 36 67 00, FAX +46 455 820 12
EMAIL info@roxtec.com, www.roxtec.com

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