Grant
IN THE LABORATORY

FH60-D
Flow heaters

Operating instructions

AUTOMATIC COPENHAGEN BATH:

FH60D / CT60

CONTENTS

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 which provides a safety earth (ground) terminal.
- Before moving, disconnect at the power supply socket.
- Do not check the temperature by touch, use 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.
- Set the adjustable overtemperature cut-out after setting or changing the set temperature, and reset it at monthly intervals to check that the cut-out 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.
- Do not connect to a power supply or switch on before filling the system.
- Take care when topping up or draining, as the liquid in the system may be hot.

- If the alarm lamp is illuminated do not touch the liquid or the heater, they may be very hot. Refill carefully, a hot heater can cause a spattering of very hot water droplets and scalding steam.
- Drain before moving the bath. Before draining allow the liquid to cool to below 50°C or heat to above 10°C.
- Use only liquids specified in the operating instructions, within the specified temperature range.
- Always use connecting pipe or hose suitable for the operating temperature and liquid used, and check that the pipe connections are secure.
- Do not disconnect any pipes or hoses while they contain very hot or cold liquid.

2 Assembly

2.1 Unpacking

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

Packs should contain:-

Circulator FH60D unit
FH60D circulating unit
External probe
User manual
Three way drain tap
Hose clips
Connecting tubing (15mm bore)

Bath CT60 tank
Stainless steel tank

2.2 Installation

Before starting ensure:-

Pipes are long enough and they are not kinked.
The flow should not be restricted or blocked as the over temperature cut-out will operate.
The FH60D circulator must be mounted below the seed tank.
Fit hose clips provided before the system is filled.
Fit hose clips to all the tubing joints securely.

2.2.1 Pipe work system (mains water cooling):-

Fit tank to support frame(supplied separately),or a similar set up.
Position mounting plate below seed tank and locate FH60 unit.
Connect a length of tubing (as supplied) between the FH60 inlet pipe on rear of unit, and the central connection of the three way drain tap.
Connect a length of tubing (not supplied) between the outlet side connection of the three way drain tap and a suitable waste disposal drain.
Fit another piece of connecting tubing (as supplied) between the tank coupling pipe, with the stainless steel disc, and the inlet side connection of the three way drain tap.
Between the cooling inlet pipe on the rear panel of the FH60, and a mains water supply, connect a length of suitable tubing (not supplied).
Connect another length of suitable pipe between the cooling outlet pipe on rear of the FH60 and a waste disposal drain.
Finally connect a length of tubing (as supplied) between the outlet pipe on the rear of the FH60 unit, and the remaining tank coupling pipe.

3. Operation

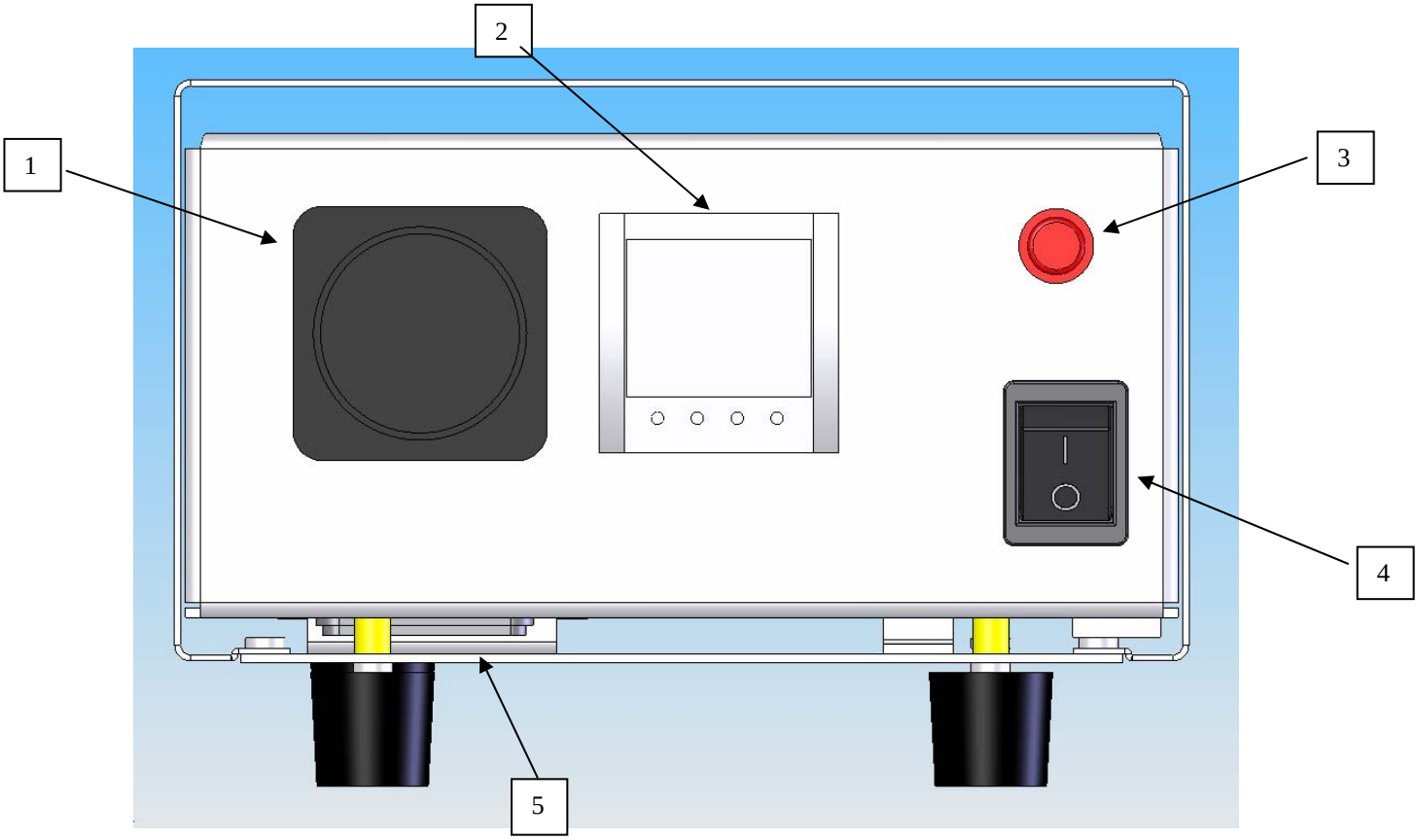

Fig 1

3.1.0 Front panel Controls and indicator lamps *Fig. 1*

1. 24Hr Timer
2. Temperature controller
3. Alarm indicator
4. Power switch
5. Mains power connection and fuses

3.1.1 Rear Panel Connections

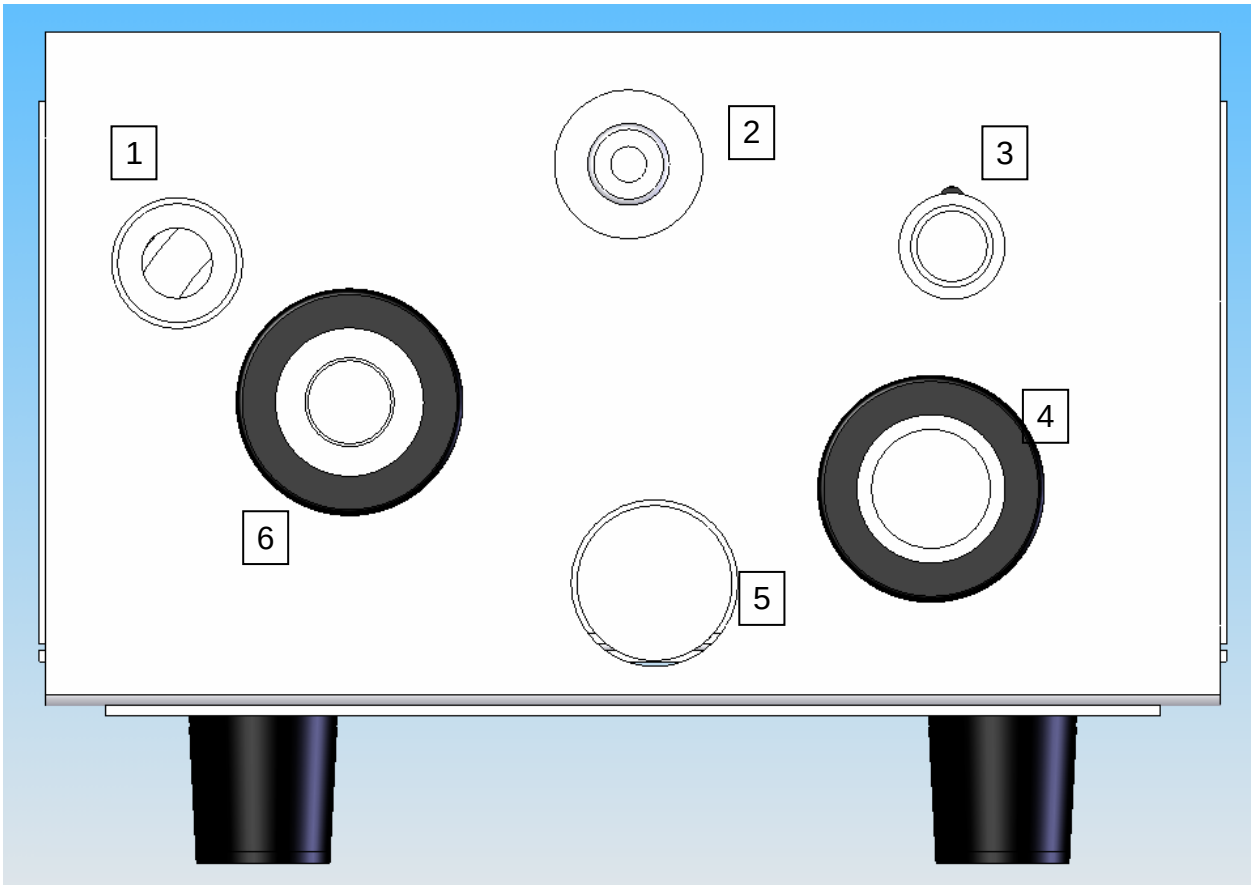

Fig. 2

1. Cooling outlet
2. Overtemperature cut out
3. External probe
4. Heater inlet
5. Cooling inlet
6. Heater outlet

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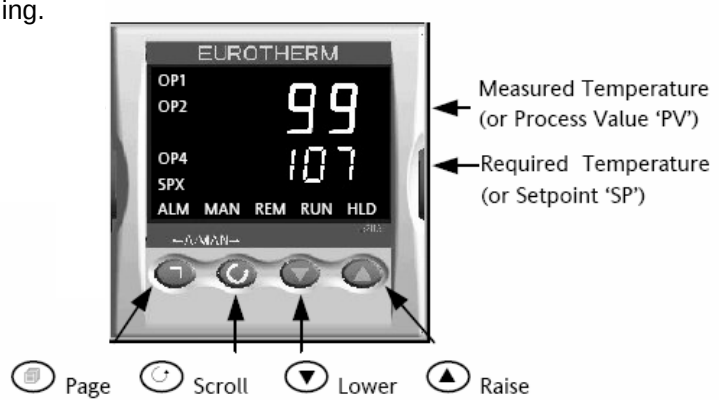
3.1.2 Temperature controller

Setting the temperature

To set the required operating temperature, press the 'lower' or 'raise' 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.

Beacons:-

OP1 lit when output 1 is ON Normally Heating.
OP2 lit when output 2 is ON Normally Cooling.



Operator Buttons:-


From any display – press to return to home display


Press to select a new parameter. If held down it will continuously scroll through parameters.


Press to decrease an analogue value or to change the state of the digital (enumerated) value


Press to increase an analogue value or to change the state of the digital (enumerated) value

Press the scroll button until SP1 is displayed, use the 'raise' or 'lower' buttons to set the required temperature.

Press the scroll button until SP2 is displayed, use the 'raise' or 'lower' buttons to set the required temperature.

SP1 'Day time setting'
SP2 'Night time setting'

3.1.3 Set time

Set Time for high and low phases.
The timer scale is calibrated from 0 to 24 hours and the switch contacts are set to give a high phase and a low phase settings.
The Red pins control the start of the "HOT" phase and the Green pins control the start of the "COLD" phase.
Remove any pins not in use.

3.1.4 Probe

The Probe socket is located on rear panel.
This is for connection of the external probe.

3.1.5 Alarrm

The alarm lamp (red) on front panel illuminates when either there is a leak in the pipe system or the over temperature cut- out has operated.
If alarm lamp is illuminated press the over temperature reset button. If alarm lamp does not go out, set overtemperature as shown in 3.3

3.1.6 Set-overtemperature

The over temperature cut-out is located on the rear panel of the flow heater unit. *See fig 2*
The cut-out operating temperature is adjustable and turns off both heating and pumping of the liquid temperature rises above the cut-out set temperature. Pressing the shaft resets the cut-out. To adjust the cut-out temperature a screwdriver can be used to rotate the slotted shaft. See **Switching on and setting up 3.3**

3.2 Filling of tank

Before filling the bath, disconnect the mains power supply
Fill the tank with mains tap water if possible to a depth of at least 30mm.
The circulator will automatically be filled, by gravity, but some air may be trapped in the system. This can be cleared by switching the circulator on and off at 15 second intervals once or twice. (This operation should be carried out with both high and low-phase set temperature turned down below the probe temperature to ensure that the heater is off). If necessary top up tank to required level.

Please note:
Should the tap water be very hard it will form lime scale inside the circulator and in the tank. Hard water may be softened if necessary, but soft water can cause germination problems. Distilled or rain water can be used, but distilled water may delay germination and rain water may be heavily polluted in industrial areas.

3.3 Switching on and setting up

3.3.1 Before starting

Place a full set of glass strips(not supplied) on the tank.
Connect external probe to FH60D probe socket. *See fig 2*
Place the FH60D temperature sensing probe under one of the plastic covers with a slot cut in the side so at least 10mm is under the pad.
Place the pad tail in the water.
Place a glass reference thermometer in the hole in the top of the plastic cover.
Ensure room temperature is 2^{o}C below the lowest required pad temperature.

3.3.2 Timer settings
Set switch contacts on **timer** (green pin) to start at 09:00 and finish at 17:00 for high phase setting.
Set switch contacts on **timer** (red pin) to start at 17:00 and finish at 09:00 for low phase setting.
Other cycle times can be set by resetting the pins to the required times.

3.3.3 Starting

Connect control unit to a grounded (earthed) electrical supply with voltage and frequency within the range specified on the serial number plate.

Before switching on for the first time, **set overtemperature** adjustment to its mid position. Press to insure that it is reset.

Switch **power** switch on.

Turn the **timer** to 18:00 hours ,and set the low phase temperature.
Check the pad temperature (usually 20°C) with the reference thermometer and adjust the temperature accordingly and allow temperature to stabilise.
Turn the **timer** to 10:00 hours and set the high phase temperature (usually 30°C) and allow temperature to stabilise.
Adjust fine setting ± 1°C if required.

After temperature has stabilised at the required set overtemperature, adjust the **set overtemperature thermostat** as follows :
Turn shaft anticlockwise, using a screwdriver, until **alarm** lamp comes on.
Press shaft to reset, and turn slowly clockwise until **alarm** lamp goes out.
(Turn shaft slowly until alarm light goes out. This will prevent liquid rising more than 10°C above the operating temperature).

3.3.4 Function checking

With the system running at high phase, turn the timer dial to 16:50 hours and let it run through the change over from high phase to low phase until it has settled at the low phase temperature.
Check that the cooling system operates when the low phase operation (night time) setting begins, the cooling will draw mains water for up to an hour from the start of the cooling phase.
Turn the **timer** dial to 09:00 hours and let it run through the change from low phase to high phase. High phase set temperature should be reached within an hour.

3.3.5 Setting for operation

When the high and low phases have been set to the required start points for the required time settings set the timer dial to the time of day.

4 Accessories (supplied only if separately ordered)

4.1 Frame SF60

Support frame for tank
FH60 support mounting plate

4.2 Plates GP60

12 off glass plates (Dimensions 495mm x 90mm x 4mm)

4.3 Plastic covers PC60

Plastic covers

5 Fault Diagnosis

Symptom	Possible Cause	Action Required
Unit does not operate	Unit not switched on	Switch on
	Unit not plugged into power supply	Plug in, switch on
	Fuse blown in unit or in plug (UK units only)	Check and replace
	Electrical power supply failure	Check that other electrical appliances on same circuit are working.
Alarm lamp on	Overtemperature cut-out has operated	Reset cut-out as described in 3.3
Temperature does not rise when expected	**Set temperature** is lower than liquid temperature	Check set temperature
	Set temperature is too close to ambient	Raise set temperature
	Temperature control circuit fault	Have unit checked by technician
Temperature continues to rise when not expected	**Set temperature** is higher than liquid temperature	Check set temperature

6 Technical Specification

Temperature range	Ambient plus 2°C to 50°C
Supply Voltage Range	220-240V 50Hz
Heater Power FH60	750W

Overtemperature is by variable resetable overtemperature cut-out with range -30° to 150°C

This equipment is for indoor use and will meet its performance figures within an ambient temperature range 10° to 35°C with maximum relative humidity of 80%.

7 Maintenance

No routine maintenance is required for FH60D.
No maintenance is required for CT60 seed tank except for cleaning of hard water scale, and is as follows :-
Fill seed tank with hot water, block inlet and outlet holes with corks.
Use 2 % sulphamic acid solution by weight (as domestic kettle descaler).
CAUTION: These may be toxic - follow the cleaner manufacturers instruction.
Allow solution to clean tank and then drain fluid. Rinse bath well afterwards.
For service, the circulator can be removed and can be returned to our service department or, in other countries to our distributor.

DO NOT RETURN TANK.

7.1 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.

7.1 Replacement of fuses

Fuse replacement should only be carried out by a competent person.
Disconnect unit from the power supply.
Locate fuses on underside as part of mains supply inlet.
Use screw driver of correct size to turn fuse holder a quarter turn anti-clockwise to release fuse holder. Check and replace fuse if necessary.
Replace with correct fuses: 1.25 x 0.25 inch ceramic quick acting
220 - 240V: 5AF
Replace fuse holder.

8 Guarantee

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

9 Service

For repair return to our Service Department, or in other countries to our distributor.

Service Address: Grant Instruments (Cambridge) Ltd.
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