

# ICH



## OPERATING MANUAL

**ICH 256**

Cooled incubator with compressor cooling and humidity control  
Optional CO<sub>2</sub> supply or interior lighting

## Manufacturer and customer service

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When contacting customer service, always quote the product serial number on the nameplate (see page 17).

### Shipping address for repairs:

Memmert GmbH + Co. KG  
Kundenservice  
Willi-Memmert-Str. 90-96  
DE-91186 Büchenbach  
Germany

Please contact our customer service before sending appliances for repair or before returning equipment, otherwise, we have to refuse acceptance of the shipment.

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Date 06/2013

We reserve the right to make changes

## About this Manual

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### Purpose and target group

This manual describes the assembly, function, transport and operation of ICH 256 cooled incubators. It is intended for use by personnel trained by the operator, who have the task of operating and/or maintaining the cooled incubator.

If you are asked to work on the cooled incubator, read this manual carefully before starting work on the unit. Familiarise yourself with the safety regulations. Only perform work that is described in this manual. If there is something you do not understand, or certain information is missing, ask your superior or contact the manufacturer. Do not do anything without authorisation.

### Contents

The ICH 256 cooled incubator is available with different configurations: If specific equipment features or functions are available only with one of the configurations, this is indicated at the relevant points in this manual.

Due to individual configurations, depictions in this manual may be different from the actual appearance.

### Other documents that have to be observed:

- ▶ For control of the cooled incubator with the Memmert PC software "Celsius", please refer to the enclosed, separate manual.
- ▶ For service and repair work (see page 68), please refer to the separate service manual.

### Storage and forwarding

This instruction manual belongs to the cooled incubator and should always be stored where persons working on the appliance have access to it. It is the responsibility of the owner to ensure that persons who are working or will work on the appliance are informed as to the whereabouts of this instruction manual. We recommend that it is always stored in a protected location close to the cooled incubator. Make sure that the instruction manual is not damaged by heat or humidity. If the cooled incubator is sold on or transported and then set up again at a different location, this manual must also go with it.

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# 1. Safety Regulations

## 1.1 Terms and signs used



















In this manual, certain common terms and symbols are used to warn you of dangers or to give you hints that are important in avoiding injury or damage. Observe and follow these hints and regulations to avoid accidents and damage. These terms and signs are explained below.

### 1.1.1 Terms used

**"Warning"** is always used whenever you or somebody else could be injured if you do not observe the accompanying safety regulation.

**"Caution"** is used for information that is important for avoiding damage.

### 1.1.2 Signs used

Prohibition sign (forbidding an action)					
	Do not tilt appliance		Do not lift appliance		Do not stack appliance
Warning signs (warning of a danger)					
	Danger of electrical shock		Explosive atmosphere		Danger of frostbite/cold burns
	Warning of gas bottles		Gas		UV radiation
Regulation signs (stipulate an action)					
	Disconnect the mains plug		Wear gloves		Wear safety shoes
	Observe information in separate manual		Two or more persons required		Wear UV safety goggles
Other icons					
	Information on first aid		First Aid: Rinse eyes out		Important or useful additional information

## 1.2 Product safety and dangers

ICH cooled incubators are technically sophisticated, manufactured using high-quality materials and subject to many hours of testing in the factory. They contain the latest technology and comply with recognised technical safety regulations. However, there are still dangers involved, even when the appliance is used as intended. These dangers are described below.

**Warning!**

**After removing covers, live parts may be exposed. You may receive an electric shock if you touch these parts. Disconnect the mains plug before removing any covers.**



**Any work inside the unit may only be performed by qualified electricians.**

**Warning!**

**When loading the chamber with an unsuitable load, poisonous or explosive vapours or gases may be produced. This could cause the chamber to explode, and people could be badly injured or poisoned. The chamber may only be loaded with materials/test objects which do not form any poisonous or explosive vapours when heated up (see also Chapter Intended use on page 15).**



### 1.2.1 Additional safety regulations for cooled incubators with interior UV lighting

**Warning!**

**UV light is a danger to your eyes. Your eyes could be injured by UV light if you do not wear protection. Always wear UV safety goggles when you open the door of the cooled incubator with interior UV lighting. This is indicated by the warning signs on the door (refer to page 8).**



### 1.2.2 Additional safety regulations for cooled incubators with CO<sub>2</sub> supply.



**Warning!**

**Danger of suffocation.** CO<sub>2</sub> can have a suffocating effect in high concentrations. In normal operation, the cooled incubator gives off small amounts of CO<sub>2</sub> to its surroundings. You should therefore ensure that the room in which it is installed is properly ventilated. Always close the stop valve or pressure reducer on the gas bottle if there is no gas bottle connected or if the bottle connected is empty.



**Warning!**

**High concentrations of CO<sub>2</sub> can cause cold burns or frostbite.** Avoid contact with CO<sub>2</sub> gas to the eyes and skin.



**Warning!**

**Gas bottles may burst or explode at high temperature. Keep the gas bottles away from open flames. Do not store gas bottles at or above 50 °C and ensure that the location is always well-ventilated. Prevent water from penetrating as well as backflow into the gas bottles. It is essential that you read the safety notes and regulations of the gas suppliers.**

CO<sub>2</sub> is not a dangerous substance in terms of the German Hazardous Substances Ordinance (GefStoffV). You should nevertheless familiarise yourself with the applicable safety regulations prior to handling such gas bottles.

### 1.3 Safety labels

Warning signs for dangerous UV radiation in the working area are attached to the doors or cooled incubators with interior UV lighting (Fig. 1). They indicate that either the lighting has to be switched off or UV safety goggles are required when the door is opened.

These stickers must not be removed and must always be well visible. If they become unrecognisable or if they peel off, they must be replaced. They can be ordered from Memmert customer service.

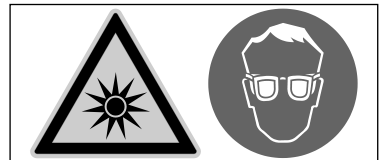


Fig. 1 Warning sign on the door

### 1.4 Requirements of the operating personnel

The cooled incubator may only be operated and maintained by persons who are of legal age, and who have received relevant instructions. Personnel who are to be trained, instructed or who are undergoing general training may only work with the appliance under the continuous supervision of an experienced person.

The cooled incubator may only be transported (with a forklift truck or manual pallet jack) by persons, who are trained for this work and are familiar with the corresponding safety regulations.

Repairs may only be performed by qualified electricians. The regulations in the separate service manual must be observed.

## 1.5 Responsibility of the owner

The owner of the cooled incubator

- ▶ is responsible for the flawless condition of the cooled incubator and for its proper operation in accordance with its intended use (see page 15);
- ▶ is responsible for ensuring that persons who are to operate or service the cooled incubator are qualified to do this, have received the respective instructions and are familiar with this operating manual;
- ▶ must know about the applicable guidelines, requirements and operational safety regulations, and train staff accordingly;
- ▶ is responsible for ensuring that unauthorised persons have no access to the cooled incubator;
- ▶ is responsible for ensuring that the maintenance plan is adhered to and that maintenance and repair work is properly carried out;
- ▶ ensures, for example through corresponding instructions and inspections, that the cooled incubator and its surroundings are kept clean and tidy;
- ▶ is responsible for ensuring that personal protective clothing is worn by operating personnel,  
e.g. work clothes, UV safety goggles, safety shoes, protective gloves.

## 1.6 Changes and alteration

No unauthorised changes or alterations may be made to the cooled incubator.

No parts may be added or inserted which have not been approved by the manufacturer.

Unauthorised changes or alterations result in the EC declaration of conformity (see page 16) losing its validity, and the test chamber may no longer be operated.

The manufacturer is not liable for any damage, danger or injuries that result from independent conversions or alterations, or from non-observation of the regulations in this manual.

## 1.7 Behaviour in case of malfunctions and irregularities

The cooled incubator may only be used in a flawless condition. If you as the operator notice irregularities, malfunctions or damage, immediately take the cooled incubator out of service and inform your superiors.

**i** You can find information on eliminating malfunctions from page 47.

## 1.8 What to do in case of accidents



1. Keep calm. Act with determination and consideration. Pay attention to your own safety.
2. Switch off the cooled incubator and close the valve on the gas bottle.
3. Call a doctor.
4. Initiate first aid measures. If available: Call a trained first aid helper.

### In case of contact with CO<sub>2</sub> to the eyes and skin:



Rinse eyes out with water for at least 15 minutes. In case of cold burns, rinse with water for at least 15 minutes. Cover over in a sterile way. Call a doctor.

### After inhaling CO<sub>2</sub>:

High concentrations can cause suffocation. Symptoms may include a loss of mobility and unconsciousness. The victim is not aware of suffocating.

Low concentrations of CO<sub>2</sub> can cause accelerated breathing and headaches.

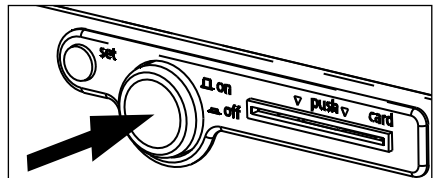
Anyone affected should breathe fresh air, using a breathing device independent of recirculating air. Keep the person warm and calm. Call a doctor. In case of respiratory arrest, use artificial respiration.

### In case of gas leakage:

Leave the room immediately, warn others and ventilate the room. If you re-enter the room, use a breathing device independent of recirculating air if it has not been established that the atmosphere is harmless.

## 1.9 Switching off the cooled incubator in an emergency

- ▶ Push main switch on the front of the appliance (Fig. 2).
- ▶ Close the valve on the gas bottle.



*Fig. 2 Switch off the cooled incubator by pressing the main switch*

## 2. Design and Function

### 2.1 Design



Fig. 3 Design of ICH cooled incubators

- |  |  |
|--|--|
| 1 Controller/control panel (see page 28) | 9 Sliding grid   |
| 2 Push/turn control (see page 28)        | 10 Chamber fan   |
| 3 Standard feed-through                  | 11 Connection for the illumination box (only for models with interior lighting, see page 66) |
| 4 Humidity sensor                        | 12 Illumination box (only for models with interior lighting, see page 66)                    |
| 5 Cooling compressor (see page 65)       | 13 Chipcard reader   |
| 6 Locking swivel castors                 |  |
| 7 Nameplate (see page 17)                |  |
| 8 Glass door                             |  |

### 2.2 Function

Air is heated inside the cooled incubator by means of large-area all-round heating. Humidification is achieved by evaporating water from a tank at a set rate by means of a hot-air generator on the rear side of the appliance. The sterile hot air is introduced into the interior above the fan and mixed with the air current. Humidity is reduced by condensing on two Peltier cooling modules on the rear side of the appliance. Ice that might build up due to dehumidification is automatically defrosted in cycles.

- ▶ If the appliance is equipped with CO<sub>2</sub> supply, carbon dioxide is introduced into the interior through a sterile filter. The turbulence-free interior ventilation ensures a uniform gas distribution, creating a homogeneous atmosphere. The CO<sub>2</sub> content is reduced by introducing fresh air.
- ▶ If the cooled incubator is equipped with interior lighting, it includes an illumination box at the top of the interior (see Fig. 3 on page 11) that contains fluorescent tubes (daylight only or daylight combined with UV light). The chamber load can either be illuminated with daylight or a combination of daylight and UV light.

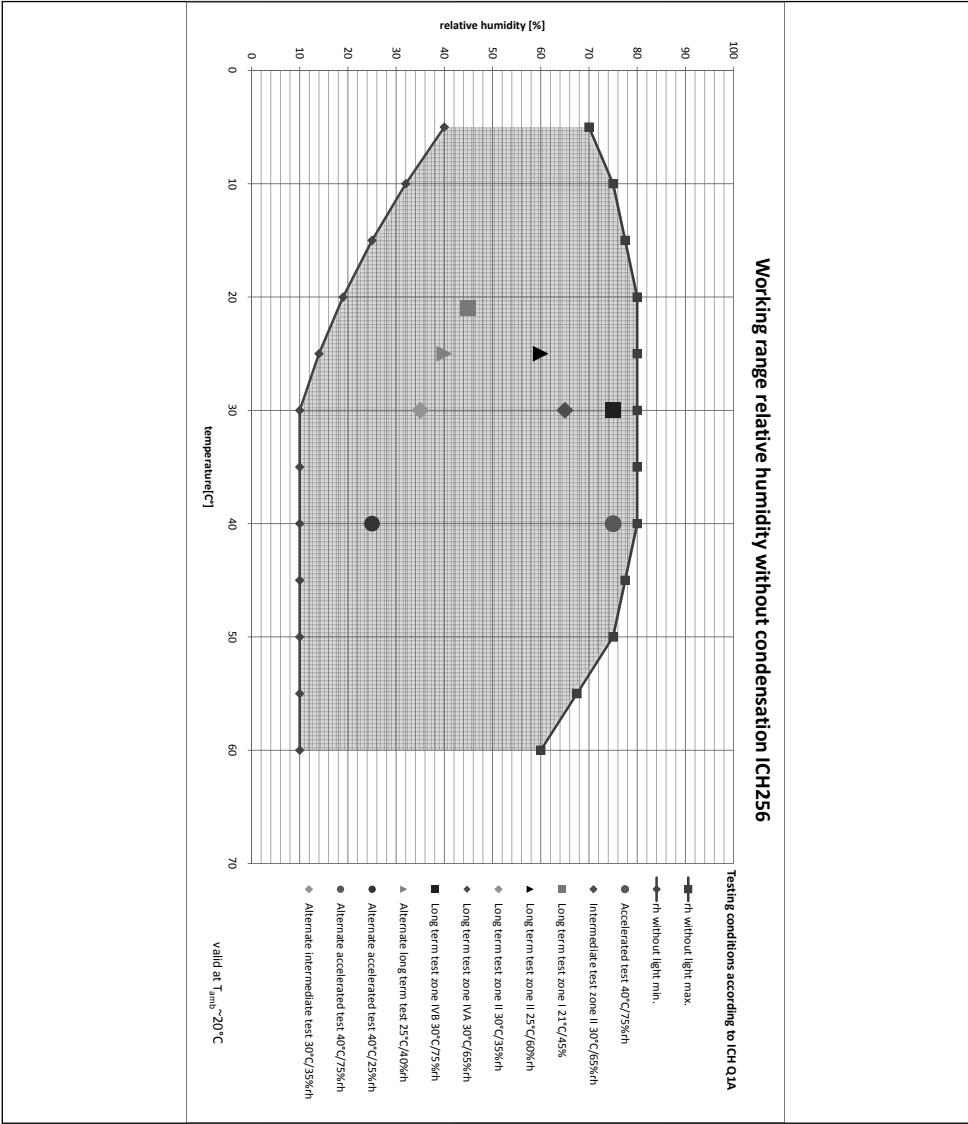


Fig. 4 Working range



## 2.3 Configuration

### 2.3.1 Basic configuration

- ▶ Electronic fuzzy-supported PID process controller with pulse package control and permanent performance adjustments and time-saving self-diagnosis system for quick error location
- ▶ All-round large-area heating with additional thermal conduction layer
- ▶ Capacitive humidity sensor
- ▶ Homogeneous atmosphere and temperature distribution through encapsulated, turbulence-free ventilation system
- ▶ Language selection
- ▶ Alphanumeric text display
- ▶ Integrated week time switch with group function (e.g. all workdays)
- ▶ Recessing push/turn control for simple operation of the appliance
- ▶ Two separate Pt100 temperature sensors DIN class A in a 4-wire circuit for control and monitoring
- ▶ Digital monitoring control for overtemperature, undertemperature and automatic setpoint following (ASF)
- ▶ Mechanical temperature limiter (TB protection class 1)
- ▶ Monitor relay to switch off heating in case of fault
- ▶ Visual alarm indication
- ▶ Acoustic warning signal
- ▶ Calibration of temperature, humidity and (optional) CO<sub>2</sub> at the appliance, without the need of a separate computer

### 2.3.2 Additional fittings

The ICH 256 cooled incubator can be equipped with the following fittings:

- ▶ CO<sub>2</sub> supply
- ▶ Illumination simulation daylight
- ▶ Illumination simulation daylight and UV light

## 2.4 Material

For the outer housing, Memmert deploys stainless steel (Mat.No. 1.4016) and for the interior, stainless steel (Mat.No. 1.4301) is used, which stands out through its high stability, optimal hygienic properties and corrosion-resistance towards many (but not all!) chemical compounds (caution for example with chlorine compounds).

The chamber load for the appliance must be carefully checked for chemical compatibility with the materials mentioned.

A material resistance table can be requested from the manufacturer.

## 2.5 Electrical equipment

- ▶ Operating voltage: See nameplate (page 16), 50/60 Hz
- ▶ Current consumption: See nameplate (page 17)
- ▶ Protection class 1, i.e. operating insulation with PE conductor in accordance with EN 61010
- ▶ Protection type IP 20 acc. to EN 60 529
- ▶ Interference-suppressed acc. to EN 55011 class B
- ▶ Appliance fuse: Fusible link 250 V/15 A quick-blow
- ▶ The temperature controller is protected with a miniature fuse 100 mA (200 mA at 115 V)
- ▶ The CO<sub>2</sub> controller is equipped with a 6.3 A miniature fuse.

## 2.6 Connections

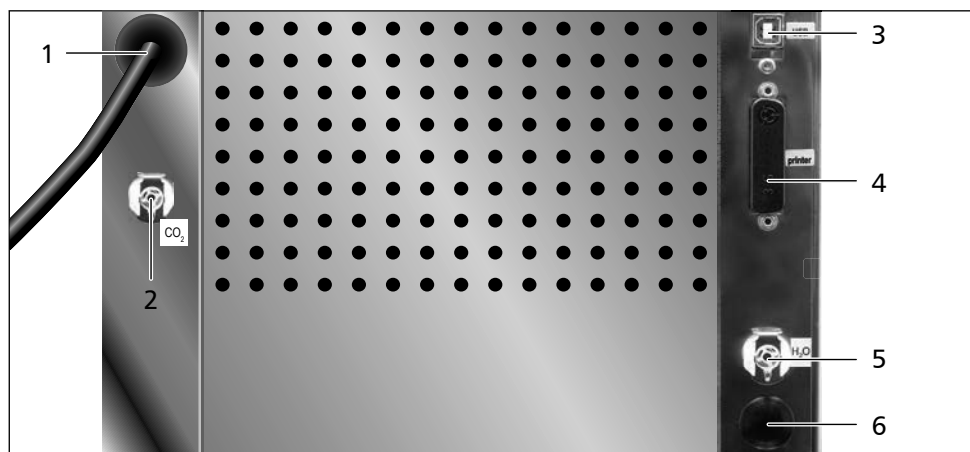


Fig. 5 Connections on rear of appliance

- 1 Mains lead
- 2 CO<sub>2</sub> connection (only for models with CO<sub>2</sub> supply)
- 3 USB connection (optional ethernet connection, see page 57)
- 4 Printer connection (see page 51)
- 5 Water connection (see page 23)
- 6 Fresh air connection (only for models with CO<sub>2</sub> supply)

### 2.6.1 Electrical connection

Observe the country-specific regulations when connecting (e. g. in Germany DIN VDE 0100 with residual current circuit breaker).

This appliance is intended for operation on an electrical power system with a system impedance  $Z_{\max}$  of a maximum of 0.292 ohm at the point of transfer (service line). The operator must ensure that the cooled incubator is operated only on an electrical power system that meets these requirements. If necessary, you can ask your local energy supply company what the system impedance is.

### 2.6.2 Connection of external appliances

Only appliances may be connected to external connections whose interfaces comply with the requirements for safety extra-low voltage (e.g. computer).

### 2.6.3 Gas connection (only for models with CO<sub>2</sub> supply)

The appliance can be connected with the supplied compressed air tube via a pressure regulator with gas bottle monitor (DIN 8546) to a CO<sub>2</sub> compressed gas bottle or directly to a central CO<sub>2</sub> gas supply.

The primary pressure must not exceed 1.2 bar. A value between 0.8 and 1 bar is considered to be an ideal value.

### 2.6.4 Water connection

The supplied tube can be used to connect the cooled incubator with the supplied water tank.

## 2.7 Intended use

ICH cooled incubators may only be used for incubating cell cultures, for material and stability tests or similar. Any other use is improper, and may result in hazards and damage.

Cooled incubators are not explosion-proof (they do not comply with the German workplace health & safety regulation VBG 24). The appliances may only be loaded with materials and substances which cannot produce any toxic or explosive vapours at temperature ranges up to 60 °C and which cannot explode, burst or ignite.

The incubators may not be used for drying, vaporising and branding paints or similar materials the solvents of which could form an explosive mixture when combined with air. If there is any doubt as to the composition of materials, they must not be loaded into the cooled incubator. Potentially explosive gas-air mixtures must not be produced, neither in the interior of the chamber nor in the direct vicinity of the appliance.

Only CO<sub>2</sub> gas bottles with a pressure regulator may be connected to the gas connection of the appliance. The use of other gases or materials than CO<sub>2</sub> is not permitted.

## 2.8 EC Declaration of Conformity



memmert

**EC Declaration of Conformity**

Manufacturer's name and address:

MEMMERT GmbH + Co. KG  
 Äußere Rittersbacher Straße 38  
 91126 Schwabach, Germany  
 Cooled incubator  
 ICH  
 256  
 AC 230 V, alternatively AC 115 V 50/60 Hz

Product:

Type:

Size:

Rated voltage:

This product complies with the provisions of the directives:

**Machinery Directive 2006/42/EC**  
 and revisions

**Directive of the Council for harmonisation of the laws of Member States on the level of protection for accident prevention.**

*The tested product's level of compliance with the essential protection requirements of the Directive is substantiated by its compliance with the following standards:*

EN ISO 12100-1, -2: 2004  
 EN ISO 13850: 2007

EN ISO 13857: 2008  
 EN 60204-1: 2007

**EMC Directive 2004/108/EC**  
 and revisions

**Directive of the Council for harmonisation of the laws of Member States on electromagnetic compatibility.**

*The tested product's level of compliance with the essential protection requirements of the Directive is substantiated by its compliance with the following standards:*

DIN EN 61326-1: 2006-10  
 DIN EN 61000-3-11: 2001-04

EN 61326-1: 2006  
 EN 61000-3-11: 2000

Applied harmonised standards:

**Low Voltage Directive 2006/95/EC**  
 and revisions

**Directive of the Council for harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.**

*The tested product's level of compliance with the essential protection requirements of the Directive is substantiated by its compliance with the following standards:*

DIN EN 61 010-1 (VDE 0411 part 1):2002-08  
 DIN EN 61 010-2-010 (VDE 0411 part 2-010):2004-06

EN 61 010-1:2001  
 EN 61 010-2-010:2003

Schwabach, Germany, 09/02/2011

(legally binding signature of the manufacturer)

This declaration states the compliance with the above Directives, however, does not provide any warranted properties. The safety instructions in the supplied documents have to be observed.

D24249

2.9 Designation (nameplate)

The nameplate (Fig. 6) provides information about the appliance model, manufacturer and technical data. It is attached to the front of the appliance, on the right beneath the door (see page 11).

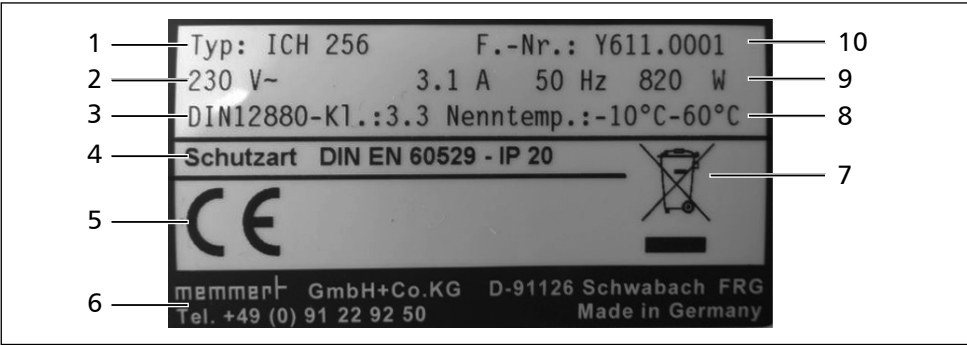


Fig. 6 Nameplate

- 1

Type designation
- 2

Operating voltage
- 3

Applied standard
- 4

Protection type
- 5

CE conformity
- 6

Address of manufacturer
- 7

Disposal note
- 8

Temperature range
- 9

Connection/performance values
- 10

Factory number

2.10 Technical data

Technical data	without interior lighting		with interior lighting
Appliance width D* [mm]	958		
Appliance height E* [mm]	1335		
Appliance depth F* (including door handle) [mm]	706		
Chamber width A* [mm]	800		
Chamber height B* [mm]	640		545
Chamber depth C* [mm]	500		
Chamber volume [litres]	256		231
Weight [kg]	144		
Performance [W]	See nameplate		
max. number of sliding shelves	7		6

\* see Fig. 7 on page 19.

Technical data	without interior lighting	with interior lighting
max. load per sliding shelf [kg]	30	
max. load per appliance [kg]	80	
Temperature	Temperature recording is done by means of Pt100 in a 4-wire circuit Adjustment range normal operation: -10 °C to 60 °C, for models with CO <sub>2</sub> supply or interior lighting 0 °C to 60 °C Adjustment precision: 0.1 °C Deviation in time: max. ±0.1 °C at 37 °C Spatial deviation: max. ±0,3 °C at 37 °C	
Humidity	Relative humidity in the chamber is measured by a capacitive humidity sensor and displayed digitally in percent. The measurement precision of the humidity sensor is 1 % rh ► Adjustment range: 10 to 80 % rh ► Adjustment precision: 1 % rh ► Display range: 10 to 98 % rh ► Deviation in time: max. ±2 % rh	
CO <sub>2</sub>	The CO <sub>2</sub> content is determined through an NDIR measuring procedure, controlled constantly by a microprocessor and displayed digitally in percent ► Adjustment range: 0 to 20 % ► Adjustment precision: 0.1 % ► Deviation in time: max. ±0.1 % ► Spatial deviation: max. ±0.3 %	—
Interior lighting	—	Daylight: LT 18W/965 UV: LT 18W/009 UV

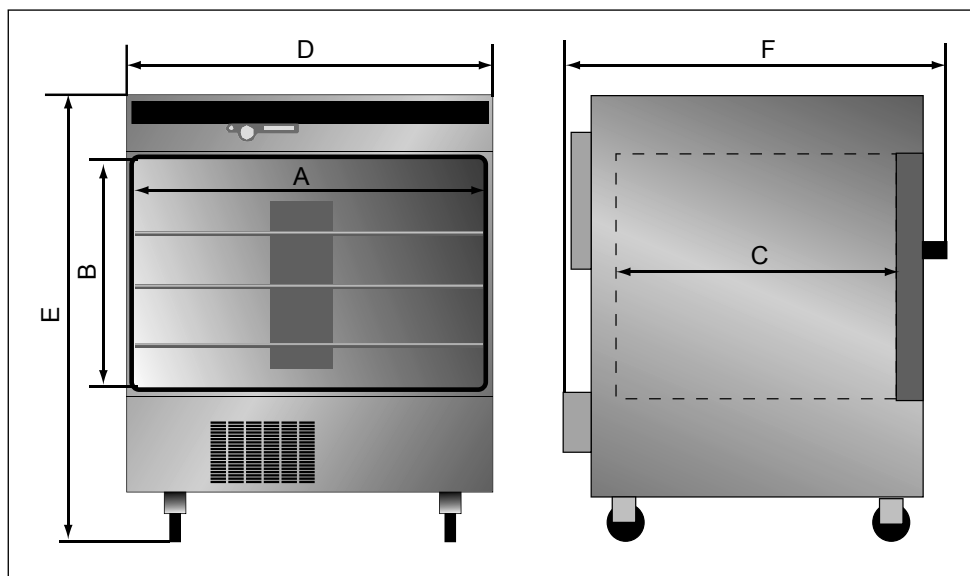


Fig. 7 Dimensions of ICH cooled incubators

## 2.11 Ambient conditions

- ▶ The cooled incubator may only be used in enclosed rooms and under the following ambient conditions:  
 Ambient temperature: 5 °C to 28 °C  
 Humidity: max. 80 %  
 Degree of pollution: 2  
 Altitude of installation: max. 2000 m above sea level
- ▶ The cooled incubator may not be used in areas where there is a risk of explosions. The ambient air must not contain any explosive dusts, gases, vapours or gas-air mixtures. The cooled incubator is not explosion-proof.
- ▶ Heavy dust production or aggressive vapours in the vicinity of the appliance could lead to sedimentation in the interior and, as a consequence, could result in short circuits or damage to electrical parts. For this reason, sufficient measures are to be taken to prevent large clouds of dust or aggressive vapours from developing.

## 2.12 Accessories

- ▶ One sliding shelf
- ▶ Water supply tank and connection tube

Additional for cooled incubators with CO<sub>2</sub> supply:

- ▶ Gas pressure tube

### 3. Delivery, Transport and Setting Up

#### 3.1 Safety regulations

**Warning!**

**You may injure your hands or feet when transporting and setting up the cooled incubator. You should wear protective gloves and work shoes.**

**Warning!**

**Because of the heavy weight of the cooled incubator, you could injure yourself if you try to lift it.**

**If possible, only transport the appliance with a forklift truck or manual pallet jack. The cooled incubator may only be moved using a means of transport by persons who have the required qualification for this (e.g. forklift truck licence). The cooled incubator may not be transported with a crane.**

**If the cooled incubator needs to be carried, at least four persons are required.**

**Warning!**

**The cooled incubator could fall over and seriously injure you. Never tilt the cooled incubator and transport it only in an upright position.**

**Warning!**

**Never stack cooled incubators on top of each other. The cooled incubator on top could fall off and seriously injure or kill someone.**

**Warning!**

**The cooled incubator may only be set up on the floor, and never on tables or similar. A table could collapse or the appliance could fall off and seriously injure or kill someone.**

#### 3.2 Transport

The cooled incubator can be transported in three ways:

- ▶ on its own castors, for which the catch on the (front) castors must be released
- ▶ with a forklift truck; move the forks of the truck entirely under the test chamber
- ▶ on a manual pallet jack.



### 3.3 Delivery

The cooled incubator is delivered in cardboard packaging on a pallet.

#### 3.3.1 Unpacking and checking

1. Remove cardboard packaging or cut open carefully along an edge.
2. Check the delivery note to ensure that the delivery is complete.
3. Check the inside and outside of the cooled incubator for damage. If you notice deviations from the delivery note, damage or irregularities, do not put the cooled incubator into operation but inform the haulage company and the manufacturer.
4. Lift the cooled incubator off the pallet with a fork-lift truck or a manual pallet jack and position it on the installation site.
5. Remove protective foil.

#### 3.3.2 Disposing of packaging material

Dispose of the packaging material (cardboard, protective foil) in accordance with the legally applicable disposal regulations for cardboard packaging in your country.

#### 3.3.3 Storage after delivery

If the cooled incubator is initially to be stored after delivery: Read the storage conditions from page 69.

### 3.4 Setting up

The cooled incubator may only be placed on the ground, not on a table. When doing this, ensure that the appliance is positioned exactly horizontally. The installation site must be level and must be able to reliably carry the weight of the cooled incubator (see page 17). Do not place the appliance on inflammable surfaces and do not stack.

The front swivel castors can be locked with a catch. To ensure stability, always turn the front swivel castors to the front to lock them.

A power connection corresponding to the information on the nameplate (see page 17) must be available at the installation site.

The distance between the wall and the rear of the cooled incubator must be at least 15 cm. The clearance from the ceiling must not be less than 20 cm and the side clearance from the wall must not be less than 8 cm (Fig. 8). The ventilation slits of the cooling unit on the rear of the appliance may not be adjusted.

Sufficient air circulation in the vicinity of the appliance must be guaranteed at all times.

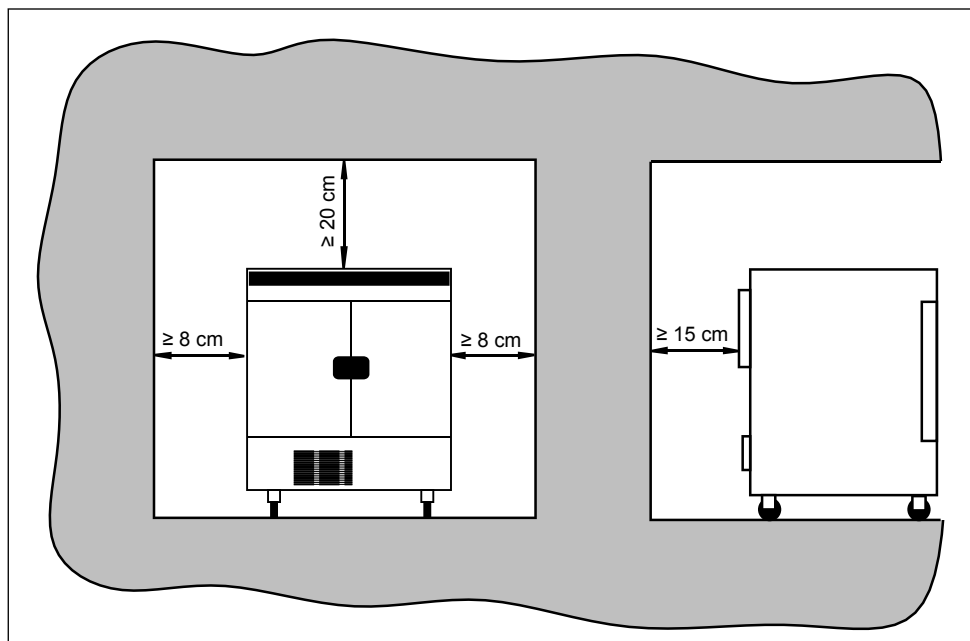


Fig. 8 Minimum clearance from walls and ceiling

## 4. Putting into Operation

### 4.1 Check the door and adjust if necessary

See page 68.

### 4.2 Connecting

#### 4.2.1 Power supply

**Caution:**  
Observe the country-specific regulations when connecting (e. g. in Germany DIN VDE 0100 with residual current circuit breaker). Observe the connection and power ratings (see nameplate).

The cooled incubator is intended for operation on an electrical power system with a system impedance  $Z_{\text{max}}$  at the point of transfer (service line) of a maximum of 0.292 ohms. The operator must ensure that the cooled incubator is operated only on an electrical power system that meets these requirements.

If necessary, you can ask your local energy supply company what the system impedance is.

Connecting power cable (see Fig. 5 on page 14).

#### 4.2.2 External devices

Only appliances may be connected to the connections on the rear of the incubator (see Fig. 5 on page 14) whose interfaces comply with the requirements for safety extra-low voltage (e.g. PC, laptop, printer).

#### 4.2.3 Water connection

Fill the supplied water tank with water and connect it with the enclosed tube to the "H<sub>2</sub>O" connection on the rear of the chamber (Fig. 9).

##### Water specifications

For steam creation, use only:

- steam distilled water (aqua dest)  
or
- Demineralised water (aqua dem) in accordance with VDE 0510/DIN EN 50272; regulations must be strictly adhered to (production conductivity  $\leq 10 \mu\text{S}/\text{cm}$ ). Battery water in accordance with VDE 0510 is available in larger chemist's shops, super markets, hardware stores and in the wholesale trade. The standard VDE 0510/DIN EN 50272 has to be explicitly specified on the label.

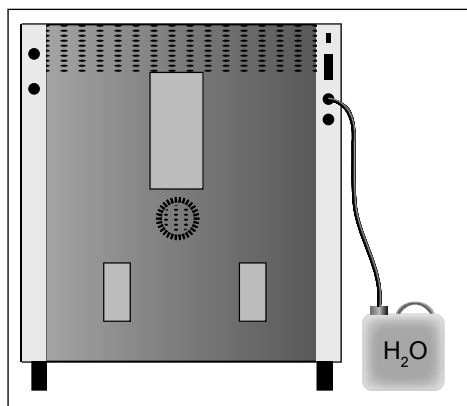


Fig. 9 Water connection

Otherwise, possible calcification in the steam generators, steam piping and peristaltic pumps could affect the operability of the device.

Use only water with a pH value between 5 and 7.

### 4.2.4 Gas connection

(only for models with CO<sub>2</sub> supply)



**Warning!**

**Danger of suffocation:** CO<sub>2</sub> can have a suffocating effect in high concentrations. In normal operation, the cooled incubator gives off small amounts of CO<sub>2</sub> to its surroundings. You should therefore ensure that the room in which it is installed is properly ventilated.



**Warning!**

**High concentrations of CO<sub>2</sub> can cause cold burns or frostbite. Avoid contact with CO<sub>2</sub> gas to the eyes and skin.**



**Warning!**

**Gas bottles may burst or explode at high temperature. Keep the gas bottles away from open flames. Store gas bottles at lower than 50 °C in a well-ventilated location. Prevent water from penetrating as well as backflow into the gas bottles. It is essential that you read the safety notes and regulations of the gas suppliers.**

Attach the supplied pressure tube to the gas bottle (pressure regulator) and to the "CO<sub>2</sub>" connection on the rear of the appliance (Fig. 10 and page 14).

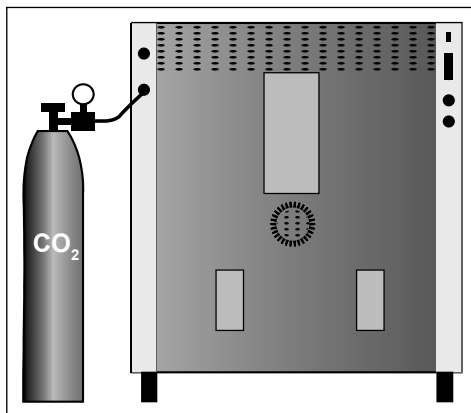


Fig. 10 CO<sub>2</sub> connection

## 5. Operation and Control



### Warning!

**UV light is a danger to your eyes. Your eyes could be injured by UV light if you do not wear protection. Always wear UV safety goggles when opening the door of the cooled incubator with interior UV lighting. This is indicated by the warning signs on the door (refer to page 8).**

### 5.1 Operating personnel

The cooled incubator may only be operated and by persons who are of legal age and have received appropriate training. Personnel who are to be trained, instructed or who are undergoing general training may only work with the cooled incubator under the continuous supervision of an experienced person.

### 5.2 Opening the doors

- ▶ To open the doors, pull out the knobs (Fig. 11).
- ▶ To close, press in the door knobs.

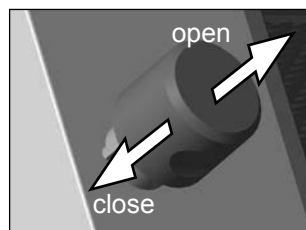


Fig. 11 Opening and closing the doors

### 5.3 Switching on appliance

The cooled incubator is switched on and off by pressing the main switch/push-turn control on the front of the appliance.

- ▶ Switching on: press the main switch so that it comes out of the appliance (Fig. 12).
- ▶ Switching off: press the main switch so that it retracts back into the appliance (Fig. 13).

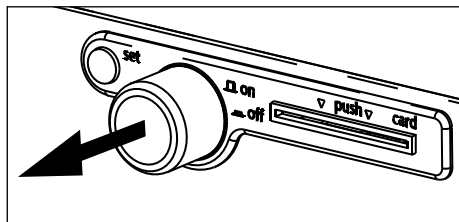


Fig. 12 Switch on cooled incubator

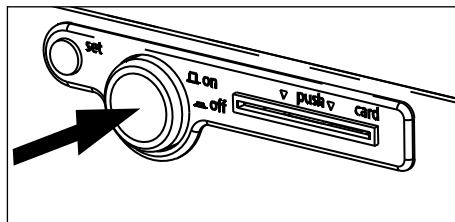


Fig. 13 Switch off cooled incubator

## 5.4 Checking interior lighting

(only for corresponding model)

As the light output and working life of fluorescent tubes may decline according to operational demands over time, it is necessary to check the illuminance and condition of the fluorescent tubes prior to every test.

1. For cooled incubators equipped with UV lighting: Wear UV safety goggles.
2. Switch on the interior lighting (refer to page 31)
3. Check if all fluorescent tubes are working. If not: Replace the respective tube set (refer to page 66)
4. Measure the illuminance with a conventional lux meter by introducing it into the chamber and reading off the measured illuminance. Replace the fluorescent tubes if the light output is insufficient (refer to page 66).

## 5.5 Loading the cooled incubator



### Warning!

**When loading the appliance with an unsuitable load, poisonous or explosive vapours or gases may be produced. This could cause the cooled incubator to explode, and people could be seriously injured or poisoned. The chamber may only be loaded with materials which do not form any toxic or explosive vapours when heated up, and which cannot ignite. If there is any doubt as to the composition of materials, they must not be loaded into the cooled incubator.**



### **i Caution:**

Check the chamber load for chemical compatibility with the materials of the cooled incubator (see page 13), since considerable damage could otherwise occur to the chamber load, the appliance or the surroundings.

The cooled incubator is not explosion-proof (it does not comply with the German workplace health & safety regulation VBG 24) and is therefore not suitable for drying, vaporising and branding paints or similar materials the solvents of which could form an explosive mixture when combined with air. Potentially explosive gas-air mixtures must not form, neither in the interior of the chamber nor in the direct vicinity of the appliance.

Heavy dust formation or aggressive vapours in the chamber or in the vicinity of the appliance could lead to sedimentation in the chamber interior and as a consequence, could result in short circuits or damage to electrical parts. For this reason, sufficient measures should be taken to prevent large clouds of dust or aggressive vapours from developing.

The chamber must not be loaded too tightly, so that proper air circulation in the working chamber is guaranteed. Do not place any of the chamber load on the floor, touching the side walls or right below the ceiling (heating ribs) of the working chamber. To guarantee optimum air circulation, push in the sliding grids so that the gaps between the door, sliding grid and rear wall of the chamber are roughly the same size.

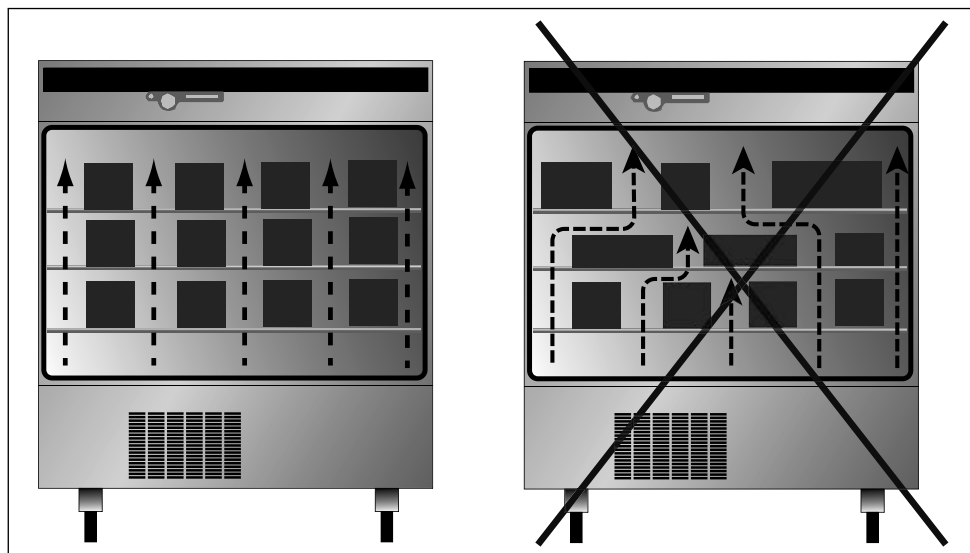


Fig. 14 Correct and incorrect chamber loading

## 5.6 Connecting gas supply

(only for models with CO<sub>2</sub> supply)

1. Check that the gas bottle is properly connected (see page 24).
2. Open the valve on the gas bottle.

## 5.7 Basic operation

The desired parameters are entered on the operating panel of the controller on the front of the appliance (Fig. 15). Basic settings, as well as those for time and pressure, can also be made here. In addition, programmed and current parameters are displayed, as well as warning messages:

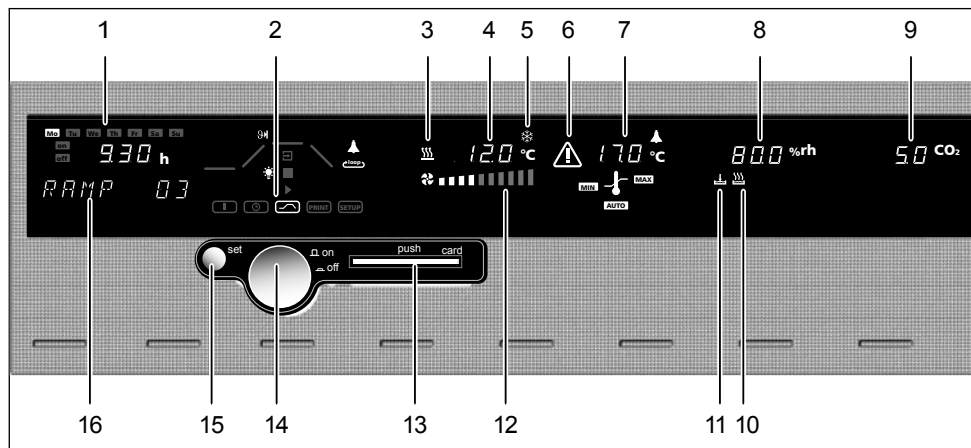
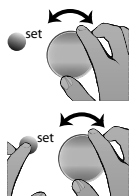


Fig. 15 Operating panel

- |  |  |
|--|--|
| 1 Time display   | 10 Display: appliance is humidifying   |
| 2 Operating mode display (see page 29)   | 11 Display: water tank empty   |
| 3 Display appliance is heating up  | 12 Display: fan speed  |
| 4 Temperature display  | 13 Card reader   |
| 5 Display: appliance is cooling down   | 14 Push/turn control   |
| 6 Alarm display (see chapter 7.3)  | 15 Set key   |
| 7 Temperature monitoring display (see chapter 7.3)                                   | 16 Text display and (for appliances with interior lighting) Display: interior lighting |
| 8 Humidity display   |  |
| 9 Setting the CO <sub>2</sub> setpoint (only for models with CO <sub>2</sub> supply) |  |



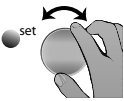
All operating functions are selected by turning the push-turn control to the left or right...

...and adjusted by turning with the SET key held down.

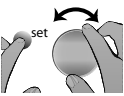


5.8 Setting parameters

Normally, all setting actions on the operating panel described on the following pages are made in the same way:



1. Select the desired parameter with the push-turn control (menu item, e. g. temperature), then all other parameters go dark and the selected one flashes.



2. With the SET key held down, set the desired value (e. g. 37.0 °C) with the push-turn control.



3. Release the SET key to save the set value. The display briefly shows the set value, flashing. Then, the current temperature is displayed and the cooled incubator begins to heat up to the set temperature.

Settings for other parameters can be made in the same way.

**i** The control returns automatically to the main menu if neither the push-turn control nor SET key are pressed for approx. 30 seconds.

Quick adjustment of temperature:

- 1. Hold down the SET key and set the desired temperature setpoint with the push-turn control.
- 2. Release the SET key.

The appliance flashes briefly, displaying the temperature setpoint. Then, the current temperature appears on the display and the controller begins to adjust the temperature to the set value.

5.9 Operating modes

ICH cooled incubators can be operated in four modes (Fig. 16):

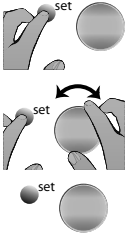
- ▶ Normal mode: The appliance runs in permanent operation at the values set on the operating panel. Operation in this mode is described from page 30.
- ▶ Week time switch: The cooled incubator runs at the set values only at certain times. Operation in this mode is described from page 33.
- ▶ Programme mode: Time sequences of temperature, humidity, fan and CO<sub>2</sub> or lighting values are programmed (so-called ramps), which the cooled incubator automatically works through one after another. Operation in this mode is described from page 35.
- ▶ Interface mode with computer/laptop (optionally, see page 44).

In addition, basic appliance settings (SETUP, see page 52) and printouts (PRINT, see page 51) can be made.

Normal mode (see page 30)	Week time switch (see page 33)	Programme mode (see page 35)	Printer (see page 51)	Basic appliance settings (see page 52)

Fig. 16 Operating modes


## 5.10 Setting the operating mode



1. Hold down the SET key for approx. three seconds until the selected operating mode begins to flash.
2. Select the desired operating mode (normal mode, week time switch, programming mode, printer or basic appliance settings/setup) by turning the control with SET key held down.
3. Release the SET key and the selected operating mode is activated.

### 5.10.1 Normal mode

In this operating mode, the appliance runs in permanent operation. The desired setpoint values for operating the appliance can be selected. The settings have an immediate effect on the functions of the appliance.

1. Load the cooled incubator (see page 26).
2. Switch on the appliance. To do this, press the push-turn control on the operating panel so that it comes out of the appliance (see Fig. 12 on page 25).
3. Select the normal operating mode  with the push-turn control as described above.
4. As described above, set the individual parameters with the push-turn control and the SET key:



Adjustment range: 0°C to 50°C, for models without CO<sub>2</sub> supply and without interior lighting -10°C to 50°C



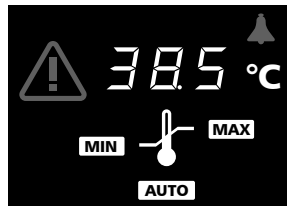
#### Fan speed

Adjustment range: 10 % to 100 % in steps of 10%



#### Temperature monitoring

Adjustment range:  
MIN MAX AUTO  
(see also page 53)



Adjustment range:  
10 to 80 %rh



#### CO<sub>2</sub> setpoint

(only for corresponding model)

Adjustment range:  
0 to 20 %



### UV light

(only for corresponding model)

Adjustment range: OFF, ON



### Daylight

(only for corresponding model)

Adjustment range: OFF, ON



**i** Both lighting modes can be combined or switched on and off independently.

## 5.10.2 Settings example normal mode

The appliance should heat up to 37 °C with a humidity of 80 % rh and a fan speed of 40 %. The monitoring function should trigger at 38.5 °C and at 36.0 °C: For a model with CO<sub>2</sub> supply, the CO<sub>2</sub> content should be 5.0 %. For a model with interior lighting, daylight should be simulated:

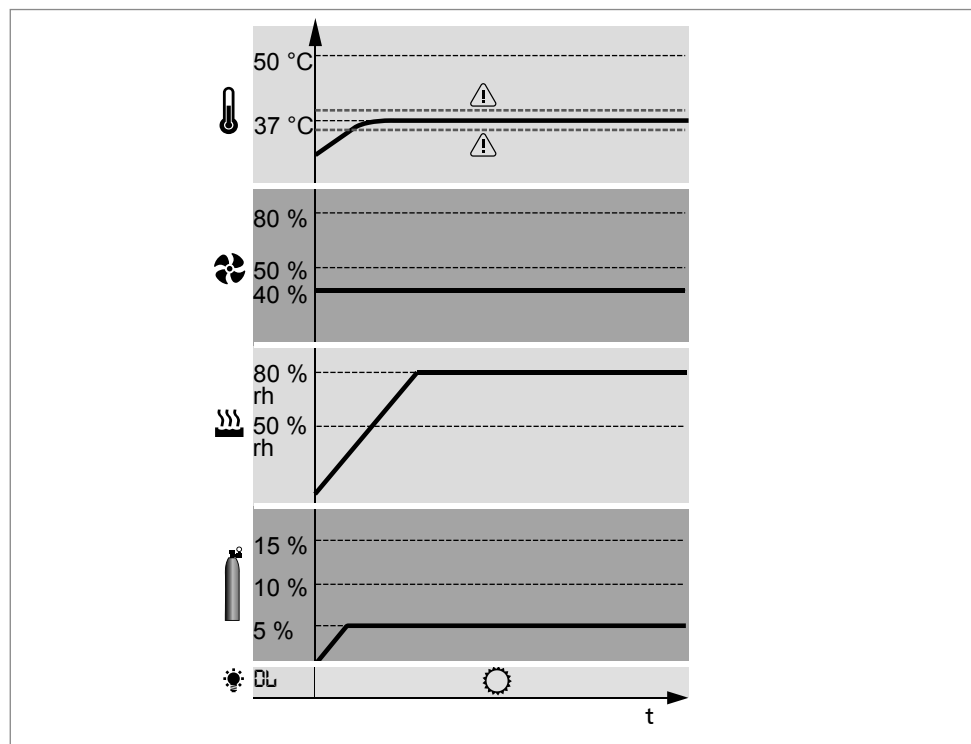



Fig. 17 Example for normal mode

## 1. Setting the normal operating mode:

Hold down the SET key for approx. 3 seconds and the current operating mode then begins to flash.



Select the operating mode  with the push-turn control while keeping the SET key depressed. After you release the SET key, the normal operation mode is activated.



## 2. Setting the temperature setpoint:


Hold down the SET key and set the desired temperature setpoint to 37.0 °C with the push-turn control.

Release the SET key and the appliance will briefly flash, showing the temperature setpoint. Then, the current temperature appears on the display and the controller begins to adjust the temperature to the set value of 37.0 °C.

- ▶ Heating operation is indicated by the  symbol.
- ▶ Cooling is indicated by the  icon.




## 3. Setting the monitoring temperature:

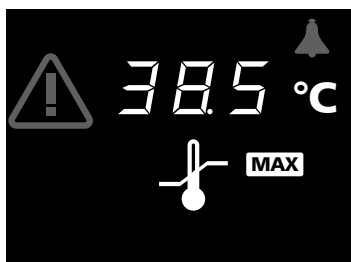
Turn the push-turn control to the right, up to the monitoring temperature and until the MIN or MAX symbol flashes. Hold down the SET key and, with the push-turn control, set the overtemperature limit to 38.5 °C and the undertemperature limit to 36.0 °C. Turn the push-turn control to the right until the monitoring temperature and the AUTO symbol flash. Hold down the SET key and, with the push-turn control, select .

- The tolerance band is set in the SETUP menu (see page 53).

## 4. Setting the humidity setpoint:

Turn the push-turn control to the right until the humidity display flashes. Hold down the SET key and set the desired humidity setpoint to 80.0 % rh with the push-turn control. After releasing the SET key, the humidity setpoint briefly flashes. Then, the current humidity value appears on the display and the controller begins to adjust the humidity to the set value.

- The humidification process is indicated by the  symbol.



### 5. Setting the CO<sub>2</sub> setpoint (only for models with CO<sub>2</sub> supply)

Turn the push-turn control to the right until the CO<sub>2</sub> display flashes. Hold down the SET key and set the desired CO<sub>2</sub> setpoint to 5.0 % with the push-turn control. Release the SET key. The appliance flashes briefly, showing the CO<sub>2</sub> setpoint. The current CO<sub>2</sub> actual value appears on the display and the controller begins to adjust the CO<sub>2</sub> content to the setpoint.



### 6. Adjust lighting (only for models with interior lighting)

Turn the push-turn control to the right until LAMP DL (DL = daylight) appears on the display. Hold down the SET key and set to 01 with the push-turn control. Release the SET key. The daylight lighting is activated.



The cooled incubator is now running in permanent operation with the set values.

## 5.10.3 Week time switch

In this operating mode, the appliance switches on and off automatically at the times programmed.



During the OFF phase of the week time switch, the appliance is in standby mode. The heating and cooling functions, along with the CO<sub>2</sub> and humidity supply are switched off here and the controller display shows the time, dimmed.

The sequence of the week time switch repeats itself each week.

In total, a maximum of 9 time blocks can be programmed, consisting of the switching on and switching off times.

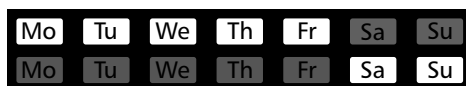
#### Weekday

Adjustment range: Monday to Sunday



#### Day groups

Adjustment range: Working days Mo-Fr  
Weekend Sat-Sun



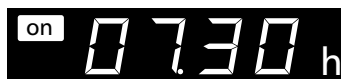
#### No switch on time: ---

Appliance not switched on on this day



#### Switch on time (on)

Adjustment range: 00:00 to 23:59 hours



#### Switch off time (off)

Adjustment range: one minute after the switch-on time up to 24:00



By turning further to the right, parameters (temperature, humidity setpoints etc.) can be selected as in the normal operating mode.

**i** If no settings (temperature setpoint etc.) are made for the ON phase, the controller takes over the values from the normal operating mode.

For reasons of safety, you should always check that a switch-on time is only programmed in the desired time blocks and days.

If the controller is in standby mode or the week time switch is in the ON phase, the temperature setpoint can be directly accessed by briefly pressing the SET key. By turning the control to the right, you get to the temperature monitoring, humidity and CO<sub>2</sub> settings. By turning to the left, you can return to the settings for the individual time blocks.

#### 5.10.4 Settings example week time switch

The appliance should switch on from Mo-Fr (workdays group) at 9.30 (am) and switch off at 19.00 (7pm). In addition, it should operate on Saturday from 10.00 (am) to 14.00 (2pm) (see Fig. 18).

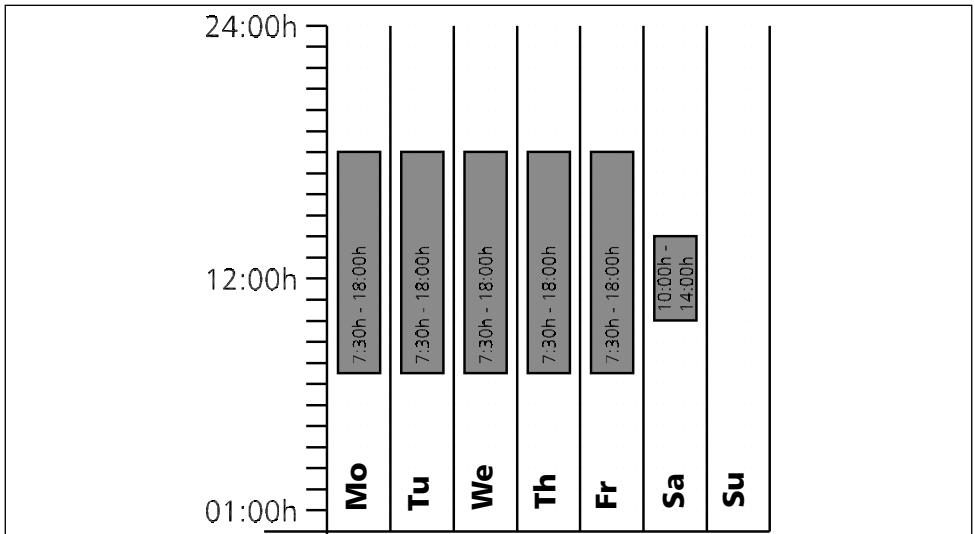



Fig. 18 Operation with week time switch (example)

##### 1. Setting the week time switch operating mode

Hold the SET key down for approx. 3 seconds and the current operating mode then begins to flash. Select the week time switch operating mode  with the push-turn control, while the SET key is held down.

Release the SET key and the control is now in the week time switch operating mode.



## 2. Switch on Mo-Fr at 09:30

Turning the push-turn control to the left, select "MO-FR ON" (group working days).

Hold down the SET key and set the desired switch-on time with the push-turn switch to 09:30 (am).



## 3. Switch off Mo-Fr at 19.00 (7pm)

Select "MO-FR OFF" (group working days) with the push-turn control.

Hold down the SET key and set the desired switch-off time with the push-turn switch to 19:00 (7PM).



## 4. Switch on Sa at 10.00 (am)

With the push-turn control, select "SAT ON".

Hold down the SET key and set the desired switch-on time with the push-turn switch to 10:00 (AM).



## 5. Switch off Sa at 14.00 (2pm)

With the push-turn control, select "SAT OFF".



Hold down the SET key and set the desired switch-off time with the push-turn switch to 14:00 (2PM).



## 5.10.5 Programme mode

In this operating mode, up to 40 freely programmable sequences (ramps) can be set with various combinations of temperature, humidity, fan speed and CO<sub>2</sub> or lighting, which the cooled incubator then processes automatically one after another.

### Setting the programme operating mode

1. Press the SET key and keep it held down.
2. Select the programme mode  with the push-turn control, while the SET key is held down.
3. Select the EDIT  function with the push-turn.



You can now select and modify the following parameters in turn (see also the adjustment example on page 34):



## 4. Delayed programme start: Switch-on day

Adjustment range: Monday to Sunday, workdays Mo-Fr, weekends Sa-Sun, every day Mon-Sun or no day. If no week day is set, the appliance start immediately (INSTANT START) after the start of the programme. In the example shown: Switch-on day Monday.



## 5. Delayed programme start: Switch-on time

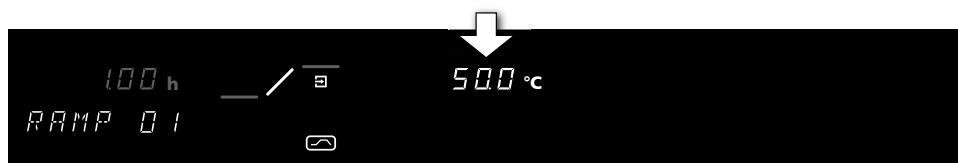
Adjustment range: 00:00 to 23:59 (shown: Switch-on time 8:00)

- i** If no switch-on day is shown, then no switch-on time can be selected, and the programme starts immediately (INSTANT START).



## 6. Duration of first ramp segment

Adjustment range: 1 MINUTE to 999 hours. In the example shown: Duration of first ramp segment: 1.00 hour.



## 7. Setpoint temperature/temperature to end of ramp segment

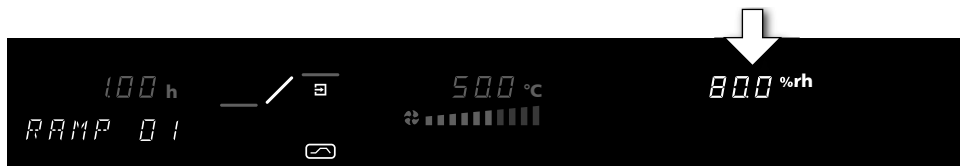
Adjustment range: 0 °C ... 60 °C. In the example shown: temperature 50 °C.





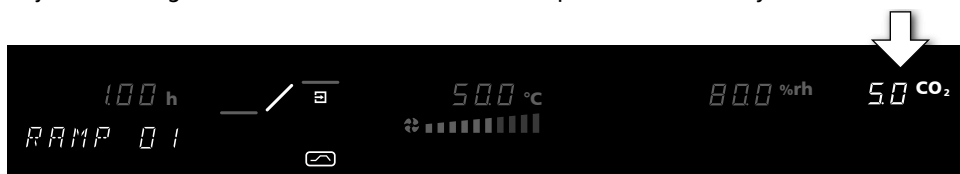
#### 8. Fan speed of first ramp segment

Adjustment range: 10 % to 100 % in 10-% steps In the example shown: fan speed 60 % (six bars lit up)



#### 9. Setpoint humidity (humidity to end of ramp segment)

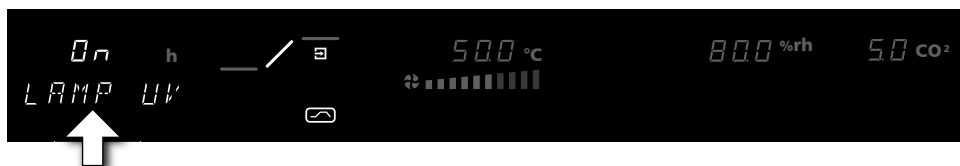
Adjustment range: 10 to 80 % RH and OFF. In the example shown: humidity 80.0 % rh.



#### 10. CO<sub>2</sub> content of first ramp segment

(only for models with CO<sub>2</sub> supply)

Adjustment range: 0 to 20 %. In the example shown: CO<sub>2</sub> content 5.0 %.



#### 11. UV lighting of the first ramp segment

(only for models with interior lighting for daylight and UV light)

Adjustment range: ON, OFF

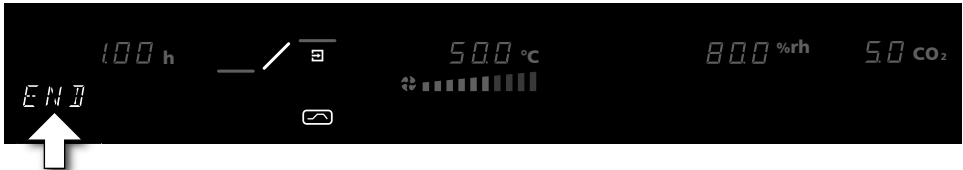


12. Daylight lighting of the first ramp segment

(only for models with interior lighting for daylight and UV light)

Adjustment range: ON, OFF

Each ramp must be completed with a close statement connecting the ramp to the next one. These commands thus control the programme sequence:



13. Close statement of the ramp segment

Setting: NEXT, SPLIT (T), SPLIT (H), SPLIT (TH), LOOP, HOLD, END (shown: command End, see also chapter 5.10.6 "Close statements for ramp segments" on page 39).



14. Leave programme write EDIT mode

Turn the push-turn control to the right until EXIT appears the display and then press the SET key briefly to confirm.

After releasing the SET key ...

- ... a new programme can be created as described above, or an existing one be edited.



EDIT

- ... the programme can be stopped



STOP

- ... the programme can be started



START

### 5.10.6 Close statements for ramp segments

Each ramp must be completed with a close statement connecting the ramp to the next one. These commands thus control the programme sequence:

**NEXT**

NEXT

Connect the next programme segment.

**SPWT (T)**

SET-POINT WAIT (T – temperature)

Wait until the setpoint temperature has been reached.

The appliance starts the next programme segment only when the programmed set temperature has been reached, even if the set heating up time has already elapsed.

**SPWT (H)**

SET-POINT WAIT (H – humidity)

Wait until setpoint humidity has been reached.

Appliance starts the next programme segment only when the programmed setpoint humidity has been reached, even if the set time has already elapsed.

**SPWT (TH)**

SET-POINT WAIT (TH – temperature and humidity)

Wait until setpoint temperature and setpoint humidity have been reached. The appliance starts the next programme segment only when the programmed setpoint temperature and programmed setpoint humidity have been reached, even if the set time has already elapsed.

**LOOP**

Ramp repeat function

The programme entered is repeated after it has run through all programmed segments.

1-99 = repetitions

LOOP = endless repeat function

**HOLD**

Programme end while maintaining the temperature and humidity of last programme ramp

**END**

Programme end, switching off the heating / cooling function and humidification

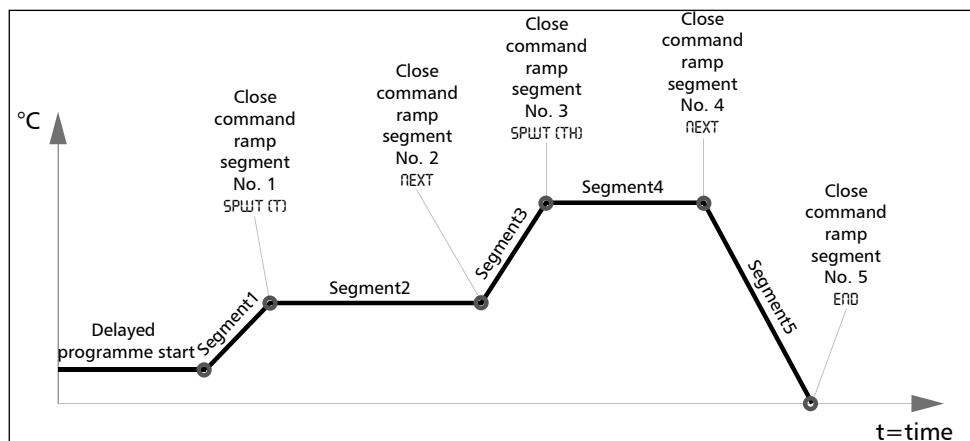


Fig. 19 Schematic example of the use of ramp segment close statements

### 5.10.7 Settings example programme mode

On Monday at 8.00, the cooled incubator should heat up to 37 °C as quickly as possible with a fan speed of 30 %, and reach a relative humidity of 70 % rh. For models with CO<sub>2</sub> supply, the CO<sub>2</sub> content should be set to 5 % and for models with interior lighting, daylight should be simulated.

Once the temperature and humidity have been reached, the cooled incubator should retain the setpoint values at a fan speed of 50 % for 45 minutes. For models with lighting, the test samples should be subject to UV light and daylight during that time.

Afterwards, the appliance should cool down to 20 °C and reach 50 % rh humidity within 1 hour at 30 % fan speed. For models with CO<sub>2</sub> supply, the CO<sub>2</sub> content should be adapted to the natural content of the ambient air and for models with interior lighting, daylight should be simulated. The overtemperature protection should trigger at 38.5 °C.

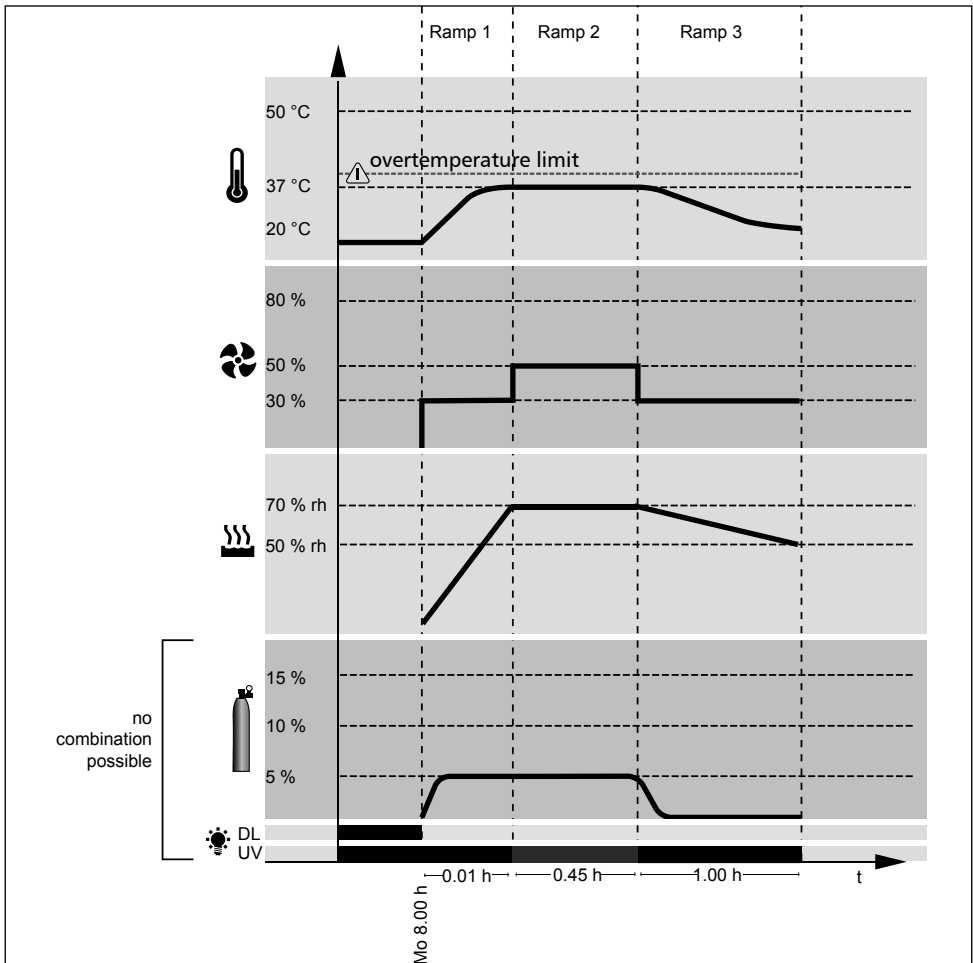


Fig. 20 Settings example programme mode

**i** This ramp programme can only be set for cooled incubators equipped with CO<sub>2</sub> supply or interior lighting. Basic appliances do not include adjustment options for CO<sub>2</sub> or lighting. The respective descriptions in this example are therefore not relevant for these appliances.

**i** Before programming ramp sequences, especially complicated ones, it is recommended that you prepare a similar plan so that you can enter the required ramp commands correctly, as described below. For the sake of retaining an overview, it is recommended that you programme large programmes graphically on your computer, using the "Celsius" software.

1. Setting the programme operating mode:  
Hold the SET key down for approx. three seconds; the current operating mode then begins to flash. Select the programme operating mode with the push-turn control, while the SET key is held down.  
After releasing the SET key, the control is in the programme operating mode.



2. Editing the programme:  
Select EDIT with the push-turn control, while the SET key is held down.  
After releasing the SET key, the controller is in the programme write mode.



3. Weekday for delayed programme start:  
Set the start day MON by turning the push-turn control while the SET key is held down.



4. Setting the clock time for delayed programme start:  
Select the time display with the push-turn control.  
Hold down the SET key and set time to 8:00 with the push-turn control.



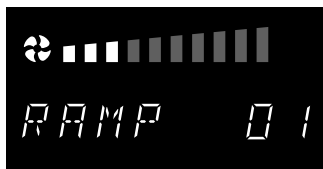
5. Setting the duration of the first ramp segment:  
Turn the push-turn control further to the right until the time display flashes.  
Hold down the SET key and set the time to 00:01 with the push-turn control.



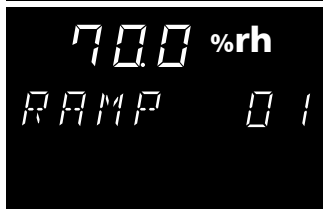
6. Setting the temperature of the first ramp segment:  
Turn the push-turn control to the right until the temperature display flashes.  
Hold down the SET key and set the desired temperature setpoint to 37.0°C with the push-turn control.



7. Setting the fan speed of the first ramp segment:  
Turn the push-turn control to the right until the fan display flashes.  
Hold down the SET key and set the desired fan speed of 30 % (three bars lit up) with the push-turn control.



8. Setting the relative humidity of the first ramp segment:  
Turn the push-turn control to the right until the humidity display flashes.  
Hold down the SET key and set the desired humidity setpoint to 70.0 % RH with the push-turn control.



9. Setting the CO<sub>2</sub> content of the first ramp segment (only for appliances with CO<sub>2</sub> supply, otherwise please continue with point 10):  
Turn the push-turn control to the right until the CO<sub>2</sub> display flashes.  
Hold down the SET key and set the desired CO<sub>2</sub> setpoint to 5.0% with the push-turn control.



10. Set lighting of the first ramp segment (only for models with lighting, otherwise please continue with item 11):  
Turn the push-turn control to the left until the LAMP ON display appears.  
Hold down the SET key and choose ON with the push-turn control.



11. Setting the close statement of the first ramp segment:  
Turn the push/turn control to the right until a segment close statement, e.g. SPWT, appears.  
Hold down the SET key and set the close statement SPWT (TH) with the push/turn control.



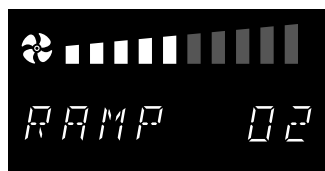
12. Setting the duration of the second ramp segment:  
Turn the push-turn control further to the right until the time display flashes.  
Hold down the SET key and set time to 0.45 with the push-turn control.



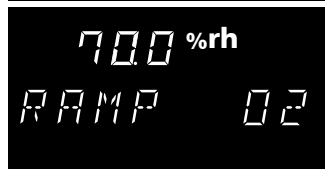
13. Setting the temperature of the second ramp segment:  
Turn the push-turn control to the right until the temperature display flashes.  
Hold down the SET key and set the desired temperature setpoint to 37.0°C with the push-turn control.



14. Setting the fan speed of the second ramp segment:  
Turn the push-turn control to the right until the fan display flashes.  
Hold down the SET key and set the desired fan speed of 50 % (five bars lit up) with the push-turn control.



15. Setting the relative humidity of the second ramp segment:  
Turn the push-turn control to the right until the humidity display flashes.  
Hold down the SET key and set the desired humidity setpoint to 70.0 % RH with the push-turn control.



16. Setting the CO<sub>2</sub> content of the second ramp segment (only for appliances with CO<sub>2</sub> supply, otherwise please continue with point 17):  
Turn the push-turn control to the right until the CO<sub>2</sub> display flashes.  
Hold down the SET key and set the desired CO<sub>2</sub> setpoint to 50.0% with the push-turn control.



17. Set lighting of the second ramp segment (only for models with lighting, otherwise please continue with point 18):  
Turn the push-turn control to the left until the LAMP UV display appears.  
Hold down the SET key and choose ON with the push-turn control.



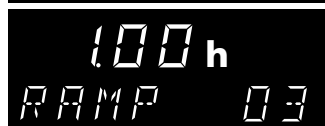
Turn the push-turn control to the left until the LAMP DL display appears.  
Hold down the SET key and set to ON with the push-turn control.



18. Setting the close statement of the second ramp segment:  
Turn the push-turn control to the right until a segment close statement, e.g. END, APPEARS.  
Hold down the SET key and set the close statement NEXT with the push/turn control.



19. Setting the duration of the third ramp segment:  
Select the time display with the push-turn control.  
Hold down the SET key and set the time to 1.00 with the push-turn control.



20. Setting the temperature of the third ramp segment:  
Turn the push-turn control to the right until the temperature display flashes.  
Hold down the SET key and set to 20.0 °C with the push-turn control.



21. Setting the relative humidity of the third ramp segment:  
Turn the push-turn control to the right until the humidity display flashes.  
Hold down the SET key and set the desired humidity setpoint to 50.0 % RH with the push-turn control.



22. Setting the CO<sub>2</sub> content of the second ramp segment (only for appliances with CO<sub>2</sub> supply, otherwise please continue with point 23):  
Turn the push-turn control to the right until the CO<sub>2</sub> display flashes.  
Hold down the SET key and set the desired CO<sub>2</sub> setpoint to 0.0% with the push-turn control.



23. Setting the lighting of the second ramp segment (only for models with lighting, otherwise please continue with point 24):  
Turn the push-turn control to the left until the LAMP ON display appears.  
Hold down the SET key and set to 01 with the push-turn control.



24. Setting the close statement of the third ramp segment:  
Turn push-turn control to the right until a close statement appears in the display, e.g. END, and press the SET key briefly to confirm.



25. Leave programming write mode EDIT  
Turn push-turn control to the right until EXIT appears in the display, and press the SET key briefly to confirm.



26. Setting the temperature monitoring:  
Turn the push-turn control to the right and adjust the temperature monitoring (for more detailed information on this, see page 53).



27. Activating the programme:  
Turn the push-turn control to the right until the stop icon ■ flashes.  
Hold down the SET key and select the start icon ► with the push-turn control. Release the SET key, and the programme is activated.



## 5.10.8 Operation with PC/laptop (optional)

The cooled incubator can optionally be used, controlled and programmed with a PC/laptop. For this purpose, it is equipped with a USB or ethernet interface on the rear side (see page 14 and 57).



The control of the appliance with the Memmert computer software "Celsius" is described in a separate manual.



## 5.11 During operation









Regularly check the water level. If necessary, add distilled water.

Warning messages during operation: See page 47.

### CO<sub>2</sub> mode

In the heating up phase, the CO<sub>2</sub> controller is initially deactivated. The CO<sub>2</sub> inlet is interrupted during this period. About 5 minutes after the setpoint temperature has been reached, the CO<sub>2</sub> control begins measuring and CO<sub>2</sub> gas is introduced into the chamber via a sterile filter. The setpoint can be set from 0 to 20 % in 0.1 % steps.

### Displays in CO<sub>2</sub> mode:

	displayed during the heating up phase of the CO <sub>2</sub> sensor. In the CO <sub>2</sub> display, $\text{CO}_2$ is shown.
	displayed during the zero balance adjustment.
	After the setpoint temperature has been reached, the CO <sub>2</sub> concentration is displayed in % depending on the setting.
	<p>displayed if the CO<sub>2</sub> concentration exceeds the defined setpoint by at least 1 % for more than 3 minutes. If the concentration is higher, the CO<sub>2</sub> display and the  icon flash.</p> <p>In this case, you should open the door for 30 sec. and wait to see if the controller steadily adjusts to the setpoint. If the error occurs again, contact the customer service.</p> <p> This monitoring function only starts working once the CO<sub>2</sub> setpoint has been reached.</p>
	<p>displayed if the gas bottle is empty. In this case, connect a new gas bottles (see page 23).</p> <p> The pressure in the gas bottles is a constant approx. 57 bar at 20 °C ambient temperature. The pressure in the bottle cannot be used to determine its filling level, since the pressure only drops immediately before the bottle is completely empty.</p>

## Active humidity control

The active humidity control guarantees that setpoint humidity is quickly reached, without the use of water trays.

In the heating up phase, the humidity controller is initially deactivated. Approx. 5 minutes after the setpoint temperature is reached, the humidification and dehumidification control starts working. The setpoint can be set from 10 to 80 % rh. The humidity setpoint can also be adjusted during the transient state. For humidification, water is let into the chamber via a dosing pump. To avoid the formation of germs, the steam is first heated to approx. 140 °C. Dehumidification takes place through the supply of dry air via a sterile filter.

**i** If no humidity is required in the chamber, the humidity control can be deactivated by setting to OFF.

## 5.12 Ending operation

1. Switch off appliance. To do this, press the main switch on the operating panel so that it clicks into the appliance (Fig. 21).
2. For models with CO<sub>2</sub> supply: Close the valve on the gas bottle.
3. Open the door
4. Remove the chamber load.
5. Check for condensation water in the interior. Wipe it up.
6. Empty the water tank, if the cooled incubator will not be used for several days.

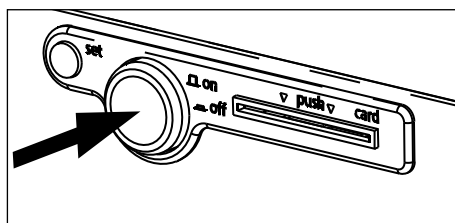


Fig. 21 Switch off cooled incubator

## 6. Warning Messages and Malfunctions

### 6.1 Warning messages

- i** The warning messages also set off an intermittent acoustic signal:  
This can be temporarily switched off by pressing the SET key.



Error in the temperature control system (see also chapter "Temperature monitoring" on page 53):

<b>TH-ALARM</b>	TH-ALARM - if the temperature limiter is triggered	Remedy: See page 54
<b>HI-ALARM</b>	HI-ALARM - if overtemperature protection is triggered	Remedy: Check the setting of the MAX temperature monitor.
<b>LO-ALARM</b>	LO-ALARM - if undertemperature protection is triggered	Remedy: Check the setting of the MIN temperature monitor.
<b>ASF-ALARM</b>	ASF-ALARM - if the automatic monitoring function is triggered	Remedy: Check the setting of the ASF temperature monitor.

Error in the dehumidification system:

<b>RH EMPTY</b>	if the water supply is defective	Remedy: Check that the water supply is properly connected. Fill water supply tank with distilled water if it is empty.
<b>RH OVER</b>	If humidity exceeds the setpoint for longer than 30 minutes.	Remedy: Open the door for 30 sec. and wait to see if the controller steadily adjusts to the setpoint. If the error occurs again, contact the customer service.

Error in the CO<sub>2</sub> system (only for models with CO<sub>2</sub> supply)

	if the CO <sub>2</sub> supply is defective	Remedy: Set CO <sub>2</sub> setpoint to 0, check the stop valve and connection of the gas bottle; if the gas bottle is empty, replace it and set the CO <sub>2</sub> setpoint to the desired value.
	if the CO <sub>2</sub> concentration exceeds the defined setpoint by at least 1 % for more than 3 minutes.	Remedy: Open the door for 30 sec. and wait to see if the controller steadily adjusts to the setpoint. If the error occurs again, contact the customer service.

## 6.2 System/appliance errors






### Warning!

**After removing covers, live parts may be exposed. You may receive an electric shock if you touch these parts. Malfunctions requiring intervention inside the appliance may only be rectified by electricians. Please refer to the separate ICH cooled incubator service manual for this.**

Do not try to rectify the error yourself but contact an authorised customer service point for MEMMERT appliances or contact the MEMMERT customer services department directly (see page 2).



In case of enquiries, please always specify the model and appliance number from the nameplate (see page 17).

Error	Possible cause	Remedy
The display does not work, although the cooled incubator is switched on.	Power supply interrupted	Check the power supply and fuse/circuit breaker.
	Appliance fuse or miniature fuse or controller defect	Contact the customer service and refer to the service manual.
	Appliance error	
	Power module defect	
Appliance cannot be operated	Cooled incubator locked with user-ID card	Unlock incubator with user-ID card (see page 59).
	Push-turn control defect	Contact the customer service and refer to the service manual.
No CO <sub>2</sub> display shown in the CO <sub>2</sub> module	Switched mode power supply SP 200 defect	Contact the customer service and refer to the service manual.


Error	Possible cause	Remedy
 icon flashes ...	Temperature protection (TWW, ASF) has triggered	<ul style="list-style-type: none"> <li>► Increase temperature difference between monitoring and working temperature (see page 53).</li> <li>► Replace Pt100 temperature sensor of monitoring controller, if necessary (see service manual)</li> </ul>
... and RH EMPTY	Water supply tank empty	Set humidity setpoint to OFF, fill up distilled water, then reset humidity setpoint back to desired value.
... and RH OVER	Humidity setpoint exceeded	Open the door for 30 sec. and wait to see if the controller then steadily adjusts to the setpoint. If the error occurs again, contact the customer service.
... and CO <sub>2</sub> OVER	CO <sub>2</sub> setpoint is exceeded	Open the door for 30 sec. and wait to see if the controller steadily adjusts to the setpoint. If the error occurs again, contact the customer service.
... and ERROR AUTOZERO	<ul style="list-style-type: none"> <li>► Autozero pump defect</li> <li>► CO<sub>2</sub> controller defect</li> </ul>	Contact the customer service and refer to the service manual.
Error display (E...) in display	Appliance/system error	Contact the customer service and refer to the service manual.
Error message CONF (is displayed for only 10 sec. after switching on)	Checksum error (error when saving setpoint values)	The error can be rectified by the controller itself after a setpoint parameter has again been saved. If the error should continue occurring or cannot be rectified: Contact the customer service and replace the controller (see service manual).
Chamber fan does not work	Miniature fuse or mains adapter faulty	Contact the customer service and refer to the service manual.
Heating icon  does not light up	► Ambient temperature too high	Set up appliance in a cooler room, minimum setpoint temperature = ambient temperature + 8 °C
	► Temperature in appliance higher than defined setpoint temperature	Wait until the appliance has cooled down.
 symbol is permanently on	Temperature protection (TB) has triggered	Remedy: See page 54

### 6.3 Power failure

In case of a power failure, the cooled incubator operates as follows:

In normal  and week time switch operating modes 

After the power supply has been restored, operation is continued with the parameters set. The time and duration of the power failure are documented in the log memory.

In Programming mode 

- ▶ After a power failure of less than 60 minutes, the current programme is continued from the point at which it was interrupted. The time and duration of the power failure are documented in the log memory (see page 58).
- ▶ In case of a power failure of more than 60 minutes, the cooled incubator starts in manual operating mode for safety reasons and all setpoint values are changed to safe default values (see table below).

For remote operation

If there is a power failure in remote operation, the appliance starts in the normal operating mode for safety reasons and all setpoint values are changed to safe default values (see table). The programme can only be continued from the computer. The time and duration of the power failure are documented in the log memory.

Parameters	Default value
Temperature	20 °C
Fan speed	100 %
CO <sub>2</sub>	0 %
rh	OFF

## 7. Advanced Functions

### 7.1 Printer

The cooled incubator is equipped with a parallel printer port as used in computers. Standard PCL3 compatible inkjet printers with a parallel port (e.g. HP DeskJet 5550 or HP DeskJet 9xx) can be connected to the printer interface on the rear of the appliance (see page 14).

Make sure that a shielded interface cable is used. The shielding must be connected to the plug casing.

The controller has an internal log memory (see page 58). The log data can be printed out in this mode via the connected printer.

If a colour printer is connected, the various graphs are printed out in colour.

On a printout, the GLP header is also printed automatically and contains the following details:

- ▶ Date of printout
- ▶ Period of log
- ▶ Consecutive page numbers
- ▶ Serial numbers and appliance name

#### Running the printing function:

Select the PRINT operating mode with the push-turn control, as described on page 27. By turning the push-turn control and holding down the SET key, the following parameters can be selected and altered one after another, as described in chapter Basic operation on page 28:



Querying the date of the first print page

FIRST

Querying the date of the last print page

LAST

Starting graphical printout

GRAPH

Leaving the print menu and returning to the main menu

EXIT

## 7.2 Basic appliance settings (Setup)

(setup options may vary depending on the appliance model)

In this operating mode, the basic settings for the appliance can be made.



By turning the push-turn control and holding down the SET key, the following parameters can be selected and changed, as described in chapter Basic operation on page 27:

### Clock time in 24 hr. format



Conversion to summer time is not automatic, but must be done manually.

1430 h

SET TIME

### Date

The controller features a calendar that automatically observes the different lengths of months and leap years.

3005

SET DATE

### Weekday

Tu

SET DAY

### Year

Adjustment range from 2000 to 2100

2010

SET YEAR

### Acoustic signal at programme end

ENDSOUND

Setting: OFF or ON

OFF ON

ENDSOUND

### Acoustic Signal for alarm, e.g. over/undertemperature

ALARM SO

Setting: OFF or ON

OFF ON

ALARM SO

### Communication address

Adjustment range: 0 to 15  
(see chapter "Communication interfaces" on page 57)

ADDRESS

### Automatic defrosting system

Setting: OFF 3H 6H 12H 24H 48H

(see page 58).

Factory setting: 12H

DEFROST



### Tolerance band ASF

Adjustment range: 0.5 to 5°C (see page 53)

ASF SET

### Language

Setting: GERMAN, ENGLISH, FRANCAIS, ESPANOL and ITALIANO

GERMAN

### Corrective values

CR1 1-3, RH20, RH80, CO2 5, CO2 10, CO2 15

for customer-side calibration of temperature, humidity and CO<sub>2</sub> (see chapter "Calibration" on page 59)

CAL 1

rh 20

CO2 5

### Leave setup

Save all settings and leave the SETUP mode

EXIT

The realtime clock which is set in the SETUP contains the date and clock time. It is used for logging purposes in accordance with GLP. Date and clock time are specified on the log printout. On graphical printouts, the time axis is labelled with the realtime. The clock is battery-buffered and is independent of the mains connection. The integrated lithium battery of the type CR 2032 has a lifetime of approx. 10 years.

## 7.3 Temperature monitoring

The monitoring temperature is measured via a separate Pt100 temperature sensor in the chamber interior. The monitoring unit is used to protect the chamber load and as a protection for the appliance and surroundings.

The appliance is equipped with a double overtemperature protection (mechanical/electronic) in accordance with DIN 12880.

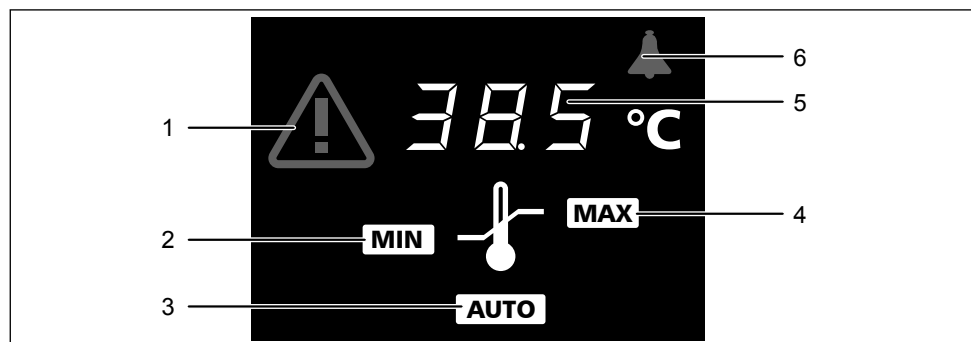



Fig. 22 Temperature monitoring display

- 1 Visual alarm icon lit up: TB alarm flashing: TWW alarm, ASF alarm
- 2 Undertemperature protection
- 3 Automatic temperature monitor (ASF, see page 56)
- 4 Overtemperature protection (TWW, TWB, see page 54)
- 5 Trigger temperature
- 6 Acoustic alarm icon

### 7.3.1 Mechanical temperature monitoring: Temperature limiter (TB)

The cooled incubator is equipped with a mechanical temperature limiter (TB) of protection class 1 in accordance with DIN 12880.

If the electronic monitoring unit should fail during operation and the factory-set maximum temperature is exceeded by approx. 20 °C, the temperature limiter, as the final protective measure, switches off the heating permanently. As a warning, the  icon lights up.


Error rectification after the TB has been triggered:

1. Switch off the appliance and leave to cool down.
2. Reset the TB by pressing the red button, located on the rear side of the unit (next to the power cord, see Fig. 23). Press until you hear a „click“ sound.

### 7.3.2 Electronic temperature monitoring (TWW)

Temperature monitoring can be adjusted independently from the operating modes.

The manually set monitoring temperature **MIN** and **MAX** the overtemperature control is monitored by an adjustable over/undertemperature controller (TWW) protection class 3.3 acc. to DIN 12880.

If the manually set monitoring temperature **MAX** is exceeded, the TWW takes over temperature control and begins to regulate the monitoring temperature (Fig. 24). The alarm icon flashes as a warning .

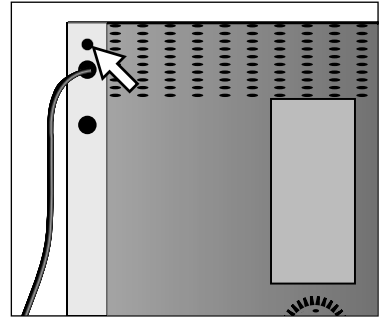


Fig. 23 TB Reset

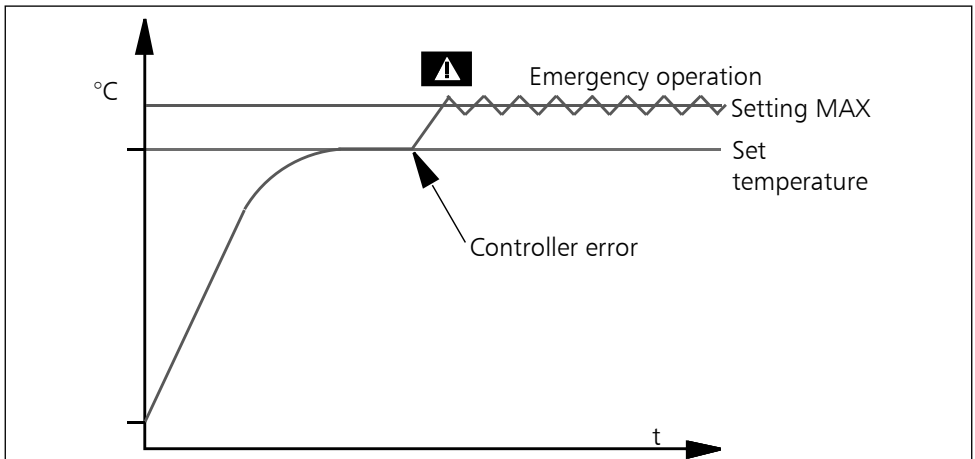


Fig. 24 Schematic diagram of how the TWW temperature monitoring works

**i** The monitoring temperature must always be set sufficiently high above the maximum working temperature.

If the acoustic alarm is switched on in the SETUP, the TWW alarm is additionally signalled by an intermittent tone. If the SET key is pressed, the acoustic alarm can be temporarily switched off until the next alarm event occurs.

Setting:

Overtemperature protection:

Adjustment range: up to max. 10 °C above nominal temperature (for details of the nominal temperature, see nameplate)

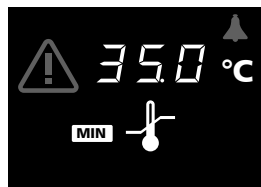
Setting:

1. Select the **[MAX]** icon with the push-turn control.
2. Hold down the SET key and set the desired temperature limit with the push-turn control (e.g. to 38.5 °C).

Undertemperature protection:

Adjustment range: 10 °C below the minimum temperature of the appliance up to 10 °C above nominal temperature of the appliance (for details of the nominal temperature, see nameplate).


- i** The lower alarm limit value cannot be set higher than the top one. If no undertemperature protection limit is required, set the lowest temperature.



### 7.3.3 Automatic temperature monitor (ASF)

ASF is a monitoring device that automatically follows the set temperature setpoint within an adjustable tolerance band (Fig. 25).

The ASF is activated – if switched on – automatically if the actual temperature value reaches 50 % of the set tolerance band of the setpoint (in the example:  $37^{\circ}\text{C} - 1.5^{\circ}\text{C}$ ) reached for the first time (section A). The activation of the ASF is shown by the brightly lit **AUTO** icon.

When the temperature violates the set tolerance band around the setpoint (in the example in Fig. 25:  $37^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ) – e. g. if the door is opened during operation (section B of illustration) – the alarm is set off. This is shown by the **AUTO** and  icons flashing.

If the acoustic alarm is switched on in the SETUP, the ASF alarm is additionally signalled by an intermittent tone. If the SET key is pressed, the acoustic alarm can be temporarily switched off until the next alarm event occurs.

The ASF alarm is automatically triggered as soon as 50 % of the set tolerance band of the setpoint (in the example:  $37^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$ ) are reached again (section C).

If the temperature setpoint is altered, the ASF is automatically disabled temporarily (in this example: The setpoint is changed from  $37^{\circ}\text{C}$  to  $30^{\circ}\text{C}$ , section D), until it has reached the tolerance range of the new temperature setpoint (section E).

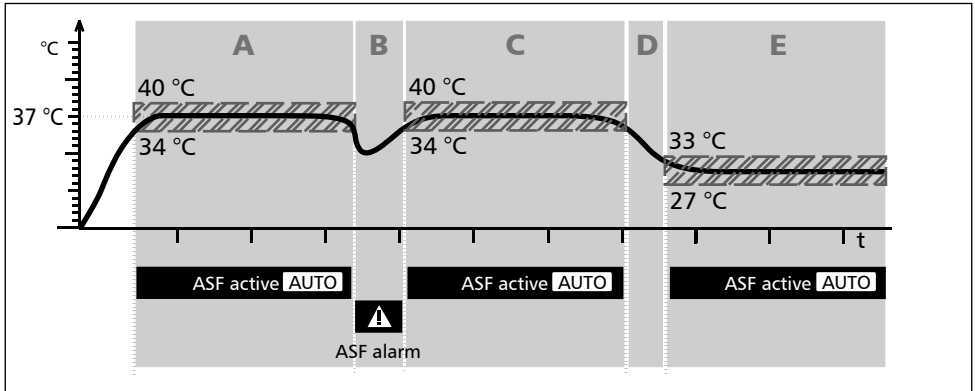

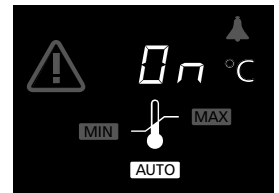


Fig. 25 Schematic diagram of how the ASF temperature monitoring works

#### Switching on the automatic temperature monitor:

Select the AUTO icon with the push-turn control.


Hold down the SET key and set to  with the push-turn control.

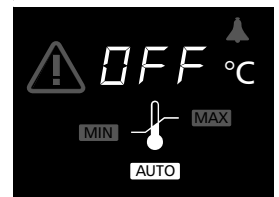


#### Switching off the automatic temperature monitor:

Select the AUTO icon with the push-turn control.

Hold down the SET key and set to OFF with the push-turn control.

 The tolerance band for the ASF can be set in the SETUP in the range 0.5 ... 5 °C (see page 53).



## 7.4 Communication interfaces

### 7.4.1 USB interface

The cooled incubator is equipped by default with a USB interface. In accordance with USB specification (see Fig. 5 on page 14). With this interface, it is possible to control and log the appliance remotely from the computer. This is done with the help of the "Celsius" software.

To do this, the cooled incubator must be given a unique device address in the SETUP sub-menu, menu item ADDRESS, via which the computer communicates with the appliance (see page 52). Using this, the respective cooled incubator can be selected and programmed from the computer. The default setting is ADDRESS 0.

If several appliances are to be connected to a computer via USB interface, an appropriate interface on the computer and a separate cable are required for each. The maximum cable length is 5 m.

### 7.4.2 Ethernet interface

The cooled incubator can optionally be equipped with an ethernet interface to connect it to a network. For identification purposes, each cooled incubator connected must have its own unique IP address. Each appliance is delivered by default with the IP address 192.168.100.100. The programme "XTADMIN", which can be found on the "Celsius" CD-ROM, can be used to change the IP address.



How to set the IP address is described in the enclosed "Celsius" manual.

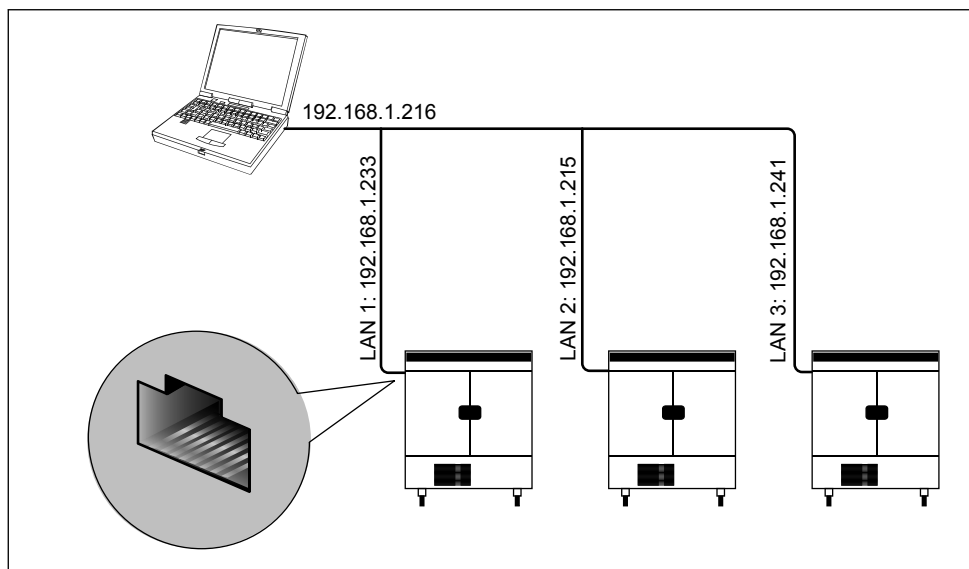


Fig. 26 One or more cooled incubators are connected to a network via ethernet interface (schematic diagram)

## 7.5 Log memory

The controller continually logs all relevant measured values, settings and error messages at 1-minute intervals.

The internal log memory is listed as a ring buffer, i.e. the oldest log data is always overwritten automatically with new data.

The logging function cannot be switched off and is always active. The measured data are stored in the controller, safe from manipulation. For documentation purposes, the controller memory can be read out via the Celsius control software. Each dataset is stored with a unique timestamp.

The internal log memory has a size of 1024 kB. This corresponds to a storage capacity of about three months in permanent operation.

If the power supply is interrupted, the time of the power cut and the return of voltage are stored in the controller.

### Reading in the log memory to the computer via USB interface

The log data can be read out either via the USB interface and then printed out from the computer or via a connected PCL3 compatible printer.

Using the "Celsius" software, the log memory of the controller can be read out to a computer and from there be displayed graphically, printed out and stored.

**i** The log memory of the controller is not modified or deleted by reading it out.

### Printing out log memory

(see also chapter "Printer" on page 51)

For a printout, the GLP header is also printed automatically, containing the following details:

- ▶ Date of printout
- ▶ Period of log
- ▶ Consecutive page numbers
- ▶ Serial numbers and appliance name

**i** If the printer is not ready (e.g. ink cartridge or paper tray empty), no log data will be lost. Multiple printouts can also be made, since the log memory is not deleted after printing.

## 7.6 Automatic defrosting system

The integrated automatic defrosting system for the cooling unit ensures perfect operation of the cooled incubator at low temperatures and in permanent operation. The time values for the automatic defrosting system can be set in the submenu **SETUP** under **DEFROST** (see page 52).

Due to long-term operation with a working temperature below +15 °C or due to a damp chamber load and/or the door opening frequently, ice can form in the interior over time. Heavy icing may impair the function of the appliance and could damage the cooling system. In this case, the working chamber should be defrosted. This can be achieved by short heating of the appliance (to 30-40 °C) or by switching it off for a longer period of time, e.g. over night. The resulting melting water can best be collected with a cloth at the front edge of the working chamber. Afterwards, the smooth surface of the interior can easily be cleaned.

Due to this automatic defrosting, there is a minor brief increase in the chamber temperature at regular intervals. If you would like to further reduce this detraction in performance, you can decrease the defrosting frequency, e.g. to every 24 hours.

In this case, please observe if there is a permanent drop in the cooling performance or a strong fluctuation of the actual value, which may be an indication that the cooling unit is icing over. If this is the case, please set the automatic defrosting system one level higher.

If humidity/room temperature are particularly high, it is possible that the factory setting for defrosting, 12 hours, is not sufficient. If this is the case, you should set a more frequent defrosting interval, e.g. every 6 hours.

Automatic defrosting is disabled with the parameter OFF. When operating at low temperatures, this causes the cooling unit to ice over over time. Regular defrosting needs to be carried out in order to prevent damage to the cooling system.

## 7.7 User ID card (optionally available as an accessory)

The device number of the appliance and a unique user number are stored in encrypted form on the user ID card (Fig. 27). The user ID card therefore works only in the appliance with the corresponding serial number.

To use it, insert the card into the chip card reader (see page 11) on the appliance control panel.

If the user ID card has been inserted, the additional menu item ID-LOCK appears in the SETUP menu. If this setting is changed to ON, the appliance is locked against all adjustments once the chip card is removed.


**1** Locking with the user ID card is displayed with the lit up icon  on the control panel (see also page 28).



Fig. 27 User ID Card

Every login process with the user ID card is logged in the internal flash memory of the controller.

## 7.8 Calibration

### 7.8.1 Temperature calibration

The cooled incubator can be calibrated customer-specifically using three calibration temperatures of your choice:

- ▶ **CRU1** Temperature calibration at low temperature (e.g. 5 °C)
- ▶ **CRU2** Temperature calibration at medium temperature (e.g. 25 °C)
- ▶ **CRU3** Temperature calibration at high temperature (e.g. 50 °C)

For each selected balance point (Fig. 28), a positive or negative compensation correction value can be set between  $-2.9\text{ }^{\circ}\text{C}$  and  $+2.9\text{ }^{\circ}\text{C}$ . There must be a difference of at least  $10\text{ }^{\circ}\text{C}$  between each of the individual balance points.

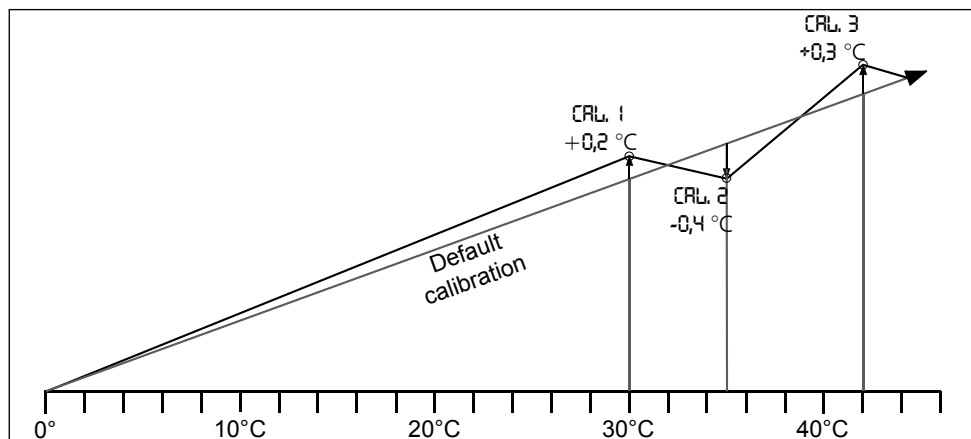


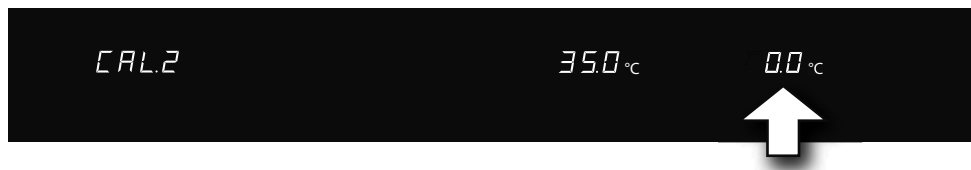
Fig. 28 Temperature calibration (example)

### Setting:

1. Choose SETUP and set the desired compensation temperature (see page 53) and the accompanying compensation correction value to  $0.0\text{ }^{\circ}\text{C}$ .
2. Use a reference instrument to measure the deviation for the selected compensation temperature.
3. Under SETUP, adjust the compensation correction value. If the measured reference temperature is too low, the compensation correction value must be set with a negative sign.
4. Perform a control measurement with the reference instrument.
5. If necessary, repeat the procedure for the other two balance points

Example: Temperature deviation at  $35\text{ }^{\circ}\text{C}$  is to be corrected.

1. Set compensation temperature CAL.2 under SETUP to  $35.0\text{ }^{\circ}\text{C}$  and set the corresponding compensation correction value to  $0.0\text{ }^{\circ}\text{C}$ :



2. With a calibrated reference instrument and at a defined setpoint temperature of  $35\text{ }^{\circ}\text{C}$  in normal operation, an actual temperature of  $34.6\text{ }^{\circ}\text{C}$  is measured.



3. Set compensation correction value for  $\text{CAL}_2$  under SETUP to  $-0.4^\circ\text{C}$ :



4. After the calibration procedure, the reference instrument should display  $35^\circ\text{C}$ .  
 5. With  $\text{CAL}_1$ , another compensation temperature below  $\text{CAL}_2$  can be programmed in the same way, and with  $\text{CAL}_3$ , one above this.

**i** If all compensation correction values are set to  $0.0^\circ\text{C}$ , the factory calibration settings are restored.

### 7.8.2 Humidity calibration

The cooled incubator can be calibrated for the individual customer by means of two balance points at 20 and at 80 % relative humidity. For each selected balance point, a positive or negative compensation correction value can be set between  $-5\%$  and  $+5\%$ .

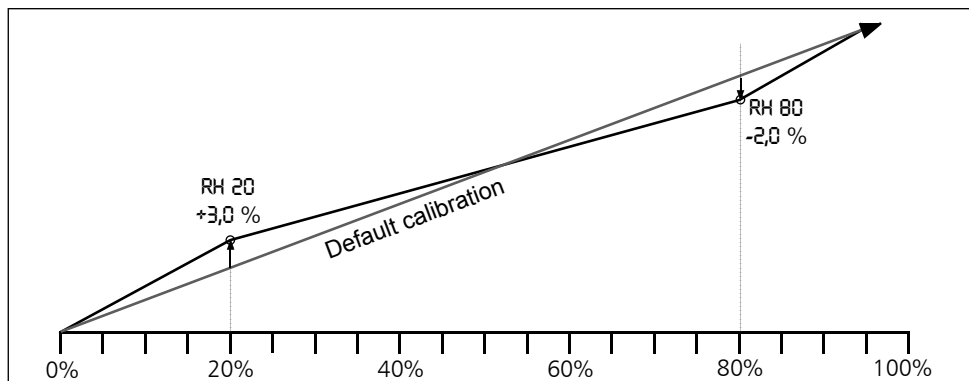


Fig. 29 Humidity calibration (example)

#### Setting:

1. Set the desired humidity balance point in the SETUP (see page 53) and set the accompanying compensation correction value to  $0.0^\circ\text{C}$ .
2. With a reference instrument, measure the deviation in the stationary state in the selected humidity balance point.
3. Under SETUP, adjust the compensation correction value. If the measured reference humidity is too low, the compensation correction value must be set with a negative sign.
4. Perform a control measurement with the reference instrument.

The procedure can be performed with humidity balance points of 20 % rh and 80 % rh.

Example: Humidity deviation at 80 % should be corrected.

1. Set humidity balance point in the SETUP to RH 80 and set the accompanying compensation correction value to 0.0 %rh:



2. With a calibrated reference instrument, an actual humidity of 78 % rh is measured at normal operation, with a defined setpoint humidity of 80 % rh.
3. Set the compensation correction value in the SETUP for RH 80 to -2.0 % rh:



4. After the calibration procedure, the reference instrument should display 80.0 %.

With RH 20 a further comparison can be programmed at 20 % relative humidity.

**i** If all compensation correction values are set to 0.0 % rh, the factory calibration settings are restored.

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

Customer calibration of appliance on controller by means of three CO<sub>2</sub> points:

- ▶ CO<sub>2</sub> 5                      CO<sub>2</sub> calibration at 5 % CO<sub>2</sub> content
- ▶ CO<sub>2</sub> 10                    CO<sub>2</sub> calibration at 10 % CO<sub>2</sub> content
- ▶ CO<sub>2</sub> 15                    CO<sub>2</sub> calibration at 15 % CO<sub>2</sub> content

For each selected balance point, a positive or negative compensation correction value can be set.

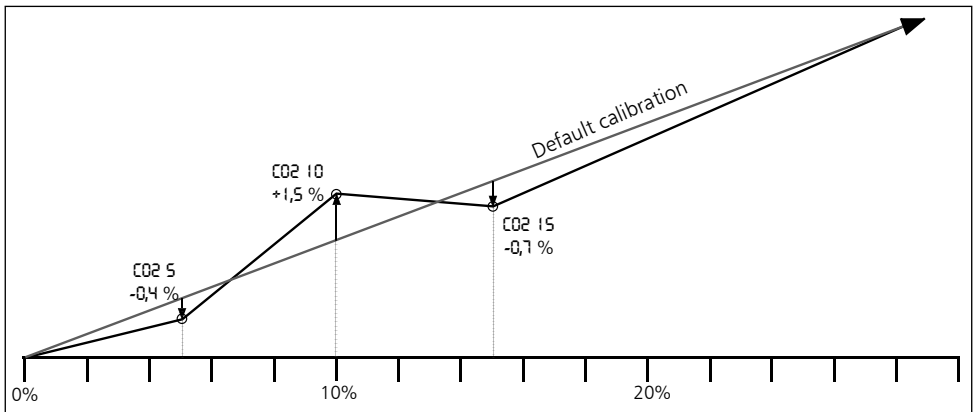


Fig. 30 CO<sub>2</sub> calibration (example)

Setting

1. Set the desired CO<sub>2</sub> balance point in the SETUP (see page 53) and set the accompanying compensation correction value to 0.0 %.
2. With a reference instrument, measure the deviation in the stationary state in the selected CO<sub>2</sub> balance point.
3. Under SETUP, adjust the compensation correction value. If the measured reference CO<sub>2</sub> content is too low, the compensation correction value must be set with a negative sign.
4. Perform a control measurement with the reference instrument.
5. The procedure can be performed for the CO<sub>2</sub> balance points 5 %, 10 % and 15 %.

Example: CO<sub>2</sub> deviation at 10 % should be corrected:

1. Set the CO<sub>2</sub> balance point in the SETUP to 002 10 and set the accompanying compensation correction value to 0.0 %:



2. With a calibrated reference instrument and at a defined setpoint CO<sub>2</sub> content of 100 %, an actual CO<sub>2</sub> content of 11.5 % is measured.
3. Set the compensation correction value in the SETUP for 002 10 to 1.5 %:



4. The reference instrument should display 10 % after the calibration procedure.

With 002 5 and 002 15, further calibrations can be programmed at 5 % and 15 %.

- 1 If all compensation correction values are set to 0.0 %, the factory CO<sub>2</sub> calibration settings are restored.

## 8. Maintenance and Servicing

### 8.1 Cleaning

**Warning!**

**Danger of injury by electric shock. Before any cleaning work, pull out the mains plug.**

#### 8.1.1 Interior and metal surfaces

Regular cleaning of the easy-to-clean interior prevents build-up of material remains that could impair the appearance and functionality of the stainless steel chamber over time.

To clean the interior, the fan cover can be removed by pulling it slightly forwards after the two fixing screws have been screwed out (Fig. 31). The metal surfaces of the chamber can be cleaned with normal stainless steel cleaning agents.

Make sure that no rusty objects come into contact with the working chamber or with the stainless steel housing. Rust deposits can lead to an infection of the stainless steel. If rust spots should appear on the surface of the working chamber due to impurities, immediately clean and polish the affected area.

#### 8.1.2 Plastic parts

Do not clean the operating panel, the plastic input module and other plastic parts of the appliance with caustic or solvent-based cleaning agents.

#### 8.1.3 Peltier module

In order to guarantee perfect function and long lifetime of the Peltier dehumidification modules on the rear side of the appliance, it is absolutely essential to remove dust deposits from the heat sink (with a vacuum cleaner, paintbrush or bottle brush, depending on the amount).

To make cleaning easier, the protective cover can be removed after the screws have been loosened (Fig. 32).



*Fig. 31 To take off the fan cover, remove two screws*



*Fig. 32 Cover of the Peltier cooling modules*

### 8.1.4 Cooling compressor

In order to guarantee perfect function and long lifetime of the refrigeration unit, it is absolutely essential to remove dust deposits from the condenser (Fig. 33, no. 1) (with a vacuum cleaner, paintbrush or bottle brush, depending on the amount).

After the screws (2) have been loosened, the air inlet cover on the front (3) can be removed and the condenser can be cleaned.

After the screws have been loosened, the air inlet cover on the rear (4) can be removed as well, to clean the refrigeration module from both sides if necessary.

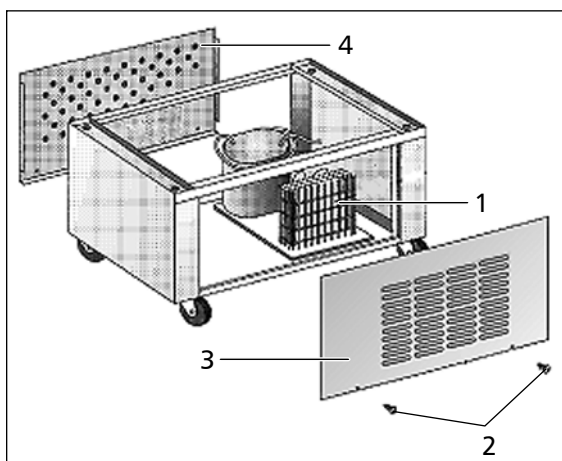


Fig. 33 Cooling compressor

## 8.2 Regular maintenance

### Every three months

- Check that the door seals fit tightly and adjust the door if necessary (see page 68).
- In permanent mode: Grease the moving parts of the doors (hinges and lock) with thin silicon grease and check that the hinge screws are not loose.

### Annually

- Grease the moving parts of the doors (hinges and lock) with thin silicon grease and check that the hinge screws are not loose.
- Check that door seals fit tightly and adjust the door if necessary (see page 68).
- Check safety labels (warning labels on the door) (see page 8). Replace them if they are unrecognisable. They can be ordered from the Memmert customer service.
- Check and replace the sterile filter if it is dirty (only models with CO<sub>2</sub> supply, see service manual)

### Additional maintenance every two years, for models with CO<sub>2</sub> supply

- Replace all sterile filters (see service manual)

## 8.3 Replacing fluorescent tubes

(only for models with interior lighting)

### **i Caution:**

- ▶ Replace the fluorescent tubes only with fluorescent tubes of the same type; e.g. UV light tubes only with UV light tubes, not daylight tubes. For information on the specifications, please refer to chapter "Technical data" on page 17.
  - ▶ Do not replace single tubes, but always the entire tube set (e.g. all UV light tubes instead of just one). Replacing single tubes can influence the light output.
1. Loosen the connection of the illumination box in the interior. To do so, turn the bayonet catch to the left and pull out the plug (Fig. 34).
  2. Pull the illumination box out of the appliance on both handles (Fig. 35).

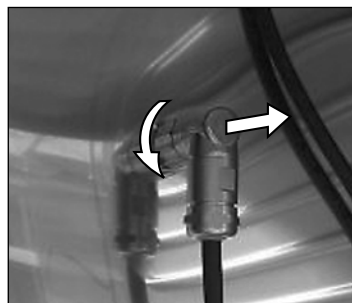


Fig. 34 Open the bayonet catch and pull off the plug

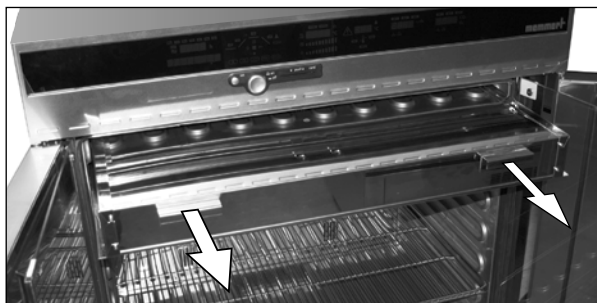


Fig. 35 Pull out the illumination box

3. Turn the illumination box around and place it carefully on a smooth surface so that the fluorescent tubes are on top (Fig. 36).
4. Remove the retaining plate of the glass cover on one side. To do so, unlock the Allen screws on the side, take off the retaining plate and pull out the glass cover (Fig. 37).



Fig. 36 Turn around the illumination box

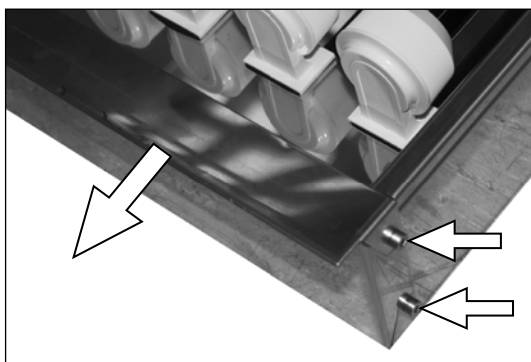


Fig. 37 Remove Allen screws and retaining plate and take out the glass cover.

5. Unlock the plastic fixing of the tubes that need to be replaced on both sides and pull out the tubes carefully (Fig. 38).



Fig. 38

- 1 Remove the plastic fixing and slide to the middle.
  - 2 Pull the tubes carefully out of the holder.
6. Insert new tubes and screw tight.
  7. Attach the glass cover and fix it with the restraining plate. To do so, screw in the two Allen screws on the side again.
  8. Put the illumination box back into the cooled incubator.
  9. Put in the plug and lock the bayonet catch by turning it right.
  10. Check the function of the lighting.

## 8.4 Adjusting door

A well-closing door is indispensable for cooled incubators. Thanks to the combination of a chamber seal and a door seal, MEMMERT appliances optimally guarantee the tight closing of the door. In permanent operation, the flexible seal material might begin to sag. To ensure that the door closes exactly despite this, an adjustment may be necessary (Fig. 39).

The top section (1) of the door hinge can be moved slightly in the direction of the arrow after the two screws (2) at the top and bottom of the door have been undone. Afterwards, tighten the screws again.

Adjusting door:

1. Undo the headless screw (5) (with a jolting motion, as it is fixed with locking paint).
2. Adjust the door by turning the eccentric (3) with a screwdriver.
3. Apply the locking paint to the headless screw and it back tight.

The locking plate (Fig. 40) can also be adjusted in the direction of the arrows after undoing the screw (6).

1. Undo screw (6).
2. Move locking plate (7) in direction of arrow.
3. Tighten the screws again.

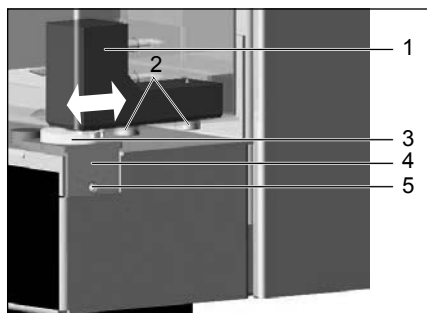


Fig. 39 Adjusting door

- 1 Upper section of the door hinge
- 2 Mounting bolts
- 3 Eccentric tappet
- 4 Eccentric socket
- 5 Headless screw

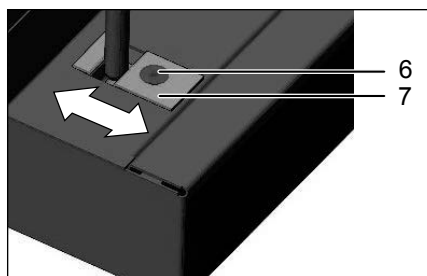


Fig. 40 Adjusting locking plate

- 6 Screw
- 7 Locking plate



**Warning!**  
After removing covers, voltage-carrying parts may be exposed. You may receive an electric shock if you touch these parts. Disconnect the mains plug before removing any covers. Any work inside the unit may only be performed by qualified electricians.



Repairs and service work are described in a separate service manual for the ICH cooled incubator.



## 9. Storage and Disposal

### 9.1 Storage

The cooled incubator may only be stored under the following conditions:

- ▶ in a dry and enclosed, dust-free room
- ▶ frost-free
- ▶ disconnected from the power supply and gas supply

Disconnect the gas bottle and close the valve of the gas bottle.

Gas bottles may be stored in closed rooms if these are sufficiently well ventilated.

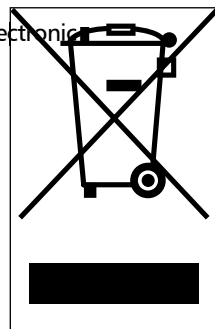
Disconnect the tube of the water supply tank and empty it.

### 9.2 Disposal

This product is subject to the Directive 2002/96/EC on Waste Electrical Electronic Equipment (WEEE) of the European Parliament and of the EU Council of Ministers. This appliance has been brought to market after August 13<sup>th</sup>, 2005 in countries which have already integrated this Directive into their national laws. It may not be disposed of in normal household waste. To dispose, please contact your dealer or manufacturer. Any appliances that are infected, infectious or contaminated with materials that are a hazard to health are excluded from return. Please observe all other regulations applicable in this context.

#### Note for Germany:

The appliance may not be left at public or communal recycling or collection points.



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