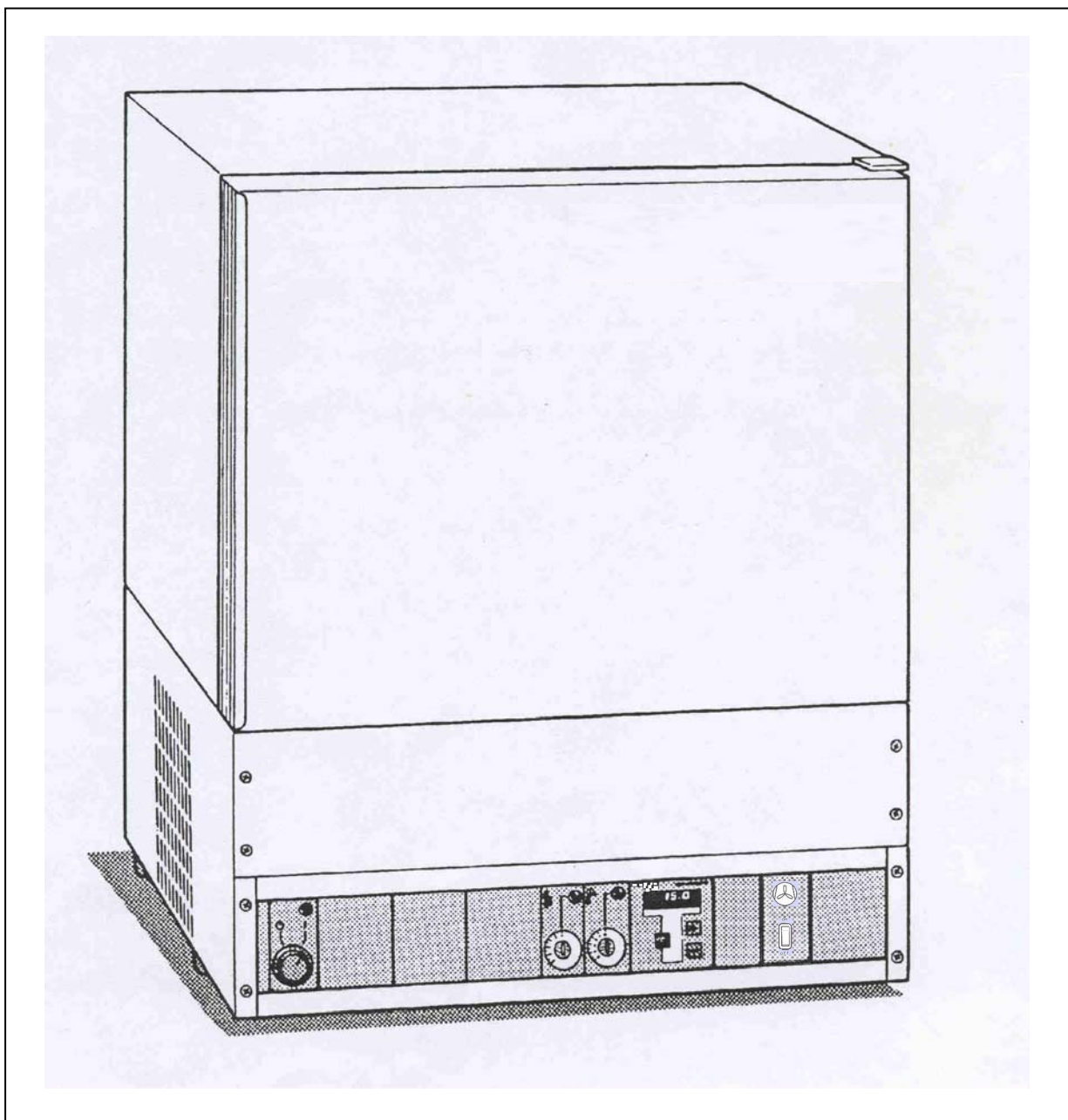


GB

## Low Temperature Incubator

BK 6160

# Operating Instructions



Below is a list of the international Thermo marketing organizations.

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**Internet:** [www.thermo.com](http://www.thermo.com)

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## WEEE Compliance:

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This product is required to comply with the European Union`s Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:



Thermo Electron has contracted with one or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on Thermo Electron`s compliance with these Directives, the recyclers in your country, and information on Thermo Electron products wick may assist the detection of substances subject to the RoHS Directive are available at [www.thermo.com/WEEERoHS](http://www.thermo.com/WEEERoHS).

To ensure the biological safety of your personnel, the environment and samples, it is of paramount importance that the operator uses the biological incubator correctly.

However, there are always risks involved with using biological incubators, especially health risks.

The extent of these risks varies from case to case.

To avoid errors and causing damage, especially personal injuries, be sure to carefully read this manual before using the equipment and follow all instructions.

After setting up the equipment, wait 24 hours before putting it into operation to prevent the cooling unit from being damaged.

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## APPENDIX

Safety Guidelines for Working with Microbiological Technology

Log book

Confirmation of safety

Explanation of confirmation of safety

Information request form regarding maintenance and servicing contract

# 1. GENERAL INFORMATION

## Icon

## Explanation



On unit:

- CAUTION! See documentation included with unit!

In the instruction manual:

- In chapters which have to do with safety, this icon appears under the title of the chapter.
- Within a chapter, this icon and a bar appear next to sections which provide safety information.



Marks information in the instruction manual for using the equipment most effectively.



Unit OFF.



Unit ON.



Over-temperature protection, temperature limit controller (TWW)



Under-temperature protection, temperature limit controller (TWW)



Fan in work chamber

on

Fan in work chamber ON.

off

Fan in work chamber OFF.

## General safety instructions



To ensure the biological safety of your personnel, the environment and samples, it is of paramount importance that the operator uses the biological incubator correctly.

However, there are always risks involved with using biological incubators, especially health risks.

The extent of these risks varies from case to case.

To avoid errors and causing damage, especially personal injuries, be sure to carefully read this manual before using the equipment and follow all instructions.

When installing and operating the equipment, be sure to comply with all applicable laws, regulations and guidelines of your country.

The unit meets the following safety standards:

EN 61010-1:2001  
EN 61010-2-010:2003  
EN 61326:1997

To ensure the proper functioning and safety of the unit, all necessary tests, and maintenance and repair work should be carried out by our service department or someone authorized by our company.

We recommend that you conclude a maintenance contract with our company (see appendix). Let us know if you would like more information on our offer.

When requesting information or ordering replacement parts, please include the data on the nameplate of your unit.

## Operating instructions

The operator (company) is expected to provide anyone who works on or with the equipment with written instructions for the tasks to be performed based on this instruction manual. These instructions should be easy to understand and in the language of the persons operating the equipment.

This also applies to disinfecting the unit.  
(See chapter MAINTENANCE)

## Log book

We suggest that you keep a log book for documenting information on tests, calibrations, and work done on and with the unit (such as maintenance work, agents used).  
(See APPENDIX)

## 2. AREAS OF APPLICATION

The BK 6160 Low-Temperature Incubator is a laboratory tool designed for biotechnological and microbiological applications, i.e.:

- Thermal processing and storage of samples between 0 °C and 50 °C.

The unit is generally designed to be installed and operated in the following environments:

- In laboratories for microbiology and biotechnology.
- Medical labs for microbiology in accordance with DIN 58956.
- For example, in the main area of clinics and hospitals.
- In laboratories for safety levels L1, L2 and L3.



Only use the unit for processing organisms in accordance with safety levels L1, L2 and L3.

When installing and operating the equipment, be sure to comply with all applicable regulations of your country.

It is prohibited to use the unit with gases or agents that emit vapors which may ignite or create a dangerous explosive atmosphere when they come in contact with air.

Be sure to comply with all applicable regulations of your country.



### 3. SAFETY INSTRUCTIONS



- To ensure the biological safety of your personnel, the environment and samples, it is of paramount importance that the operator uses the biological incubator correctly.

However, there are always risks involved with using biological incubators, especially health risks.

The extent of these risks varies from case to case.

To avoid errors and causing damage, especially personal injuries, be sure to read this manual carefully before using the equipment and follow all instructions.


- To ensure the proper functioning and safety of the unit, all necessary tests, and maintenance and repair work should be carried out by our service department or someone authorized by our company.
- The operator (company) is expected to provide anyone who works on or with the equipment with written instructions for the tasks to be performed based on this instruction manual. These instructions should be easy to understand and in the language of the persons operating the equipment.

This also applies to disinfecting the unit.  
(See chapter MAINTENANCE)

For disinfection, be sure to comply with all applicable regulations of your country.

- Do not use alcohol-based disinfection solutions, i.e., disinfection solutions which contain more than 10 weight % alcohol.
- At regular intervals, test whether the temperature limit controller(s) (TWW) are functioning properly.
- When installing testing and power connectors through lead-through openings, be sure to comply with corresponding technical regulations.
- Only use authorized replacement parts.
- Follow the instructions provided in "Safety Guidelines for Working with Microbiological Technology" in the appendix.

#### 4. DESCRIPTION OF UNIT

<b>Standard version</b>	The standard BK 6160 is equipped with a temperature limit controller for over-temperature protection and the Kelvitron® k temperature regulator.
<b>Special version</b>	<p>This version is equipped with the Kelvitron® kp program regulator.</p> <p>Incubators equipped with a lighting unit in the door include the Kelvitron® kl program controller as standard equipment. However, this model does not offer automatic shut-off of the cooling unit when temperatures in the work chamber exceed 45 °C.</p>
<b>Operating principle</b>	<p>An air jacket which delivers or removes the necessary heat via a heat exchanger is responsible for regulating the temperature in the work chamber.</p> <p>A cooling unit is responsible for generating temperatures below room temperature.</p> <p>The cooling unit is switched off for work chamber temperatures above 45 °C .</p>
<b>Automatic defrosting</b>	<p>When the cooling unit is operated at temperatures below 10 °C, it is automatically defrosted.</p> <p>The abbreviation "dF" stands for "defrost" and appears in the display of the temperature controller.</p> <p>Defrosting may lead to a slight deviation in temperature (approx. 1 °C) of the work chamber.</p> <p> When using the unit for a relatively short period of time (less than three days) at temperatures below 10 °C, we recommend that you switch off the defrosting unit to avoid deviations in temperature. For more information, see the descriptions of the various temperature controllers.</p>
<b>Shelves</b>	<p>You can adjust the position of the tilt-proof, removable shelves in 40-mm increments.</p> <p>Insert the supports for the shelves in the vertical mounts provided. No tools are necessary for removing shelves, shelf supports or vertical mounts.</p>

## Control panel

All control buttons and displays for regulating functions and monitoring the unit are located on the control panel.

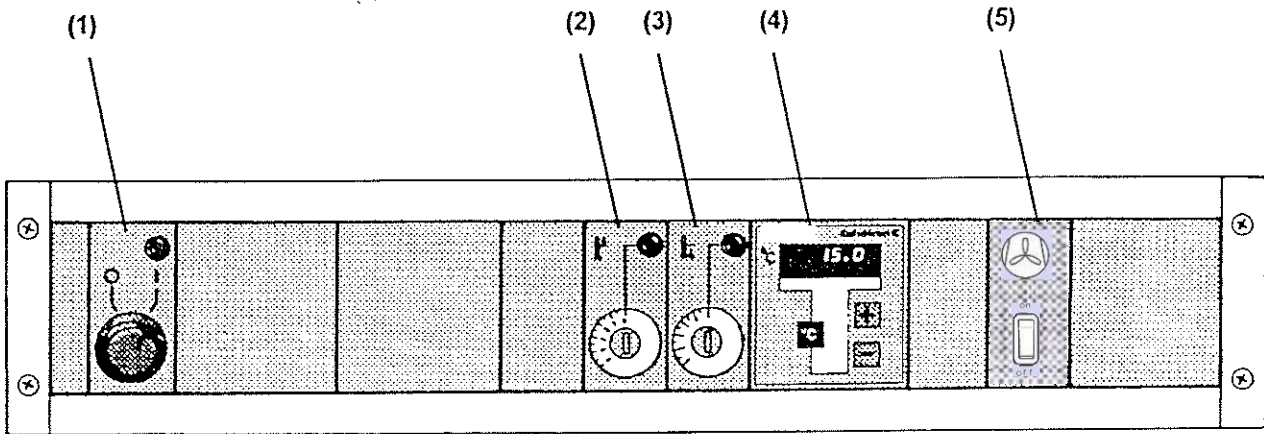


Fig. 1: Control panel

- (1) Mains switch
- (2) Over-temperature protection
- (3) Under-temperature protection
- (4) Temperature regulator
- (5) Switch for fan in work chamber

The numbers given in parentheses refer to the positions in Fig. 1 on page 10.

### (1) Mains switch



Fig 2: Mains switch

On/off switch for unit. The green light indicates that the unit is switched on.

### (2) Over-temperature protection

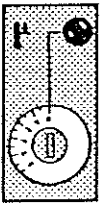


Fig. 3: Temperature limit controller

The unit is equipped with a temperature limit regulator (TWW), for protection against over-temperatures.

Should the temperature regulator fail and the temperature exceed the set limit of the TWW, the TWW takes over the function of controlling the temperature.

The red "malfunction" light indicates that the TWW has been activated.

Use a coin or screwdriver to adjust the setting of the TWW.



Test the TWW periodically to make sure that it is functioning properly.

Test:

First, the unit must reach the nominal temperature set on the regulator and the temperature must remain constant.

Set the TWW approx. 5 °C below setting of temperature regulator. TWW should be activated (red "malfunction" signal should light up). The TWW is functioning properly.

Now, set the TWW to the actual temperature limit for protection:

- To operate the TWW as protection for the unit (protects the unit and the working environment), turn the controller to the highest possible temperature setting.
- To operate the TWW also as protection for the sample (protects the unit, environment and sample), set it to approx. 5 °C above the setting of the temperature regulator.



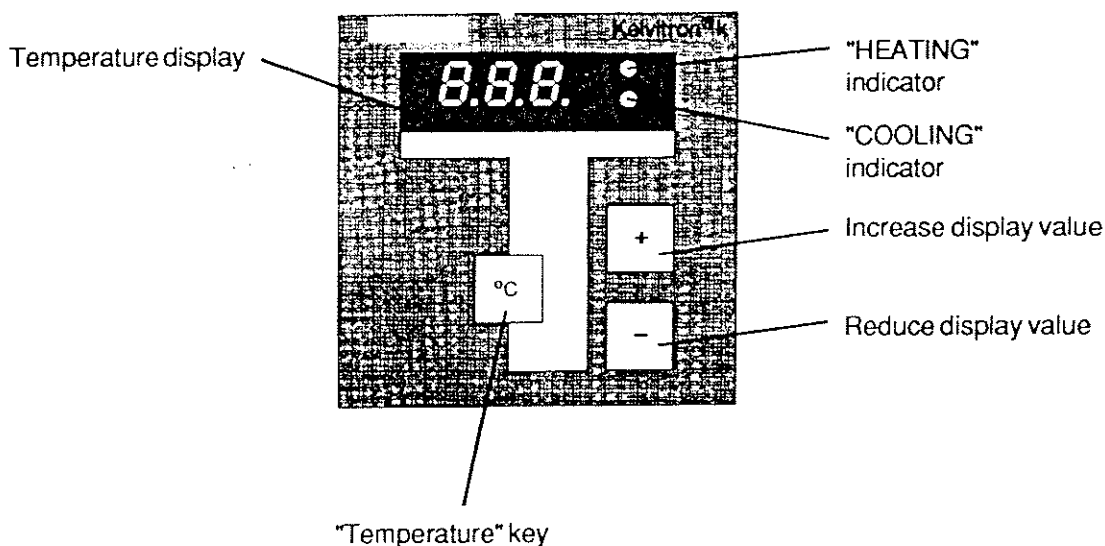
The unit can only provide protection for samples above room temperature.

If the "malfunction" signal lights up during operation:

- Check the settings of the TWW and the regulator. Make any necessary adjustments. If you cannot resolve the problem, contact our service department.

(4) Kelvitron® k  
Temperature regulator

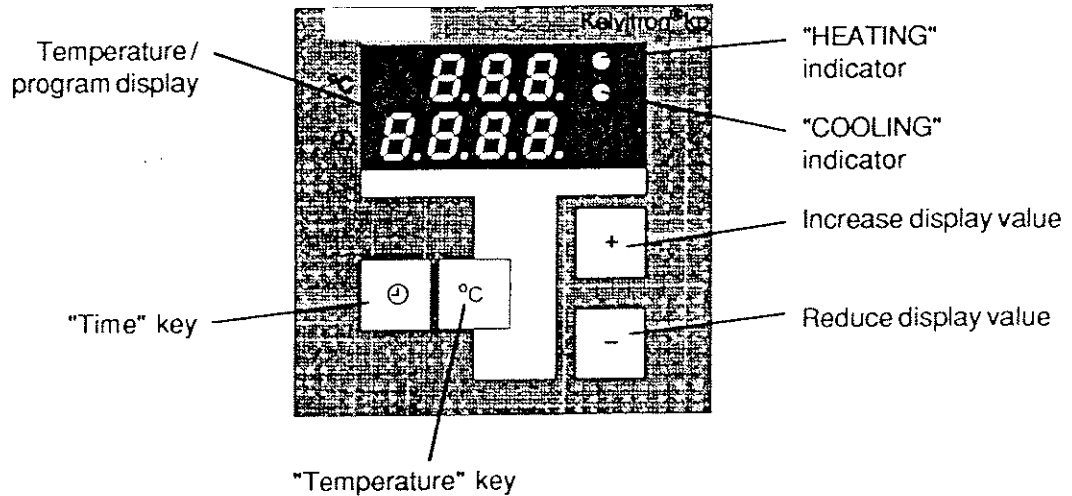
Microprocessor controlled temperature regulator with digital temperature display.



Command	Entry / Key(s) / Remarks	Display / Remarks / Condition
Turn on unit (mains switch = " I ")	All display elements illuminated for appx. 10 seconds - regulator self-test -	
Select automatic defrosting (possible within 3 seconds, when display shows " dF ")	= automatic defrost ON	
	= automatic defrost OFF	
Display preset temperature		Current nominal value shown - display blinks
Select preset temperature	&  = raise preset value	Nominal value increases
	&  = lower preset value	Nominal value decreases
Reset unit to NEW preset temperature	release	Temperature in work chamber displayed
		Pulse signal on "HEATING" or "COOLING" indicator: - Nominal temperature in work chamber held constant by temperature regulator

(4) Programm regulator  
Kelvitron® kp

Programmable temperature regulator with digital temperature display.



The regulator can be used to control the program or temperature.

Use as temperature regulator  
without programming function

Command	Entry / Key(s) / Remarks	Display / Remarks / Condition
Turn on unit (mains switch = " I ")	All display elements illuminated for appx. 10 seconds - regulator self-test -	
Select automatic defrosting (possible within 3 seconds, when display shows " dF ")	= automatic defrost ON	
	= automatic defrost OFF	
Display preset temperature		Current nominal value shown - display blinks
Select preset temperature	&  = raise preset value	Nominal value increases
	&  = lower preset value	Nominal value decreases
Reset unit to NEW preset temperature	release	Temperature in work chamber displayed
		Pulse signal on "HEATING" or "COOLING" indicator: - Nominal temperature in work chamber held constant by temperature regulator

**Use as temperature regulator  
with programming function**

The Kelvitron® kp regulator can control time/temperature programs of up to 9 programming steps, followed by a final command.

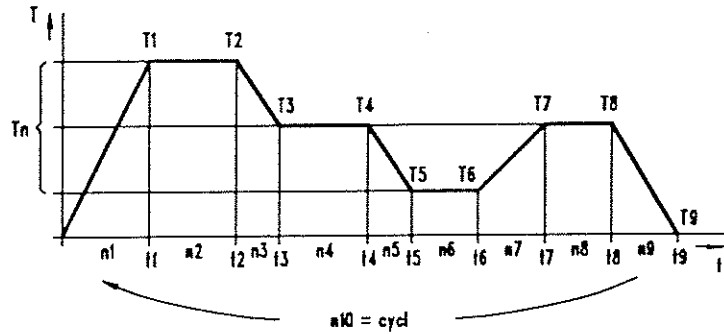


Fig. 4: Example of temperature/time sequence

- n1 ... n9 Program steps
- n10 Final command (stop, hold or cycl)
- T1 ... T9 Preset nominal temperatures (0 °C to 50 °C)
- t1 ... t9 Time setting for program steps (0:00 hr to 99:59 hr)

FINAL COMMANDS	
Command	Display / Remarks / Condition
<b>hold:</b> Program ends here - chamber temperature held constant at preset temperature of last program step, until new temperature is set.	Display sequence > 0.03 > 0.02 > 0.01 > 0.00 > <b>hold</b>
<b>stop:</b> Program ends here - heater and cooling unit shut down until stop function is cancelled.	Display sequence > 0.03 > 0.02 > 0.01 > 0.00 > hold > <b>stop</b>
<b>cycl:</b> Program ends here - program repeated, beginning at step n1, until cycle function is cancelled.	Display sequence > 0.03 > 0.02 > 0.01 > 0.00 > hold > stop > <b>cycl</b>

Example of a temperature/time program with "hold" final command

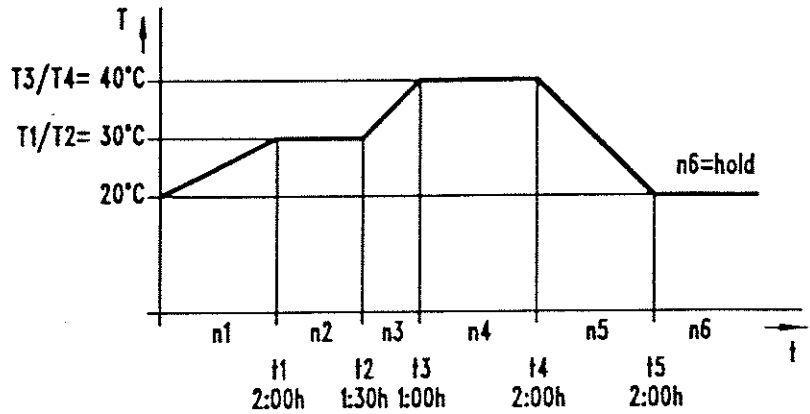


Fig. 5: Example of temperature/time program with "hold" final command

Command	Entry / Key(s) / Remarks	Display / Remarks / Condition
Select program step n1	<input type="button" value="⊖"/> & <input type="button" value="°C"/>	°C ⊖ 7 1
Select T1 = 30 °C	<input type="button" value="°C"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	°C 30.0
Select t1 = 2:00 hr	<input type="button" value="⊖"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	⊖ 2.00
Select program step n2	<input type="button" value="+"/>	°C n ⊖ 2
Select T2 = 30 °C	<input type="button" value="°C"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	°C 30.0
Select t2 = 1:30 hr	<input type="button" value="⊖"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	⊖ 1.30
Repeat procedure for steps n3 to n5		
Select program step n6	<input type="button" value="+"/>	°C n ⊖ 6
Select "hold" final command	<input type="button" value="⊖"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	°C ⊖ hold
Start program sequence	<input type="button" value="+"/> & <input type="button" value="-"/> hold for 3 seconds	°C P ⊖ on
Other commands on page 21	Pulse signal on "HEATING" or "COOLING" indicator: - Program regulator runs program as entered	°C 20.0 ° ⊖ 1



**Example of a temperature/time program with "stop" final command**

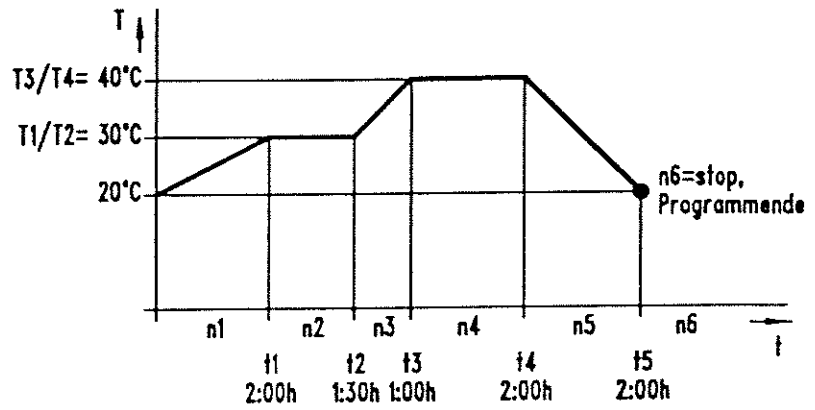














Fig. 6: Example of temperature/time program with "stop" final command

Command	Entry / Key(s) / Remarks	Display / Remarks / Condition
Select program step n1	<input type="button" value="⊖"/> & <input type="button" value="°C"/>	°C  ⊖
Select T1 = 30 °C	<input type="button" value="°C"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	°C 
Select t1 = 2:00 hr	<input type="button" value="⊖"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	⊖ 
Select program step n2	<input type="button" value="+"/>	°C  ⊖
Select T2 = 30 °C	<input type="button" value="°C"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	°C 
Select t2 = 1:30 hr	<input type="button" value="⊖"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	⊖ 
Repeat procedure for steps n3 to n5		
Select program step n6	<input type="button" value="+"/>	°C  ⊖
Select "stop" final command	<input type="button" value="⊖"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	°C  ⊖
Start program sequence	<input type="button" value="+"/> & <input type="button" value="-"/> hold 3 seconds	°C  ⊖ 
Other commands on page 21	Pulse signal on "HEATING" or "COOLING" indicator: - Program regulator runs program as entered	°C  ⊖ 

Example of temperature/time program with "cycl" final command

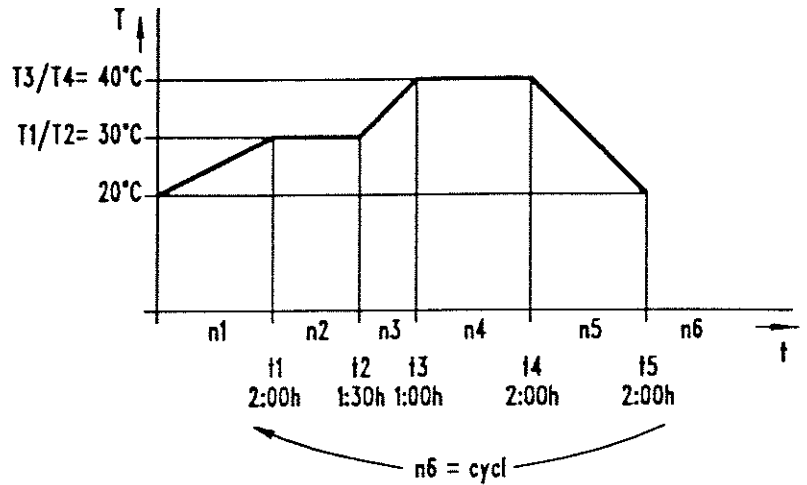
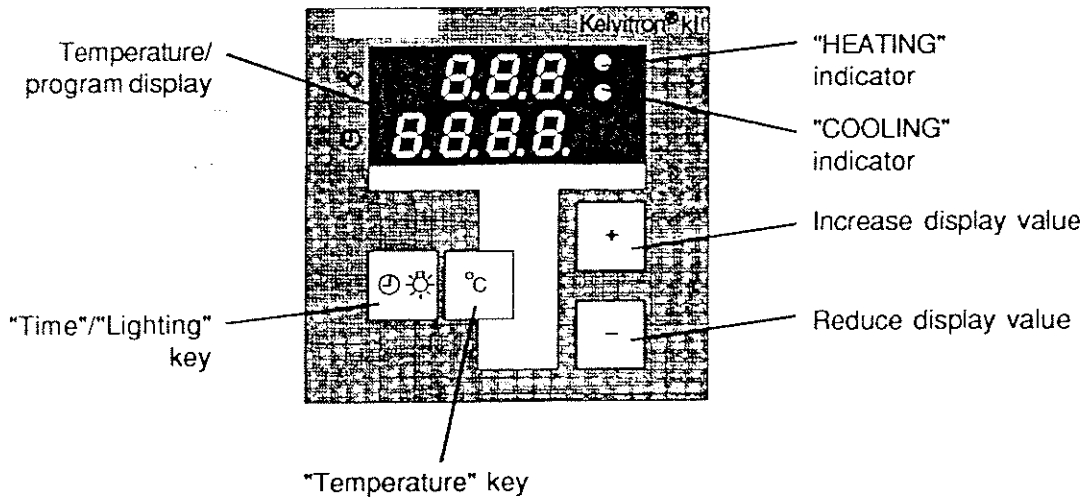


Fig. 7: Example of temperature/time program with "cycl" final command

Command	Entry / Key(s) / Remarks	Display / Remarks / Condition
Select program step n1	<input type="button" value="⊖"/> & <input type="button" value="°C"/>	°C ⊖ 7
Select T1 = 30 °C	<input type="button" value="°C"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	°C ⊖ 30.0
Select t1 = 2:00 hr	<input type="button" value="⊖"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	⊖ 2.00
Select program step n2	<input type="button" value="+"/>	°C ⊖ 2
Select T2 = 30 °C	<input type="button" value="°C"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	°C ⊖ 30.0
Select t2 = 1:30 hr	<input type="button" value="⊖"/> & <input type="button" value="+"/> or <input type="button" value="-"/>	⊖ 1.30
Repeat procedure for steps n3 to n5		
Select program step n6	<input type="button" value="+"/>	°C ⊖ 6
Select "cycl" final command	<input type="button" value="⊖"/> & <input type="button" value="+"/> oder <input type="button" value="-"/>	°C ⊖ CYCL
Start program	<input type="button" value="+"/> & <input type="button" value="-"/> hold 3 seconds	°C ⊖ P ON
Other commands on page 21	Pulse signal on "HEATING" and "COOLING" indicator: - Program regulator runs program as entered	°C ⊖ 20.0 1

(4) Kelvitron® kl  
Program regulator

Programmable temperature regulator with digital temperature display and lighting controller.



The regulator can be used to control temperature or a program of up to 9 program steps followed by a final command (refer to pages 13 to 17 for programming the Kelvitron® kp regulator).

This regulator is equipped with a program function to control light settings.

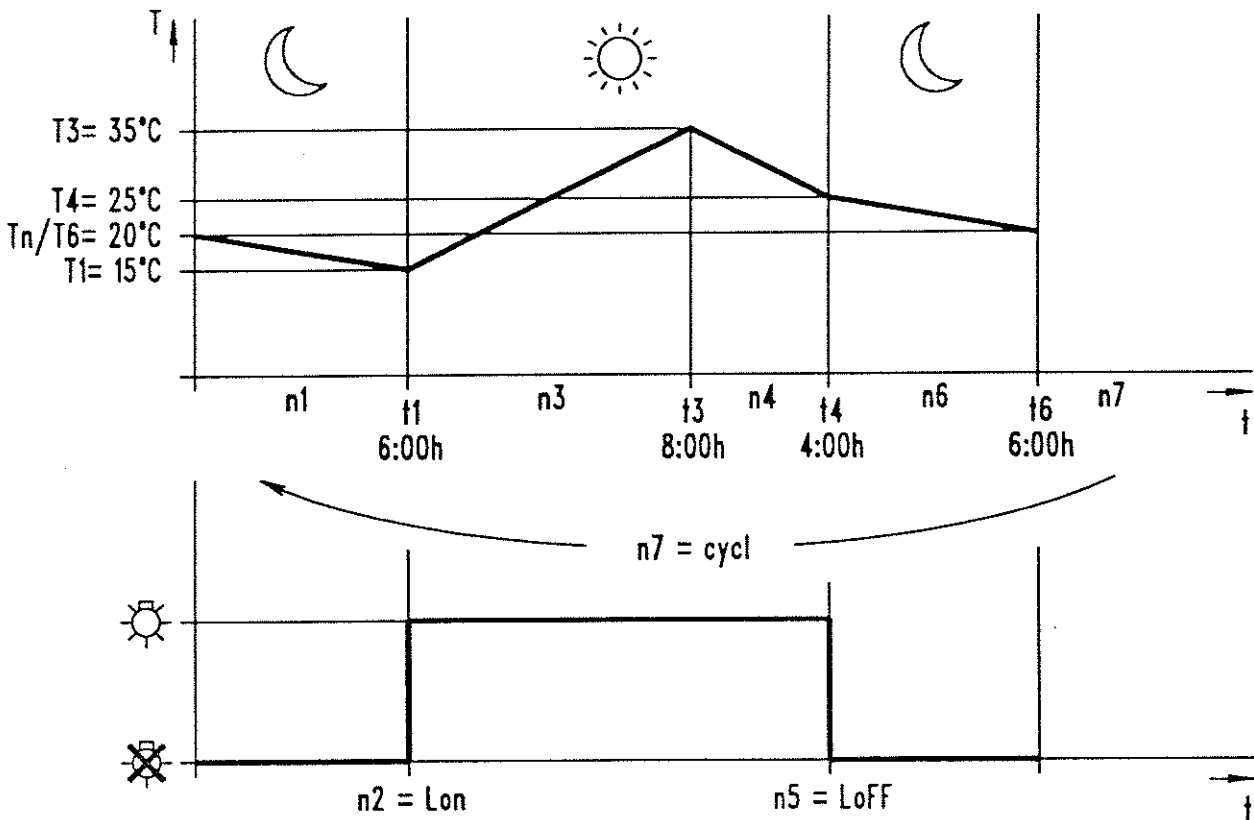


Fig. 8: Example of temperature/time program with control of light setting and final command "cycl" - day/night simulation

- n1 ... n6      Program steps
- n7              Final command "cycl"
- T1 ... T6      Preset nominal temperatures
- t1 ... t6      Time setting for program steps

FINAL COMMANDS	
Command	Display / Remarks / Condition
<b>hold:</b> Program ends here - chamber temperature held constant at preset temperature of last program step, until new temperature is set.	Display sequence > 0.03 > 0.02 > 0.01 > 0.00 > <b>hold</b>
<b>stop:</b> Program ends here - heater and cooling unit shut down until stop function is cancelled.	Display sequence > 0.03 > 0.02 > 0.01 > 0.00 > hold > <b>stop</b>
<b>cycl:</b> Program ends here - program repeated, beginning at step n1, until cycle function is cancelled.	Display sequence > 0.03 > 0.02 > 0.01 > 0.00 > hold > stop > <b>cycl</b>

LIGHT CONTROL COMMANDS	
Command	Display / Remarks / Condition
<b>LoN:</b> Turns light on. This program step can not be randomly activated by temperature/time values. It is dependent on a temperature value being set in the previous program step.	Display sequence > 0.03 > 0.02 > 0.01 > 0.00 > hold > stop > cycl > <b>LoN</b>
<b>LoFF:</b> Turns light off. This program step can not be randomly activated by temperature/time values. It is dependent on a temperature value being set in the previous program step.	Display sequence > 0.03 > 0.02 > 0.01 > 0.00 > hold > stop > cycl > LoN > <b>LoFF</b>

















The lighting is automatically switched off at the end of any program. The light control command "LoFF" should therefore always be used following the final command "cycl".

**Programming example from page 18, day/night simulation**

Command	Entry / Key(s) / Remarks	Display / Remarks / Condition
Select program step n1	& °C	°C ⊖
Select T1 = 15 °C	°C & + or -	°C ⊖
Select t1 = 6:00 hr	& + or -	
Select programm step n2	+	°C ⊖
Select light command "Lon"	& + or -	°C ⊖
Select program step n3	+	°C ⊖
Select T3 = 35 °C	°C & + or -	°C ⊖
Select t3 = 8:00 hr	& + or -	
Select program step n4	+	°C ⊖
Select T4 = 25 °C	°C & + or -	°C ⊖
Select t4 = 4:00 hr	& + or -	
Select program step n5	+	°C ⊖
Select light command "LoFF"	& + or -	°C ⊖
Select program step n6	+	°C ⊖
Select T6 = 15 °C	°C & + or -	°C ⊖
Select t6 = 6:00 hr	& + or -	
Select program step n7	+	°C ⊖
Select "cycl" final command	& + or -	°C ⊖
Start program sequence	+ & - hold 3 seconds	°C ⊖
Other commands on page 21	Pulse signal on "HEATING" or "COOLING" indicator: - Program regulator runs program as entered	°C ⊖

**Further instructions for using the  
Kelvitron® kp and Kelvitron® kl  
program regulators**

Command	Entry / Key(s) / Remarks	Displays / Remarks / Condition
Repeat program	 &  hold 3 seconds	Last program entered will be repeated, beginning at program step n1
Replace existing program	 & 	   See programming examples for further command entries
Interrupt sequence before end of program	 &  hold 3 seconds	   Regulator leaves program operation and holds chamber temperature at value set for last program step
Read values during program run		The current program step and the temperature in the work chamber are displayed while the program runs
		Displays the temperature setting on the regulator for the current program step
		Displays the time remaining in the current program step

## 5. OPTIONS



An under-temperature protection (pos. 3) is available as an optional addition to the standard over-temperature protection (pos. 2).

When correctly set, these controllers act as a safeguard against temperatures exceeding or falling below set limits: upper/lower temperature limit controller (TWW U/Ü).

### (3) Under-temperature protection

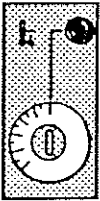


Fig. 9: Under-temperature protection

The unit is equipped with a temperature limit controller (TWW), for protection against under-temperature.

Should the temperature regulator fail and the temperature fall below the set limit of the TWW, the TWW takes over the function of controlling the temperature.

The red "malfunction" light (on pos. 3) indicates that the TWW has been activated.

Use a coin or a screwdriver to adjust the setting of the TWW.



Test the TWW periodically to make sure that it is functioning properly.

Test:

First, the unit must reach the nominal temperature set on the regulator and the temperature must remain constant.

Set the TWW approx. 5 °C above setting of temperature regulator. TWW should be activated (red "malfunction" indicator should light up). The TWW is functioning properly.

Now, set the TWW to the temperature protection limit required:

- To operate the TWW as protection for the unit (protects the unit and the working environment), turn the controller to the lowest possible setting.
- To operate the TWW as protection for the samples (protects the unit, the working environment and the samples), turn the controller to approx. 5 °C under the temperature setting of the regulator.



The unit can only provide protection for samples below room temperature.

If the "malfunction" indicator lights up during operation:

- Check the settings of the TWW and the regulator. Make any necessary adjustments. If you cannot resolve the problem, contact our service department.

**(5) Fan in work chamber**

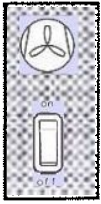


Fig. 10: Fan switch

The fan serves to circulate the air in the work chamber, thereby improving spatial distribution of air temperature.

The fan is turned on and off using a switch located on the control panel.

**Lead-through openings**

Sealed tubular openings are situated in the sides and/or in the back wall of the unit.



The installation of measurement and supply lines through openings is to be carried out in accordance with appropriate technical regulations.

**Connection to central monitoring system**

Facility to link unit to user reporting systems, e.g. telephone lines or internal house circuits.

Activation of the temperature protection unit returns an appropriate message to the user reporting system.

The load-free contacts (1 normally closed, 1 normally open) are designed for the following electrical circuits:

Electrical circuit	Voltage	User circuit protection
Mains circuit	max. 250 V AC	max. 3 A
SELV / SELV - E - circuits (ref. VDE 0100 Section 410)	25/50 V AC 60/120 V DC	max. 4 A max. 0.5 A

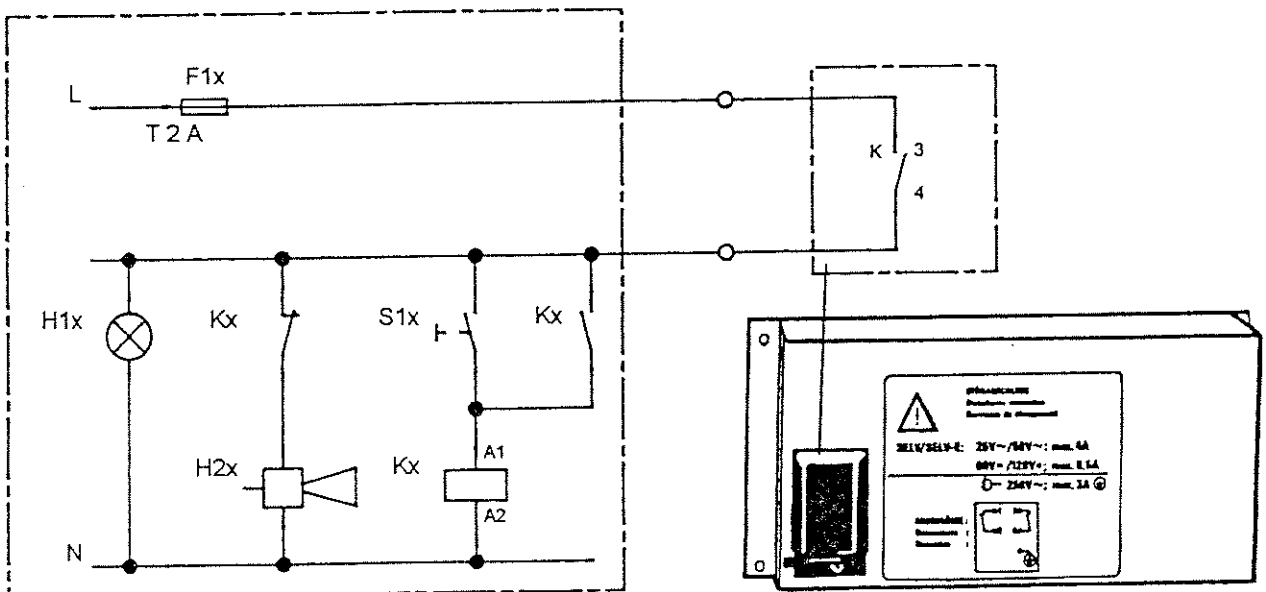
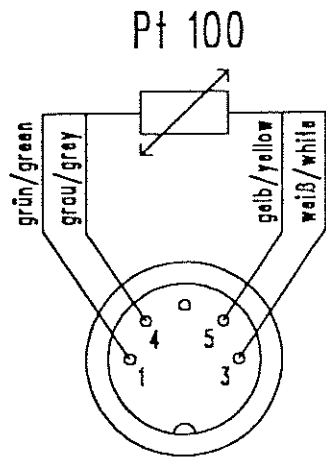


Fig. 11: Example of central monitoring circuit



## Pt 100 temperature sensor



The separate Pt 100 temperature sensor is placed in the work chamber by way of an air-tight tubular lead-through.


 The installation of measurement and supply lines through openings is to be carried out in accordance with appropriate technical regulations.

Fig. 12: Pin assignment of Pt 100 temperature sensor, front view

## 6. SETUP AND INSTALLATION



When setting up and installing the unit, be sure to comply with all applicable regulations in your country.

Do not put the unit into operation for at least 24 hours after installation. This will avoid unnecessary damage to the unit's cooling system components.

### Transport

Handle with care, avoid vibrating the unit.  
Refer to TECHNICAL SPECIFICATIONS for weight and dimensions.

### Unpacking the unit

Do not grip the loading door to unpack, transport or lift the unit.  
Remove accessories from the work chamber.

### Conditions for location of setup

The unit must be installed in a draft-free and dry place.

To avoid deviations from specified technical standards, room temperature must be within the range of 18 to 30 °C.

The fresh air and exhaust vents of the unit are not to be covered or obstructed.

The unit is to be placed on a firm non-flammable surface (laboratory table or support frame).

Placing a spirit level on the shelf, make sure the unit is in a stable and perfectly upright position.

BK 6160 incubators can not be directly stacked on top of each other.

### Distance from other objects

It is recommended that a space of at least 100 mm be kept free to ensure access to any tubular lead-through openings.

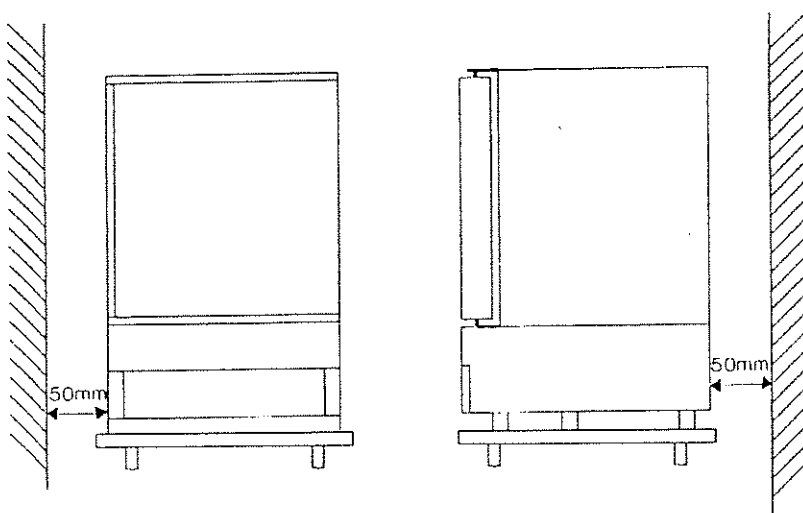


Fig. 13: Minimum distances

## Mains supply



Fig. 14: Mains plug

Before connecting to the mains, check that the available power source is compatible with that specified on the nameplate of the unit.

The device must be set up in a position where the plug of the connecting cable is accessible at any time.

The unit is supplied with a fixed power connection cable and mounted safety plug.

Mains protection required:

- A B16 circuit break-switch or T16 A mains fuse.

Refer to TECHNICAL SPECIFICATIONS for nominal power values.

## Noise insulation

Noise pressure levels may prove unacceptably high in certain installation conditions, such as: small rooms, rooms with strong reverberation characteristics, a room in which several units are in operation simultaneously.

In such cases it will be necessary to carry out additional sound proofing in the room.

Be sure to comply with all applicable regulations in your country.

Refer to TECHNICAL SPECIFICATIONS for noise pressure levels.

## 7. STARTUP

Do not put the unit into operation for at least 24 hours after installation. This will avoid unnecessary damage to the unit's cooling system components.

Command	Entry / Key(s) / Remarks	Display / Remarks / Condition
Turn on unit	Mains switch (pos. 1) = "I"	All display elements illuminated for approx. 10 seconds - regulator self-test -
Select preset temperature	Temperature regulator (pos. 4): Kelvitron® k	see page 12
	Kelvitron® kp	see page 13
	Kelvitron® kl	see page 18
Set over-temperature protection to protection limit required	Set TWW (pos. 2) limits	see page 11
Set under-temperature protection (optional) to protection limit	Set TWW (pos. 3) limits	see page 19
Turn chamber fan (optional) on or off	Switch on or off (pos. 5)	see page 20
Place samples in chamber - if necessary, wait until nominal temperature is constant.	Follow precautions in the section on OPERATION !	see page 28

## 8. OPERATION



### Operating principles

Microbiological safety during operation is essentially dependent on adherence to regulations by personnel working with the unit.

Refer to "Safety Guidelines for Working with Microbiological Technology" in the appendix.

When operating the unit, be sure to comply with all applicable regulations and guidelines in your country.

### Measures to be taken prior to operation

Put on personal safety garments necessary to protect hands, face and body; remove jewelry.

Clean and disinfect interior walls and surfaces. Wipe only with fluff-free materials.

Do not use disinfectants containing alcohol or combustible agents. Adhere to regulations applicable in your country.

Inspection windows, on models equipped with lighting, may be treated with an anti-static spray. Do not use any agents which contain chloroform.

Placing larger objects or auxiliary devices in the work chamber can impair an even distribution of air temperature.

Do not obstruct the exhaust vent when a fan is installed in the unit's work chamber.

## Precautions during operation



Temperature conditions in the work chamber are dependent on its being properly loaded.

Avoid whatever may negatively influence an even distribution of air temperature, most notably:

- obstruction of air-flow slots in shelves or in the rear wall,
- bulky objects and apparatus,
- devices used to produce agitation, such as stirrers, etc.,
- devices emitting strong heat.

Do not arrange the load too tightly on the shelf (use only 70% of the surface). This furthers proper air circulation and enables temperature to rise and fall evenly throughout the work chamber.

Do not place loads directly on the floor of the work chamber !

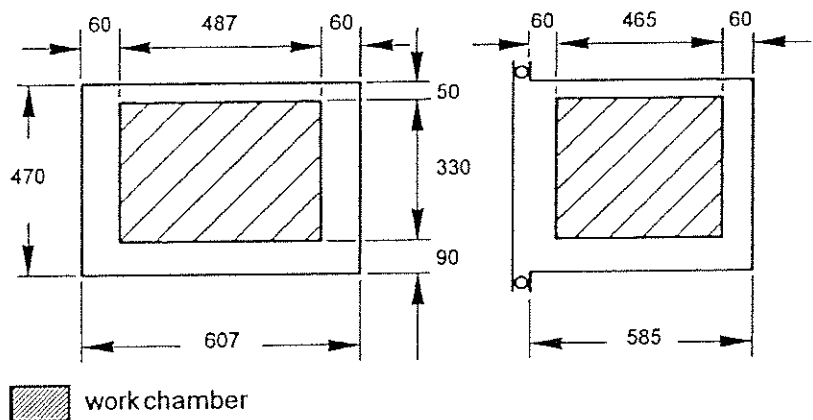


Fig. 15: Usable working space within chamber



Do not change settings for over/under-temperature protection while the unit is running. This will disable effective protection of the samples.

## Interrupting operation

If operation is interrupted, ensure that precautions against contamination have been fulfilled.

- Take out, clean and disinfect objects and auxiliary devices.
- Clean and disinfect the work chamber.
- Disinfect, and then dispose of, all residues.

## 9. SHUTDOWN



The unit is only to be taken out of operation by trained and specifically instructed personnel. There must be no risk of contamination following the shutdown of the unit.

Take out, clean and disinfect objects and auxiliary devices.

Clean and disinfect the work chamber.

Disinfect, and then dispose of, all residues.

Close door of the unit.

Turn mains switch to "O", pull mains plug.

## 10. MAINTENANCE

### Disinfection

A surface disinfectant recommended by Thermo can be ordered under part number 50052425 (250 ml spray bottle) and 50051939 (500 ml refill bottle). Details for efficiency and approvals are available on request.



For disinfection, be sure to comply with all applicable regulations of your country.

Do not use alcohol-based disinfection solutions, i.e., solutions which contain more than 10% alcohol by weight.

### Cleaning

Clean the outer surfaces and operating elements of the unit with mild detergent and a soft cloth.

### Replacing filter

Check the filter of the cooling system (at the back of the unit) approximately every 3 months.  
Pull back and remove the soiled filter. Clean with lukewarm water. Once dry, remount in unit.  
Replace filter if heavily soiled.  
Refer to **AUTHORIZED REPLACEMENT PARTS AND ACCESSORIES** for order number.

### Testing



To ensure the proper functioning and safety of the unit, all necessary tests, maintenance work and repairs should be carried out by our service department, or by someone authorized by our company.

The unit should be tested at least once a year on the following:

- Mechanics
- Function (technical specifications)
- Calibration
- Electrical circuits

We recommend that you conclude a maintenance contract with our company (see APPENDIX). Please contact us if you would like more information on the service we offer.

### Log book

We recommend that you keep a log book for documenting tests, calibrations, and main tasks performed on and with the unit, such as maintenance work and agents used.



## Replacing electrical parts



Maintenance on electrical components may only be carried out by our service department personnel after the unit has been disconnected from the mains power supply.

Only replacement parts authorized by the manufacturer are to be used.

In the case of units equipped with lighting, the fluorescent tubes and starter may be replaced by the operator's own trained electricians.

In this case:

- Disconnect unit from mains.
- Remove screws located at the side of the panel.
- Remove panel.
- Replace defective parts.
- Hold panel into position and screw it firmly back in place.
- Reconnect to mains power.

**11. AUTHORIZED  
REPLACEMENT  
PARTS AND  
ACCESSORIES**



Safe and reliable operation of the unit can only be guaranteed when replacement parts authorized by the manufacturer are used. These are listed below.

The use of any other parts can present unknown risks and is not approved under any circumstances.

Replacement part	Type	Order No.
Circuit diagram BK 6061		50035029
Instruction Manual BK 6160		50111953
Vertical mount (rear)		50034018
Vertical mount (front)		50034019
Shelf support		50011380
Shelf		50011401
Gasket for glass door		03650374
Gasket for loading door		50033975
Lead-through sealing plug		03669008
Lead-through sealing plug with 4 mm opening		50029827
Pt 100 temperature sensor		50034314
Cooling unit filter		50034049
Starter for fluorescent tube	Osram, ST 151	50033993
Fluorescent tube	Philips TLD 18 W 86, daylight acc. to DIN 5035, 4000 lux	50033994

## 12. TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS		
	UNIT:	VALUE:
<b>MECHANICAL:</b>		
Outer dimensions (WxHxD)	[mm]	744 x 920 x 725
Internal dimensions (WxHxD)	[mm]	607 x 470 x 585
Internal volume	[liter]	ca. 166
Shelves (WxD)	[mm]	560 x 500
Number	max.	7
Distributed load	[kg]	10/Shelf
Total unit load	[kg]	30
Work chamber dimensions (WxHxD)	[mm]	487 x 330 x 465
Work chamber volume	[liter]	ca. 75
Weight of unit without lighting	[kg]	ca. 100
with lighting	[kg]	ca. 120
Cooling agent		
Type		R 134a
Filling capacity	[g]	220
Rate of air circulation (fan installed in work chamber)	[liter/hr]	ca. 150
Noise pressure level (DIN 45635 Part 1)	[dB (A)]	< 58
<b>THERMAL:</b>		
Temperature control range	[°C]	0 ... 50
Temperature deviation (DIN 12880 Section 2/11.78) temporal	[°K]	< 0.1
spatial at:		
0 °C	[°K]	< ± 1.0
20 °C	[°K]	< ± 0.5
37 °C	[°K]	< ± 1.0
50 °C	[°K]	< ± 2.0
Heat rise/cooling time (chamber empty)		
at: 20 °C...37 °C	[min]	ca. 50
20 °C...50 °C	[min]	ca. 80
20 °C...15 °C	[min]	ca. 40
20 °C... 0 °C	[min]	ca. 60
External heat radiation	[kW]	ca. 0.5
Recovery time (closing of open glass door after 30 sec)		
at: 5 °C	[min]	ca. 15
37 °C	[min]	ca. 25
Relative humidity		
at: 5 °C	[%r.h.]	> 75
37 °C	[%r.h.]	> 90

TECHNICAL SPECIFICATIONS		
	UNIT:	VALUE:
<b>ELECTRICAL:</b>		
Rated voltage		1 PE AC, 230 V; 50 Hz
Interference suppression (DIN VDE 0875)		Interference level N
Degree of protection (DIN 40050)		IP 20
Protection class		I
Nominal power	[A]	4.2
Mains circuit protection	Fuse Circuit break-switch	T 16 A B 16
Rated consumption	[kVA]	1

### 13. MATERIALS USED

<b>Outer casing</b>	Zink-plated sheet steel, painted RAL 9002
<b>Inner casing, fittings, shelves</b>	Stainless steel, material no. 1.4301
<b>Glass pane</b>	Sodium silicate glass
<b>Sealing compounds</b>	EPDM 15, cellular rubber Elastomer, natural rubber, silicone
<b>Loading door gasket</b>	Magnetic core encased in flexible PVC
<b>Glass door gasket</b>	Tempered silicone
<b>Thermal insulation</b>	Expanded Polystyrene EPS 30 ACF DIN 55471 Section1
<b>Cooling agent</b>	R 134a
<b>Control panel</b>	Mixture of ABS and PC
<b>Regulator touch panel</b>	PVS, printed polyester film
<b>Tubular heating elements</b>	Stainless steel pipes with magnesium oxide filler and heating coils
<b>Cables</b>	PVC-coated copper strand
<b>Temperature protection filler compound</b>	Polydimethylsiloxane
<b>Other components</b>	Electrical components coated with various plastics, partially mounted on epoxy resin circuit boards

## **SAFETY GUIDELINES FOR WORKING WITH MICROBIOLOGICAL TECHNOLOGY \***

### **General principles:**

- Doors and windows are to be kept closed while work is in progress.
- Do not smoke, drink or eat in the room, or store food in the working area.
- Laboratory coats, or other protective clothing, are to be worn by all present.
- Using the mouth to load pipettes is forbidden. Only proper suction devices are to be used.
- Syringes and cannula should only be used when absolutely necessary.
- In using any manipulating agents, care must be taken to avoid the formation of aerosol gasses wherever possible.
- At the end of the work session, and before leaving the working area, carefully wash hands, disinfect where necessary and apply a moisturizing lotion.
- The workplace should be kept tidy and clean. Only essential equipment and materials should be kept on surfaces used for working. Supplies should only be stored in the areas and cabinets allocated for them.
- Biological agents must be regularly identified when their use presents potential hazards. The frequency of such assessments is determined by the degree of harm these agents may cause.
- Persons handling biological agents are to be personally and specifically instructed on procedures at their place of work - before taking up their employment, and thereafter at least once each year.
- Staff with no experience in microbiology, virology or cell biology must be given very detailed instructions, accompanied by extensive training and supervision.
- Where necessary, pest control is to be carried out on a regular basis.

### **Further basic precautions for work with pathogenic agents:**

- All work stations are to be disinfected daily. In some cases, the use of different disinfectants will be required to prevent an increase in resistant germs.
- Protective clothing is not to be worn outside of the workplace.
- Before being cleaned, contaminated equipment is to be sterilized in an autoclave or disinfected.
- Pathogenic waste is to be carefully collected and decontaminated by autoclaving or disinfection.
- Should there be an accidental spill of infectious substances, the contaminated area must be sealed off immediately and disinfected.
- When working with human pathogenes for which there is a known effective vaccine, all involved persons, excluding those already immune, are to be inoculated and their immunity checked at regular intervals.

\* correspondingly applicable to work with cell cultures

- The employee's state of health is to be monitored at all times through medical check-ups, the first upon taking up employment and, thereafter, once each year. The trade association guidelines G24, for "skin diseases", and G42, for "infectious diseases", are particularly relevant with regard to these work-related medical check-ups. Adhering to generally acknowledged rules of industrial medicine, these guidelines provide doctors with a common basis for assessment criteria, evaluation and reporting of results.
- The trade association guideline G43, covering "biotechnology", is to be followed for those working with genetically altered organisms, viruses and potentially hazardous subviral agents.
- First Aid instructions for accidents involving pathogenic microorganisms and viruses are to be immediately accessible at the workplace. The supervisor in charge is to be informed immediately of any accidents.

Further safety measures that may be applicable, based on potential hazards:

- The use of safety work benches (airflow directed away from experimenter) Class I, Class II (tested models)\*\* or Class III.
- Restricted and controlled access to certain areas.
- The use of special protective clothing and respiratory devices.
- Disinfection of all germ-carrying materials, before they are removed from the workplace.
- Maintenance of low atmospheric pressure in the workplace.
- Measures to reduce the number of air-carried germs released through ventilation, for example, installation of high efficiency submicron particulate filters.

**Additional general regulations, applying to work with pathogenic biological agents affecting animal and human life, are:**

- A permit in compliance with the law regarding the control of epidemics is required for work with pathogenic biological agents affecting humans.
- A permit in compliance with the law regarding the control of animal epidemics and the ordinance on animal epidemic pathogens, is required for work with animal pathogens.
- Expectant and nursing mothers are not allowed to work with biological agents which are human pathogens, or with materials which contain such agents.

\*\* Manufacturer's lists appear in information leaflets published by the Confederation of the Chemical Industry (entitled "Sichere Chemiarbeit") and the Confederation of Health Service and Welfare. The lists are also available upon request from the office of the expert committee "Health Service and Welfare", who can be contacted at Pappelallee 35 - 37, 2000 Hamburg, Germany.

**LOG BOOK**

<b>Model:</b>	<b>Serial No.:</b>	<b>Operator's remarks:</b>
<b>Work completed</b>	<b>Date</b>	

Please refer to nameplate on unit for model and serial number.



## Explanation of confirmation of safety

Dear customer,

Incorrect handling of equipment in which microbiological agents have been used can present a hazard to health, especially to maintenance and service personnel, as well as a contamination risk to the environment,

In terms of applicable government regulations in the Federal Republic of Germany, pertaining to

- the responsibility of the company to protect its employees,
- and the responsibility of the operator to ensure that contact with the unit is safe,

it is imperative that any and all risks be avoided at all times.

Depending on the type of work carried out with the equipment, it must be cleaned (and disinfected, if necessary) prior to any maintenance and repair work, prior to changing the location of the unit and prior to taking it out of operation.

We therefore request your confirmation that all necessary precautions have been taken before we start work on the unit, and would appreciate your completing the form on the next page.

Sincerely,

Thermo Electron LED GmbH

## Confirmation of safety

Model: \_\_\_\_\_

Serial no. \_\_\_\_\_

Work to be completed (mark appropriate box):

- Maintenance
- Repair
- Transfer to new location
- Transport
- No work has been carried out with the unit which could present a biological hazard.
- In preparation for any necessary work to be completed on it, the unit has been disinfected and cleaned according to requirements set out in the instruction manual and in compliance with applicable and binding regulations.

No biological hazard exists.

---

(date, authorized signature, stamp )



Please make use of this form should you wish to receive, from the service location serving you, more information on a maintenance and servicing contract for the unit you have purchased.

Your service location

### Information request form regarding maintenance and servicing contract

Dear sir/madam,

Please send us further details and an offer for a maintenance and servicing contract for the following unit (refer to nameplate of the unit for necessary information):

Thermo-Model \_\_\_\_\_

Type \_\_\_\_\_

Serial no. \_\_\_\_\_

Service no. \_\_\_\_\_  
(if already known)

Please address correspondence to:

Company/Institute \_\_\_\_\_

Department \_\_\_\_\_

Contact person \_\_\_\_\_

Street \_\_\_\_\_

Postal code & location \_\_\_\_\_

Telephone \_\_\_\_\_

Telefax \_\_\_\_\_

\_\_\_\_\_  
(date and signature)