



OPERATOR'S GUIDE

INCUBATOR OVENS
HX30 and HX60



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Setting the Standard

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Introduction to the HX range

The HX incubator range comprises the 30 litre HX30 model and a 60 litre HX60 model. The temperature is controlled by an easy-to-operate digital unit. The oven temperature range is from 40°C to 220°C, though the minimum temperature may be higher if the ambient temperature is above 30°C.

Temperature accuracy is enhanced by the use of a platinum resistance thermometer as the temperature control sensor. A simple air-flow adjustment may be made by movement of a sliding vent control mounted at the back of the oven. Typical air-flow with the vent open is 1850 litres/hour at 100°C, giving exchanges in chamber volumes per hour of 65. The door is hinged on the left for easy loading and unloading of work.

Voltage

These models must be ordered correctly to match the supply voltage. The voltage alternatives are:

- Single phase 220V-240V
- Single phase 110V-120V

Warning Symbols



DANGER of electrical shock- read any warning printed by this symbol.



DANGER - hot surface. Read any warning printed by this symbol.
WARNING: all surfaces of an oven may be hot.



DANGER - read any warning printed by this symbol.

Installation

Unpacking & Handling

Remove the shelves and runners from the packaging before installing the equipment. Lift the unit by its base. The door should not be used to support the equipment when moving it. Use two people to carry the oven where possible. Remove any packing material from the inner chamber before use.

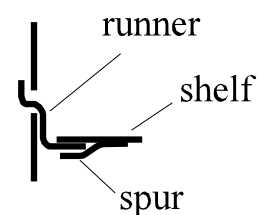
Siting & Setting Up

Place the oven on a level surface. If the overtemperature protection option is not fitted, ensure that the unit can be directly observed.

Ensure that there is at least 50mm of free space behind the oven and 25mm at the sides. There are vents in the back that must not be obstructed.

Ensure that the oven is placed in such a way that it can be quickly switched off or disconnected from the electrical supply - see below.

The ends of the runners should be inserted into the vertical columns of holes simultaneously at the front and the back. The bar should then be rotated through 90° in a downwards direction to secure it in place. The shelves slide onto the runners such that the spurs on the lower side of the shelf are under the bar at the back; this prevents the shelf from tilting forwards when partially withdrawn.



Plan to use the shelves, not the oven floor.

Electrical Connections

Connection by a qualified electrician is recommended.

The HX ovens are made only for single phase A.C. supply, which may be Live to Neutral non-reversible (polarised), Live to Neutral reversible (non-polarised) or Live to Live. Check the oven rating label before connection. The supply voltage should agree with the voltage on the label, and the supply capacity should be sufficient for the amperage on the label. The supply should be fused at the next size equal to or higher than the amperage on the label. Internal supply fuses are fitted in these models, but customer fusing is also recommended.

The oven is fitted with a supply cable. This may be fitted with a line plug or wired directly to an isolator. Ensure that the unit can be quickly disconnected from the supply.

The supply **MUST** incorporate an earth (ground).

CONNECTION DETAILS			<i>supply type</i>	
Supply	Terminal label	Cable colour	<i>Live-Neutral</i>	<i>Reversible or Live-Live</i>
1-phase	L	Brown	To live	to either power conductor
	N	Blue	To neutral	to the other power conductor
	PE	Green/Yellow	To earth (ground)	to earth (ground)

Operation

Operating Cycle

The oven is fitted with an Instrument switch which cuts off power to the control circuit. The oven has fan-assisted circulation; the fan is on when the instrument switch is on. Connect the oven to the electrical supply.

Operate the instrument switch to activate the temperature controller. The controller becomes illuminated and goes through a short test cycle.

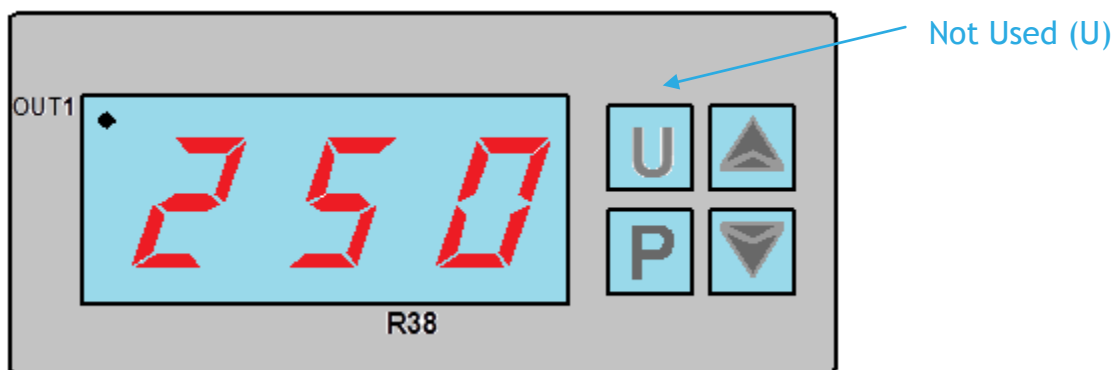
The controller becomes illuminated and goes through a short test cycle.

Adjust the temperature controller.

Over-temperature option. If the hydraulic thermostat over-temperature option is fitted, set the rotary dial to the desired protection temperature.

Unless a process timer is fitted, and is off, the oven starts to heat up according to the controller set point.

To turn the oven off, set the Instrument switch to its off position; the controller display will go blank. If the oven is to be left off unattended, isolate it the electrical supply.



Controller Operation

When switched on, the controller lights up, goes through a short test routine, and then displays the measured temperature and starts to control. The output light OUT1 indicates when heating is occurring.

To alter the setpoint, press the up or down arrow key once, "SPI" flashes.

Then use the up and down arrow keys to adjust the setpoint.

Press the P key to accept.

The Oven Door and Chamber

It is recommended that the instrument switch is turned off if the oven door is to be opened when the temperature is below 120°C. If the door is opened when on, and the temperature is below about 120°C, the temperature overshoots.

Also, remember that the fan is on when the instrument switch is on. Opening the door does not switch off the fan.

The tip of the temperature sensor is visible on the right of the chamber, below the fan. It is not electrically live, but it is delicate and should not be touched.

Loading and Unloading the Chamber

Where accurate temperature control of the load is important, use the central part of the chamber and distribute the load to allow free air circulation. Do not place loads on the chamber floor: use the bottom shelf.

The maximum load for each shelf is 10kg. The maximum load for the oven is 20 kg.



Remember that the shelves and work pieces may be hot: use suitable gloves or other handling equipment. Have a heat-resistant surface available on which to place hot materials.

There is no physical stop to prevent shelf removal: take care not to pull out a shelf accidentally.

Vents



On the back of the unit are two vents, covered by a sliding baffle plate. The inlet vent is permanently open, while the outlet may be opened or closed by means of the sliding plate.

The sliding plate gets hot. Do not touch it when the oven is hot. Make adjustments when the oven is cold.

Explosive Vapours



These models are not suitable for drying or heat treatment applications where vapours are released that are combustible or that can form explosive mixtures with air.

Maintenance

General Maintenance

No routine maintenance is required other than the occasional replacement of consumable items. The oven outer surface may be cleaned with a damp cloth. Do not allow water to enter the interior of the case. Do not clean with organic solvents. The fan motor is sealed for life; no lubrication is required.

Calibration

After prolonged use the controller and/or the temperature sensor could require recalibration. This would be important for processes that require accurate temperature readings. A quick check using an independent sensor and temperature indicator should be made from time to time to determine whether full calibration is required.

For a quick check of the temperature shown by the control sensor and oven controller, a portable temperature indicator and probe sensor may be used. Heals can supply these items.

If the process requires accurate temperature display it is possible to calibrate the controller by entering a single temperature offset value as follows:

- Hold the **P** key down for a few seconds while switching on the oven with the instrument switch to enter config mode.
- Use the up and down arrow keys to scroll through the group list until 'InP' is displayed, press "P" to accept.
- Scroll through the parameter list until 'OFst' is displayed, press "P" to accept.
- Use the up and down arrow keys to adjust the value, press "P" to accept.
- Press both arrow keys together to return to the group list.
- Press both arrow keys together again to exit the config mode.

Customer Support

Service & Calibration is available worldwide and is a totally comprehensive, worldwide support programme. When you buy instrumentation from us, it is the beginning rather than the end of a relationship. Our aim is simple: to provide precisely the services you need to maintain and protect the value of your investment. In all communications please quote the serial number of your machine.

Repairs & Replacements

Safety Warning - Disconnection from Supply

Always ensure that the oven is disconnected from the supply before repair work is carried out.



Safety Warning - Refractory Fibrous Insulation

This oven contains refractory fibres in its thermal insulation. These materials may be in the form of fibre blanket or felt, vacuum formed board or shapes, mineral wool slab or loose fill fibre.



Normal use of the oven does not result in any significant level of airborne dust from these materials, but much higher levels may be encountered during maintenance or repair.

Whilst there is no evidence of any long term health hazards, we strongly recommend that safety precautions are taken whenever the materials are handled.

- Exposure to dust from fibre that has been used at high temperatures may cause respiratory disease.
- When handling fibre always use an approved mask, eye protection, gloves and long sleeved clothing.
- Avoid breaking up waste material. Dispose of waste fibre in sealed containers.
- After handling rinse exposed skin with water before washing gently with soap (not detergent). Wash work clothing separately.

Before commencing any major repairs we recommend reference to the European Ceramic Fibre Industry Association Bulletin No. 11 and the UK Health and Safety Executive Guidance Note EH46.

We can provide further information on request. Alternatively our service division can quote for any repairs to be carried out at your premises or ours.

Panel Removal

Disconnect the oven from the electrical supply.

Side Cover. The complete right-hand side cover may be removed. Remove the screws at the back that fasten the side cover to the rest of the casing. Push the section backwards a few mm only, then ease it sideways (to the right) off the main case. Disconnect the earth (ground) wire. When reassembling take time and care in locating the tabs on the right of the front control panel into the matching slots in the side cover. Remember to reconnect the earth wire.

Internal Element Cover. Open the door. Remove the screw holding the internal side cover. Remove the cover.

Temperature Controller Replacement

Disconnect the oven from the supply and remove the side cover.

Make a note of all the wiring connections and disconnect the wires.

Loosen the screw that holds the controller body clamp in place. Use a flat screwdriver or similar object to ease apart the two plastic lugs on the side of the clamp, and pull the instrument forward out of the front control panel.

Reconnect the wires according to the notes made - or see wiring details.

Hydraulic Thermostat Replacement

Disconnect the oven from the supply and remove the side cover.

Also remove the internal element cover.

Pull off the knob from the thermostat. Remove the fixing screws. Disconnect any fixing clips or screws inside the oven chamber, and ease out the capillary tube. Remove the thermostat.

Replace by reversal of the procedure.

Control Sensor Replacement

Disconnect the oven from the supply and remove the side cover. Also remove the internal element cover.

Make a note of the connections to the temperature controller. Disconnect them.

Disconnect any fixing clips or screws inside the oven chamber, and remove the sensor.

Re-assemble with the new sensor. Take care not to damage the head by rough handling. In the case of the platinum resistance thermometer the wires may be connected to the correct controller terminals either way round.

Check that the oven is controlling properly, to ensure that the original fault was with the temperature sensor.

Solid-state Relay Replacement

Remove the control panel as given above. Make a note how the wires are connected to the solid state relay, and disconnect them.

Remove the solid state relay from the mounting surface.

Replace and reconnect the solid state relay ensuring that the heat-conducting thermal pad is sandwiched between the relay and the mounting surface. Alternatively a thin layer of white, heat-conducting silicon paste may be applied between the new relay and the plate.

Replace the removed panel.

Element Replacement

Disconnect the oven from the supply and remove the side cover. Also remove the internal element cover. The element terminals are low down in the side compartment.

Disconnect the wires from the element terminals. Remove any starlock washers - these may need to be cut with wire cutters. Remove any clips holding the element inside the chamber, and withdraw the element.

Reverse the procedure with the new element.

Run the oven at a low temperature and check that it is controlling properly, to find out whether the element failure was caused by a fault in the control circuit.

Fuse Replacement

Disconnect the oven from the supply and remove the side cover.

Supply fuses and control circuit fuses are mounted on the EMC filter circuit board. The shorter fuses are the control circuit fuses. The fuses are marked with their ratings.

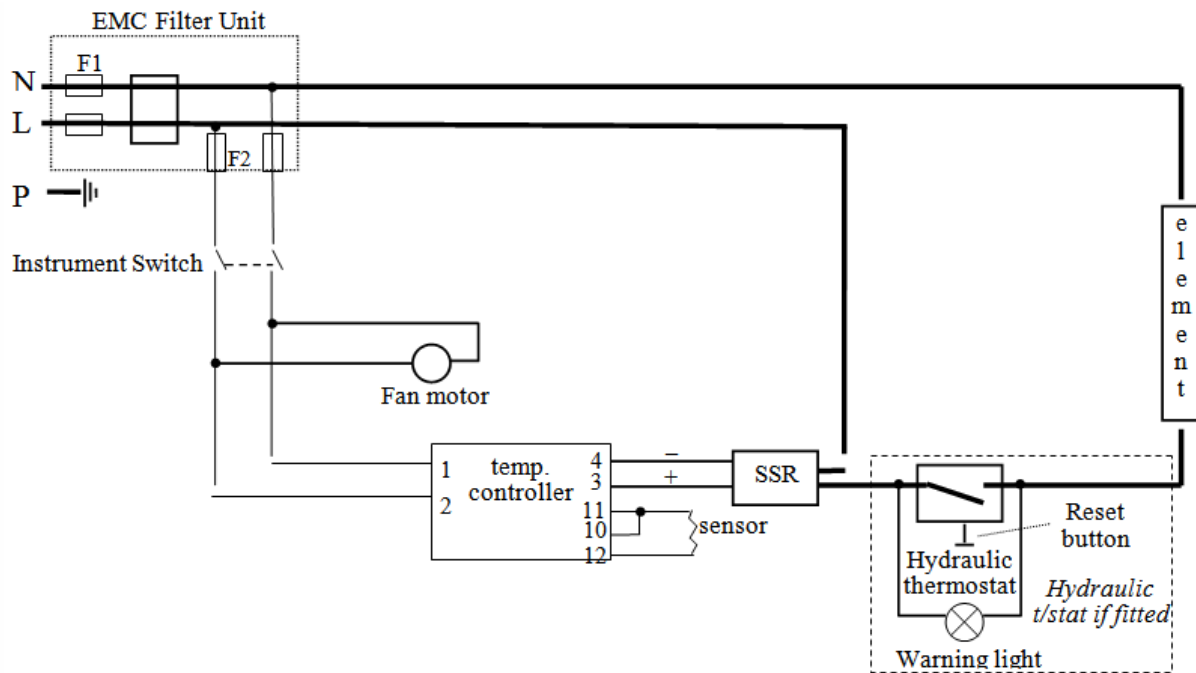
Take care not to disconnect the wires leading from the EMC filter without first recording their positions: they must be reconnected to the correct terminals.

Fault Analysis

- | | | |
|--|---|--|
| A. Oven Does Not Heat Up | | |
| 1. The controller does not light up | → No power from the supply | → Check the fuses in the supply line |
| 2. The controller does light up | → The controller shows a very high temperature or a code such as EEE or --- | → The temperature sensor has broken or has a wiring fault |
| | → The controller shows a low temperature | → The SSR could be failing to switch on due to internal failure, faulty logic wiring from the controller, or faulty controller |
| | → There are no lights glowing on the controller | → The controller may be faulty or not receiving a supply due to a faulty switch or a wiring fault |
| B. Oven Overheats | | |
| 1. Oven only heats up when the instrument switch is ON | → The controller shows a very high temperature | → The controller is faulty |
| | → The controller shows a low temperature | → The temperature sensor may not be positioned in the oven correctly |
| | | → The controller may be faulty |
| 2. Oven heats up when the instrument switch is OFF | → The SSR has failed "ON" | → Check for an accidental wiring fault that could have overloaded the SSR |
| C. Process Timer | | |
| Oven will not heat | → Temperature controller does not light up | → Process timer has not been reset |
| | → Resetting the timer has no effect | → Process timer is faulty (relay stuck open) |
| Oven continues to heat at end of process time | → Process timer OUT light is continuously on | → Process timer is faulty (relay stuck closed) |
| | → OUT light flashing or off | → not a process timer fault |

Circuit Diagrams & Fuses

Circuit Without Process Timer



Fuses

F1	Internal supply fuses	Fitted on EMC filter board.	32mm x 6mm type F
F2	Auxiliary circuit fuses	Fitted on EMC filter board.	20mm x 5mm
	Customer fuses	Recommended.	Same as table.

Model	Volts	Supply Fuse	Volts	Supply Fuse	Control Fuse
HX30	220-240	5A	110-120	5A	2A
HX60	220-240	5A	110-120	10A	2A

Specifications

James Heal reserves the right to change specifications without notice.

Models Covered by this Manual

<i>HX range of fan assisted laboratory ovens</i>										
MODEL	Max. Temp. (°C)	Max. Power (kW)	Chamber Size (mm)			Approx. Capacity (l)	Overall Size (mm)			Net Weight (kg)
			h	w	d		H	W	D	
HX30	220°C	0.25	295	300	320	28	440	590	465	24
HX60	220°C	0.675	395	400	420	66	540	690	565	37

Environment

The ovens contain electrical parts and should be stored and used in indoor conditions as follows:

temperature: 5°C - 40°C

relative humidity: maximum 80% up to 31°C decreasing linearly to 50% at 40°C

CE Declaration of Conformity

INCUBATOR OVEN MODEL HX30 and HX60

LOW VOLTAGE DIRECTIVE (73/23/EEC)

Implemented in the UK through the following:

European Standard BS EN 61010-2-010:1995 (Safety Requirements of Electrical Equipment - Particular Requirements for Laboratory Equipment for the Heating of Materials).

ELECTROMAGNETIC COMPATIBILITY DIRECTIVE (89/336/EEC) as amended by Directive 92/31/EEC

Implemented in the UK through the following:-

European Standard BS EN 50014:1993 (Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electric tools and similar electric apparatus).