



**BT5D**  
**Block heater**

*Operating instructions*



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## 1 Safety

The following symbols marked on the equipment mean: -



Caution: Read these operating instructions fully before use and pay particular attention to sections containing this symbol.



Caution: Surfaces can become hot during use.

### Always observe the following safety precautions



- Use only as specified by the operating instructions or the intrinsic protection may be impaired.
- After transport or storage in humid conditions, dry out the unit before connecting it to the supply voltage. During drying out the intrinsic protection may be impaired.
- Connect only to a power supply with a voltage corresponding to that on the serial number label.
- Connect only to a power supply, with a voltage corresponding to that on the serial number plate.
- Connect only to a power supply which provides a safety earth (ground) terminal.
- Before moving, disconnect at the power supply socket. Do not remove the IEC connector.
- Do not check the temperature by touch; use the temperature display or a thermometer.
- To reduce the risk of eye injury during high temperature operation, use safety goggles or spectacles.



- Do not touch surfaces, which become hot during high temperature operation.
- If the alarm lamp is illuminated do not touch the block, it may be **very hot**.
- Ensure that the operating temperature is less than the maximum operating temperature of your sample material.
- Set the adjustable over-temperature cutout after setting or changing the set temperature, and reset it at monthly intervals to check that the cutout is operating correctly.
- Ensure that the mains switch is easily accessible during use.
- Do not block or restrict ventilation slots.
- If liquid is spilt inside the unit, disconnect it from the power supply and have it checked by a competent person.
- It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or inside the equipment.
- Allow the unit to cool down before moving it.



## 2 Installation

### 2.1 Unpacking

Remove packing materials carefully, and retain for future shipment or storage of the unit.

BT5D pack should contain:

- Block heater
- Operating instructions
- Cord set

### 2.2 Assembly

Fit the mains cable into the IEC power socket on the underside of the unit (see Figure 1).

Before switching on for the first time, using a screwdriver, turn the black **set over-temperature** knob fully clockwise and press the reset push button. Switch on power to the unit.

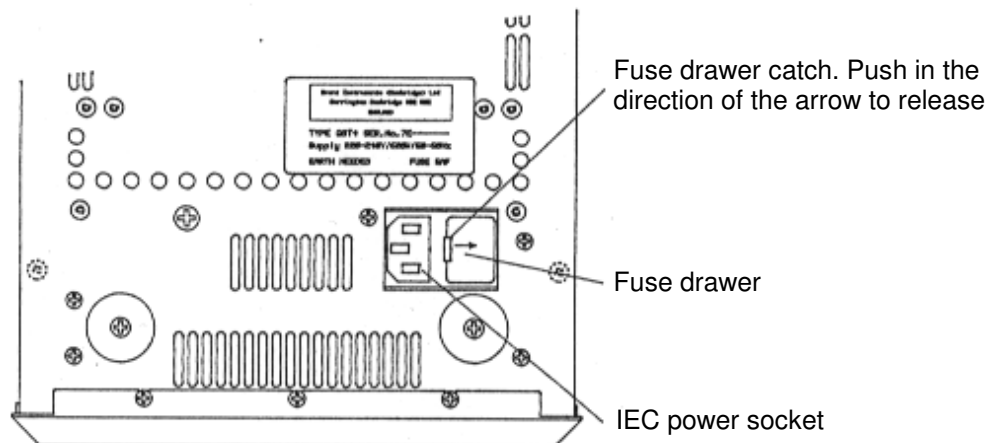


Figure 1

### 3 Operation

#### 3.1 Controls and indicator lamps

##### Power (mains) switch.

The **set temperature °C** Control sets the required operating temperature.

**Heater Lamp** (orange) indicates when the heater is on. The heater lamp is on continuously while the blocks are heating up. As the required temperature is approached, it starts to flash. When the unit is controlling at set temperature, the heater lamp flashes intermittently.



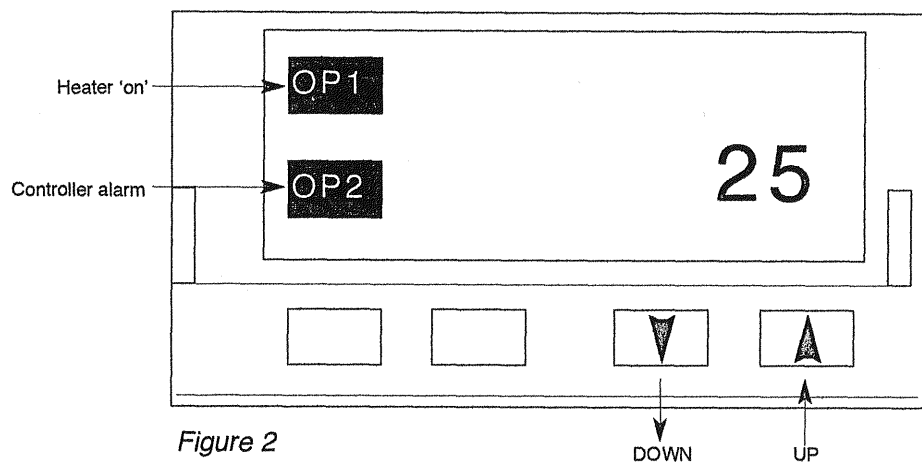
**The over-temperature lamp** (red) illuminates when the over-temperature cutout has operated.



**Set over-temperature control** sets the over-temperature cut-out to a value between 20°C and 500°C. The cutout operates if the block temperature rises above its set temperature. When it has operated the red alarm lamp illuminates and the heater is switched off.

#### 3.2 Setting the temperature

To set the required operating temperature, press the 'down' or 'up' arrow button until the required temperature is displayed. Two seconds after releasing the button the new value will be accepted and the display will revert to showing the actual temperature.



### 3.3 Programming

The following instructions describe how to set-up the BT5D controller for Programmed *Ramp/Dwell/End*

		DISPLAY	* These display figures are for reference only
▲ ▼	To Set	200	* Desired block temperature
⌚		m-A	Manual or Automatic control
▲ ▼	To Set	Auto	Automatic control
⌚		1FSH	Alarm 1 Full Scale High The alarm will trigger if Overtemperature is reached
▲ ▼	To Set	200	* Set the required Overtemperature in °C
⌚		2FSL	Alarm 2 Full Scale Low The alarm will trigger if Undertemperature is reached
▲ ▼	To Set	30	* Set the required Undertemperature in °C
⌚		65	* Actual block temperature in °C
■		SP	Setpoint List
⌚		SPrr	Setpoint Ramp Rate To set the ramp rate number of degrees per minute
▲ ▼	To Set	2.0	* Set the required rate of degrees per minute (OFF is the maximum rate)
⌚		tmr	Time Remaining Time remaining of Dwell period (default is 0)
▲ ▼		0	Display reads Dwell time remaining in Program Dwell time can be increased/decreased whilst program is running
⌚		dwEll	Dwell time The period of time at the setpoint temperature in minutes
▲ ▼	To Set	30	* Set Dwell period to number of minutes that block is required to maintain setpoint temperature
⌚		STAT	Program Status Program timer status
▲ ▼	To Set	run	Set to run to begin program
⌚		SP	Setpoint List \
■		ACCS	Only required for commissioning
■		65	* Actual block temperature in °C

## BT Block heaters

The following instructions describe how to set-up the BT5D controller for *Step or Ramp* to standard automatic control

		DISPLAY	* These display figures are for reference only
Power ON		65	* Actual block temperature
		m-A	Manual or Automatic control
	To Set	Auto	Automatic control
		1F5H	Alarm 1 Full Scale High The alarm will trigger if Overtemperature is reached
	To Set	200	* Set the required Overtemperature in °C
		2F5L	Alarm 2 Full Scale Low The alarm will trigger if Undertemperature is reached
	To Set	30	* Set the required Undertemperature in °C
		65	* Actual block temperature in °C
		SP	Setpoint List
		SPrr	Setpoint Ramp Rate To set the ramp rate number of degrees per minute
	To Set	2.0	* Set the required rate of degrees per minute (OFF is the maximum rate)
		tmc	Time Remaining Time remaining of Dwell period (default is 0)
		0	Display reads 0, until program is running
		dwEll	Dwell time The period of time at the setpoint temperature in minutes
	To Set	OFF	As no program is required, set Dwell period to "off"
		STAT	Program Status Program timer status
	To Set	oFF	As no program is required, set Timer Status to "off"
		SP	Setpoint List
		ACCS	Only required for commissioning
		65	* Actual block temperature in °C
	To Set	200	* Desired block temperature in °C

To view remaining *Dwell time* whilst a program is running, follow the instructions to view the value of

tmc

To perform *Ramp* to set point temperature with no *Dwell time*, set dwEll to OFF

At the end of the program the heater power will be cut off, and the display will flash End and **MAN** will be lit

To reset, follow previous instructions and set m-A to Auto



### 3.4 Setting the over-temperature cut-out




To protect both the unit and your samples, the over-temperature cutout should be set each time the required operating temperature is changed. Using a screwdriver, turn the **set over-temperature** control fully clockwise. The cutout is now set at its maximum. Remove the black cap from the reset push-button. Allow the block heater to stabilise at the required operating temperature. Turn the **set over-temperature** control slowly anti-clockwise until the red alarm lamp comes on. Allow the unit to cool. Press the reset button. Set the controller to the required run temperature. Ensure cut-out does not operate when the controller is running at the set temperature.

### 3.5 Measuring temperature

The block temperature may be checked by placing a temperature probe (maximum diameter 3.5mm) fully into the temperature monitoring hole in the top of the block. An accurate calibrated digital thermometer should be used. For good temperature stability in the tubes the level should not be higher than 10mm from the top surface of the block. It is not recommended to make measurements directly in the test tube, as the probe size can cause errors. If temperature is required to be measured then a very small probe should be used, and immersed to a depth of at least 20mm into tube.

Allow 20 minutes after switch on for the block temperature to stabilise after the heater lamp begins to flash.

## 4 Fault diagnosis

<u>Symptom</u>	<u>Possible cause</u>	<u>Action required</u>
Unit does not operate	Unit not switched on	Switch on
	Unit not plugged into power supply	Plug in, switch on
	Power supply failure	Check that other electrical appliances on the same circuit are working
	Fuse blown in unit or in plug (UK units only)	Check and replace - see 6.2
 Alarm lamp on	Over-temperature thermostat has operated	Set required temperature to below 250°C and check to see if the block stabilises at this temperature. If the thermostat continues to operate have the unit checked by a competent person.
Temperature does not rise when expected	Set temperature is lower than block temperature	Check set temperature
	Set temperature is too close to ambient	Raise set temperature
	Temperature control circuit fault	Have unit checked by competent person
Temperature continues to rise when not expected	Set temperature is higher than block temperature	Check setting
	Temperature control circuit fault	Have unit checked by competent person

## 5 Technical specification

This equipment is designed for indoor use in laboratory conditions, with room temperature between 5°C and 40°C and 80% relative humidity up to 31°C.

Performance figures apply within the ambient temperature range 10°C to 35°C

Installation category II (transient voltages). Pollution degree 2 in accordance with IEC 664.

For operation at altitudes of up to 2000 metres.

Temperature range	ambient +10°C to 400°C
Setting range	0°C to 400°C
Stability at 37°C	± 0.5°C
Uniformity:	1 °C @ 100 °C, 2 °C @ 200 °C 3 °C @ 300 °C, 4 °C @ 400 °C
Supply voltage range	220-240V or 110-120V 50/60Hz
Power rating	750W
Heat up rate ambient to maximum	100 minutes
Over-temperature protection	Adjustable cut-out 25°C to 500°C

## 6 Maintenance and service

All Grant laboratory products are designed to comply with IEC1010-1 and can be flash tested. Some are fitted with radio frequency interference suppressers. Therefore it is recommended that only a D.C. test be performed.

The over-temperature cut-out should be checked periodically by turning the set over-temperature control anticlockwise until the alarm lamp comes on. The cut-out should then be reset and set-up (see 3.4). If the alarm lamp fails to light with the control turned fully anticlockwise the block heater should be checked by a competent person.

### 6.1 Cleaning

The cases can be cleaned with a damp cloth after disconnection. Do not use solvents.

Before using any decontamination or cleaning method except that recommended, check with our Service Department, or in other countries with our distributor, that the proposed method will not damage the equipment.

## 6.2 Replacement of fuses

Disconnect the unit from the power supply.  
Remove the IEC plug from the socket in the base.  
Press down the fuse drawer catch (see Figure 1).  
Pull out the fuse drawer, check and replace with the correct fuses if necessary.  
The fuses should be 1.25 x 0.25 inch ceramic quick acting, rated:

220 - 240v	110 - 120v
5AF	10AF

## 7 Guarantee

When used in laboratory conditions and according to these operating instructions, this block heater is guaranteed for THREE YEARS against faulty materials or workmanship.

## 8 Service

For service, return to our Service Department in the UK, or to our distributor.

Service Address: Grant Instruments (Cambridge) Ltd.  
SHEPRETH  
Cambs  
SG8 6GB  
England.

Telephone: (+44) 01763 - 260811

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