



## **Shaking water bath OLS200**

## **Refrigerated immersion cooler CS200G**

*Operating Manual*

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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 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.
- Ensure that the operating temperature is less than the maximum operating temperature of your sample material.
- 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 tank.
- Take care when topping up or draining, as the liquid in the tank may be very 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.
-  • Always use a lid when operating above 60°C. Take care when rising and removing the lid, it may be hot. Steam and hot vapours can cause scalding.
- 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. If the **alarm** lamp is illuminated the liquid temperature may be above its recommended maximum: do not inhale the vapours given off as they may be toxic; liquids should be safely discarded and replaced.

## 2 Getting Started

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### 2.1 Unpacking

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

#### 2.1.1 Shaking bath - OLS200

The pack should contain:

shaking bath

trolley

drive magnet

drain insert (located in a clip on the rear panel of OLS200)

mains cable

these instructions.

#### 2.1.2 Universal Tray

Tray fitted with springs for use with flasks.

#### 2.1.3 Test Tube Tray

Tray for use with test tube racks.

#### 2.1.4 Cooler - CS200G

Refrigerated immersion cooler, for operating temperatures down to 0°C.

#### 2.1.5 Cooling coil - CW200

For operating temperatures at or below ambient, a Grant CW200 heat exchange coil can be used to maintain the temperature at 2°C above the temperature of the coolant.

## 2.2 Installation

### 2.2.1 Location

Position the bath on a firm level surface with the controls facing the operator and adjust the position of the feet so that the bath stands level. This can be done after filling with liquid to the top of the trolley, and levelling the water against the top of the trolley as a reference. It is necessary that the bath is level in order to achieve optimum performance.

### 2.2.2 for operating temperatures below ambient

The unit is insulated for use at temperatures below ambient. It is recommended that the gabled lid is used to reduce heat gain.

To fit the cooling coil: remove the flask tray and trolley, then remove the base tray by undoing the retaining 'N' nuts (see figures 1 and 5).

CS200G: Stand the CS200G next to the OLS 200 and position the cooling coil in the bottom of the tank, ensuring that it lies flat, with the feed pipe at the rear.

CW200: Place the CW200 cooling coil in the bottom of the tank, ensuring that it lies flat, with the input and output pipes at the rear.

To secure the cooling coil in position, replace the base tray and washers and tighten the four retaining 'N' nuts (see figure 5).

Ensure that the CS200G is located so that the ventilation grilles are not less than 100mm from any obstruction.

To use the lid: remove the slot cover and replace in the alternative position, to allow the connecting pipe to pass through.

### 2.2.3 for operating temperatures above 60°C

At operating temperatures above 60°C a lid **MUST** be fitted. The Grant sloping stainless steel lid directs condensate into the bath to prevent it from dripping into open flasks or tubes.



#### 2.2.4 Fitting the trolley

**Caution:** *The shaker uses a magnet located in the bottom of the tank. Once removed from the bath the drive magnet produces a strong magnetic field and it should be placed in a position where it cannot affect computer discs, cassettes, watches, etc. If your watch is susceptible to magnetic fields, please remove it before removing or fitting the trolley. Once the trolley and drive magnet have been fitted the stray magnetic fields are very small.*

Fit the drive magnet onto the shaft in the bottom of the bath (see figures 1 and 2). Lower the trolley into the bath, keeping it level, with the drive arm facing the front of the bath (see figure 4); fit the drive arm pin into one of the holes on the drive magnet. See figure 1 and paragraph 3.1.3.2.2 for guidance as to which hole to select. If the drive arm is not parallel to the base of the tank, it may be difficult to fit the pin into the hole.

#### 2.2.5 Fitting the tray

The OLS200 shaking bath provides both linear and orbital shaking motion. Select the type of motion you require by altering the position of the tray in the tank.

The tray is punched with a 'O' and a  (see figure 3). For orbital motion, position the 'O' nearer the front. For linear motion, position the  nearer the front.

For orbital motion: tilt up the far end, locate the near end lip on the wheels nearest to you. Lower the far end and move the trolley sideways until the pin locates in the hole in the drive arm (see figure 4).

For linear motion: tilt up the far end, insert the near end lip between the locating strips on the trolley (see figure 4). Lower the far end.

To remove the tray: hold both handles and keep the tray level as you lift it.

**WARNING:** For safety, do not remove the tray from the unit when the liquid is hot.

#### 2.2.6 Filling

Before filling ensure that the drain pipe is not attached.

Fill the bath without the tray fitted, with approximately 9 litres of liquid. Fit the tray and adjust the liquid level to the required immersion depth. When the liquid is level with the top of the tray the flask immersion depth is 50mm.

DO NOT operate the bath without any liquid.

#### 2.2.7 Specified liquids:

0 to + 5°C      80% water, 20% antifreeze (inhibited ethylene glycol)  
WARNING: ANTIFREEZE IS TOXIC. IT IS HARMFUL IF SWALLOWED.  
READ THE SUPPLIERS' HANDLING INSTRUCTIONS.

+5°C to 99°C      Water (taps or distilled). See maintenance and service section 7.

Do not use any other liquids without consulting Grant Instruments.

#### 2.2.8 Connection to electrical supply

**WARNING:** The equipment must be earthed (grounded). It is protected by internal electrical fuses. We strongly recommend that the power supply to any equipment for heating liquids should include a residual-current circuit breaker (earth leakage trip).

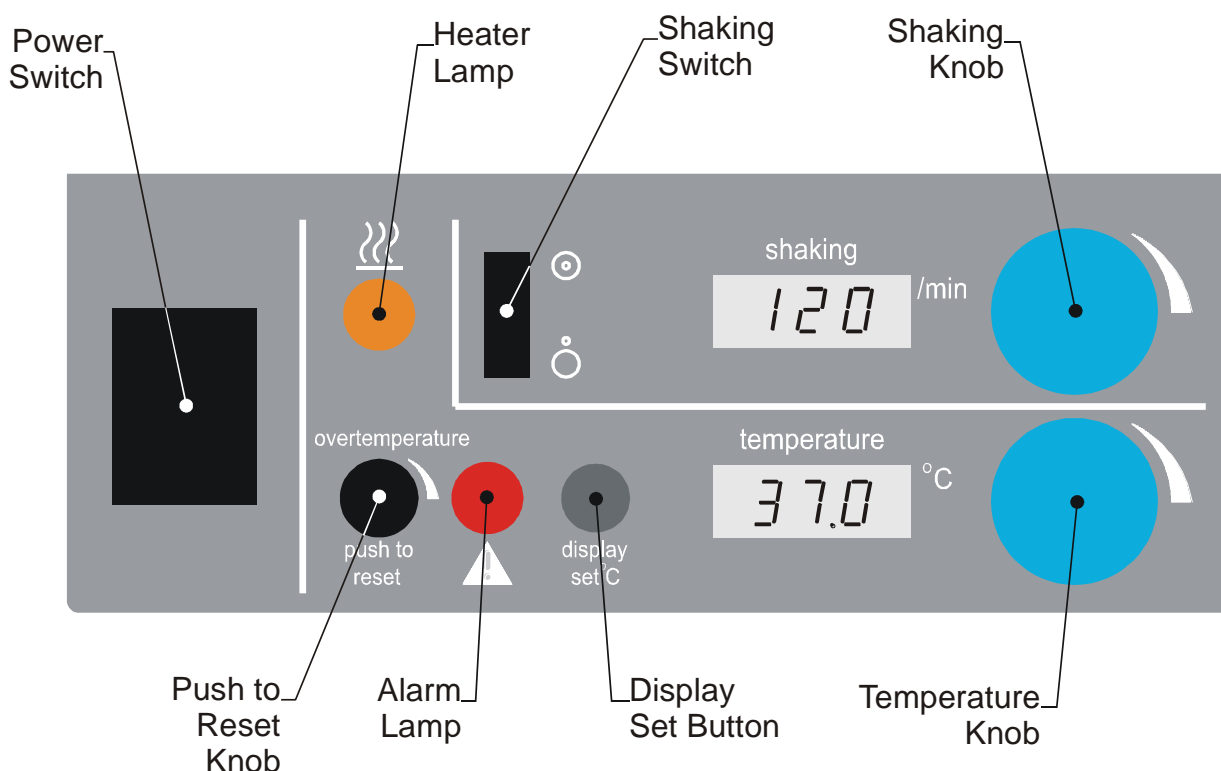
Check that the voltage rating of the products, given on the serial number plate at the power cable entry, is correct for your supply.

Fit the mains cable into the IEC power socket at the rear of the unit(s).  
Connect the plug to the power supply socket.

### 3 Operation

#### 3.1 OLS 200

##### 3.1.1 Controls and indicator lamps



The temperature display normally shows the liquid temperature in °C. When the **display set °C** button is pressed the set temperature is shown.

The **temperature °C** control knob sets the required operating temperature.



**Heater** lamp (orange) indicates when the heater is on. While the bath is warming up, the lamp is on continuously. As the temperature approaches set point, the lamp starts to flash, and continues to flash intermittently while the unit is controlling at set temperature.



Alarm lamp (red) illuminates when the overtemperature cut-out has operated.

The **overtemperature push to reset** knob sets the overtemperature cut-out. The cut-out operates if the liquid temperature rises above its set temperature. When it has operated, the red alarm lamp illuminates and the heater is switched off. The temperature of the liquid continues to be displayed to warn of possible high temperatures.

The speed display shows shaking speed in revolutions per minute. In linear motion the number of strokes is twice the number displayed.

The **shaking/min** knob sets the shaking speed.

##### 3.1.2 Setting the temperature

The display normally shows the liquid temperature. To show the set temperature at any time, press the **display set °C** button. To set the required operating temperature, push the **display set °C** button, whilst turning the **temperature °C** knob until the required temperature is indicated on the display.

### 3.1.3 Shaking

Switch on shaking. In linear motion the number of strokes/minute is double the number displayed. To set the required revolutions per minute, turn the **shaking/min** knob until the required speed is displayed. The speed rises slowly to the set value. Following adjustment, the setting should be checked after several minutes. Stroke length for linear movement

The stroke length in linear motion can be altered according to your requirement with a choice of three settings. The setting can be changed by altering the position of the drive arm pin in the drive magnet (see figure 1). Hole 'A' sets the stroke length at 18mm; there are three alternative positions of hole 'A', any of them may be used. Hole 'B' sets the stroke length at 28 mm and Hole 'C' sets the stroke length at 36 mm. See figure 1 for identification of holes.

Orbital motion operates ONLY at 9mm radius.

#### Maximum speed

The maximum speed depends on number and size of flasks, liquid depth, operating temperature and, in linear motion, stroke length. The maximum speed will need to be determined for each individual application. To determine the maximum speed, increase the speed until the trolley begins to move erratically or stop; switch the shaking off, turn the speed down and restart. By repeating this procedure the speed can be fine tuned to a maximum point, just below the point at which it de-latches. The shaking trolley is driven by a drive magnet coupled to a rotating magnet below the tank; as the speed is increased a point is reached where the magnetic coupling de-latches, causing the trolley either to move erratically or to stop.

#### Liquid depth

Maximum speed is achievable with the minimum liquid depth.

Liquid depths up to a maximum of 130mm (90mm flask immersion) can be used, but water may splash out at high speeds, particularly with a small number of large vessels.

#### Flasks, stroke length

The following table gives a guide to the maximum speeds obtainable with 50mm immersion depth, three different stroke lengths and various sizes and numbers of Erlenmeyer flasks.

Flask size ml	No. flasks	Linear 18mm stroke Hole 'A' Max. speed strokes/min	Linear 28mm stroke Hole 'B' Max. speed strokes/min	Linear 36mm stroke Hole 'C' Max. speed strokes/min	Orbital Hole 'A' Max. speed rpm
1000	1	300	270	180	160
	3	220	200	170	130
500	1	340	220	200	190
	6	260	170	120	135
250	1	380	270	180	200
	11	280	200	140	145
100	1				200
	18				145
50	1	360	300	170	200
	28	260	200	140	150

### 3.1.4 Setting the overtemperature cut-out

To protect both the unit and your samples, the overtemperature cut-out should be set each time the required operating temperature is changed. Turn the **overtemperature push to reset** knob fully clockwise and press to reset. The cut-out is now set at its maximum. Allow the bath to stabilise at the required operating temperature. Turn the control slowly anticlockwise using a screwdriver until the red alarm lamp comes on. Press the knob and gently turn clockwise until the alarm lamp goes out. Turn the knob anticlockwise three quarters of the way back towards the point where the alarm lamp came on. The overtemperature cut-out is now set approximately 10°C above the required operating temperature.

**Note:** When the cut-out has operated, the bath needs to cool to below the set temperature before the cut-out can be reset. Push the knob to reset the cut-out.

### 3.1.5 Draining

Allow the liquid to cool to below 60°C before draining. The drain connector is positioned on the rear panel. The drain insert is fitted into a clip on the rear panel next to the drain connector. Connect a suitable pipe to the drain insert. Place the end of the pipe over a drain or in a container. Push the drain insert into the drain connector. The liquid will now drain from the bath. To remove, press the button and pull out the insert. Replace in the clip.

## 3.2 CS200G

The mains (power) switch is on the rear of the unit.

Switch on at the rear. Always ensure that the bath is switched on to provide temperature control, and that **shaking** is switched on at low temperatures, to prevent the formation of ice.

Do not switch on if:

- the temperature of the liquid in the bath is above 40°C
- the cooler has been tilted by more than 25° during the past six hours
- the interval since switching off the cooling system is less than 10 minutes

## 4 Accessories

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### 4.1 Universal tray UT200

The universal tray accommodates a wide variety of vessels. The configuration of the springs can be altered to accommodate the maximum number of each size of Erlenmeyer flask as follows:

	Figure
45 x 25 ml flasks	6
28 x 50 ml flasks	7
18 x 100 ml flasks	8
11 x 250 ml flasks	9
6 x 500 ml flasks	10
3 x 1000 ml flasks	11

Springs may be removed to accommodate awkward shaped vessels, for example boxes for hybridisations.

There are two rows of holes in the long sides. The upper set should be used for high vessels and the lower set for vessels up to about 50mm tall. Select the spring configuration which best suits the application.

To change spring positions, slide out the retaining rod, place the end of the spring into the required hole and refit the rod.

### 4.2 Plain Tray UTP

Universal tray without springs.



#### **4.3 Tray for test tube racks TT200**

The tray accommodates up to five test tube racks as follows:

H1 test tube racks:

H1-10 rack holds 48 x 10 mm tubes

H1-13 rack holds 44 x 13 mm tubes

H1-16 rack holds 24 x 16 mm tubes

H1-19 rack holds 21 x 19 mm tubes

H1-25 rack holds 12 x 25 mm tubes

H1-30 rack holds 10 x 30 mm tubes

#### **4.4 Perforated tray for use as an ordinary unstirred bath SBT28**

Remove the trolley leaving the drive magnet in position, and fit the SBT28 perforated tray to provide a platform on which vessels or racks can be placed.

#### **4.5 Gabled lid, stainless steel LS200**


To use the lid with a cooler, remove the slot cover and replace it in the alternative position, to allow the connecting pipe to pass through.

## 5 Fault diagnosis

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Whilst it is not possible to cover all fault conditions, the following procedures provide guidance for solving simple faults which can occur in normal operation. The operator should not attempt to cure internal faults, but should return the unit for service to Grant Instruments' Service department or their distributor in other countries.

Before starting this procedure set power and shaking switches OFF.

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
	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 7.3.1.
 Alarm lamp on	Overtemperature cut-out has operated	Reset the cut-out and check the settings as described in 3.1.4. If the cut-out operates again or cannot be reset, have the unit checked by a competent person
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, or use cooler
	Temperature control circuit fault	Have unit checked by a competent person
Temperature continues to rise when not expected OR heater lamp on	Set temperature is higher than liquid temperature	Check setting
	Temperature control circuit fault	Have unit checked by a competent person
Trolley not shaking - shaking display zero	Shaking not switched on	Switch on
Trolley not shaking - speed display not zero	Incorrectly fitted trolley	Check fitting of trolley
	Speed too high	Reduce speed
No display or speed incorrect	Speed control circuit fault	Have unit checked by a competent person
Speed reduces	Trolley has scaled up	Immerse in descaler, or clean - see 7.1

## 6 Technical specification

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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 in ambient temperature between 10°C and 35°C.  
Installation category II (Transient voltages). Pollution degree 2 in accordance with IEC 664. For operation at altitudes up to 2000 metres.  
As Grant Instruments is committed to a continuous programme of improvement, specifications may be changed without notice.

### 6.1 OLS200 orbital/linear shaking bath

Temperature range	0 to 99°C
Stability (DIN 58966)	± 0.1°C
Uniformity	± 0.1°C
Temperature setting/display	digital/LED
Display resolution	0.1
Shaking speed range	20 to 200 rpm 40 to 360 strokes/min
Linear - stroke length	18, 28, 36 mm
Orbital radius	9mm
Shaking speed setting/display	digital/LED
Display resolution	1
Heater power	230V – 1450VA 115V – 1200VA
Power rating	230V – 1500VA 115V – 1250VA
Tank dimensions l/w/d	505/300/200 mm
Shaking tray area	375/235 mm
Flask immersion min./max.	0/90 mm
Liquid depth, in the tank	40mm to 130mm
Overall dimensions l/w/d	555/325/300 mm
Mass	15kg
Heat up time from 25°C to 70°C with water and the lid on	32 minutes
Safety: overtemperature/ low liquid level	adjustable cut-out
Supply voltage range	230V ±10% @ 50/60Hz 120V ±10% @ 50/60Hz

## 6.2 CS200G refrigerated cooler

Refrigerated cooler for use in liquids between 0° and 40°C.

Immersed material: the cooling coil is nickel-plated copper.

Power consumption 500VA

Cooler extraction @ 20°C 200 W

@ 0°C 100 W

Supply voltage: 230V ±10% @ 50/60Hz

Size: 475/320/255

Mass: 21Kg

## 7 Maintenance and service

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### 7.1 OLS200 Shaking bath

All Grant laboratory products are designed to comply with IEC1010-1 and can be flash tested. Some are fitted with radio frequency interference suppressors, so it is recommended that only a d.c. test is performed.

The overtemperature cut-out should be checked periodically by turning the **overtemperature push to reset** knob anticlockwise until the alarm lamp comes on. The cut-out should then be re-set and set-up again (see 3.1.7) If the alarm lamp fails to light with the knob turned fully anticlockwise the unit should be checked by a competent person.

To ensure free running of the trolley keep the liquid and the bath clean and free from scale. From time to time remove the tray and trolley and the drive magnet. Clean the trolley wheels and the centre of the tank where the wheels run, with warm soapy water to remove all scale and grit. Also clean the magnet and its housing. Be careful not to damage the magnet.

The base tray and the bottom of the tank can be cleaned by removing the base tray from the tank. To remove: undo and remove the nuts, followed by the washers and the base tray. To replace: relocate on the four screw heads and fix in position by replacing the four washers and nuts.

If the bath is used with water and is to be left unused for longer than a couple of days, drain the water, remove the drive magnet and dry out its housing. This will prevent the possibility of corrosion which can occur with distilled or deionised water and some tap water, even to the high grades of stainless steel used in the manufacture of the bath, and unwanted scale building up around the drive magnet.

When used with water under certain conditions, algal growth can occur which can be mistaken for rust. It can be cleaned out by washing with warm soapy water.

Cleaning: external surfaces can be wiped clean using a damp cloth and if necessary a mild detergent.

No other routine maintenance is required.

### 7.2 Refrigerated cooler: CS200G

Cleaning: external surfaces can be wiped clean using a damp cloth and if necessary a mild detergent.

#### **Dust on the refrigeration condenser**

Cooling power will be reduced if the fins behind the front grille become clogged with dust.

Examine monthly and, if necessary, call a competent person to take off the cover and remove the dust.

The flexible hose to the cooling coil should be checked periodically for wear or damage.

No other routine maintenance is required.

### 7.3 Replacement of fuses

**WARNING: Before removing the cover, isolate from the mains power supply. Only a competent person should change fuses.**

#### 7.3.1 OLS200 Shaker bath

First disconnect the mains cable from the power supply, then remove the socket end from the plug in the back of the bath. Drain the bath. Press down the fuse drawer catch (see figure 12). Pull out the fuse drawer, replace the fuse with the correct type, and replace the fuse holder. The fuses are Littelfuse 3AB 314 series, fast-acting, high breaking current (max breaking current at least 750 A); dimensions are 1.25 inch long, 0.25 inch diameter. Replace fuses only by the same type and rating.

230V units – 10A (250V)  
120V units – 15A (250V)

#### 7.3.2 Refrigerated cooler: CS200G

First disconnect the mains cable from the power supply, then remove the socket end from the plug in the back of the unit. Press down the fuse drawer catch (see figure 12). Pull out the fuse drawer, replace the fuse with the correct type, and replace the fuse holder. The fuses are 1.25 x 0.25 inch ceramic quick acting, rated:

230V units – 10A (250V)  
120V units – 20A (250V)

## 8 Guarantee

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When used in laboratory conditions and according to these instructions, this equipment is guaranteed for three years against faulty materials or workmanship.

## 9 Service

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For service, return for repair to our Service Department in the UK or, in other countries, to our distributor.

Service Address:

Grant Instruments (Cambridge) Ltd.,  
Service Department,  
Shepreth,  
Cambridgeshire  
SG8 6GB  
England

Tel: +44 (0) 1763 260811  
Fax: +44 (0) 1763 262410

## 10 Compliance

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### 10.1 Disposal & WEEE

Grant Instruments complies fully with the Waste Electrical & Electronic Equipment (WEEE) regulations 2006. We are a member of the B2B compliance scheme (Scheme Approval Number WEE/MP3338PT/SCH), which handle our WEEE obligations on our behalf. Grant Instruments have been issued with a unique registration number by the Environmental Agency, this reference number is WEE/GA0048TZ.

For information regarding WEEE collections in the UK please contact our B2B Compliance Scheme directly on 01691 676 124

For other countries please contact your equipment supplier.

For General WEEE information please visit: [www.b2bcompliance.org.uk](http://www.b2bcompliance.org.uk)



### 10.2 RoHS Directive

This unit contains refrigerant gas, which must NOT be discharged to the atmosphere. At the end of the unit's working life EITHER have the gas removed safely by using refrigerant recovery equipment OR return the unit to us for disposal.

### 10.3 Electrical safety and Electromagnetic compatibility

All the products covered by this manual comply with the requirements of the EU RoHS Directive (Directive 2002/95/EC). This means the products are free of Lead and other hazardous substances covered by the directive.

All the products covered by this manual comply with the requirements of the Low Voltage Directive (2006/95/EC) for Electrical safety and the EMC directive (2004/108/EC) for Electromagnetic compatibility. See the Declaration of Conformity on the inside back page

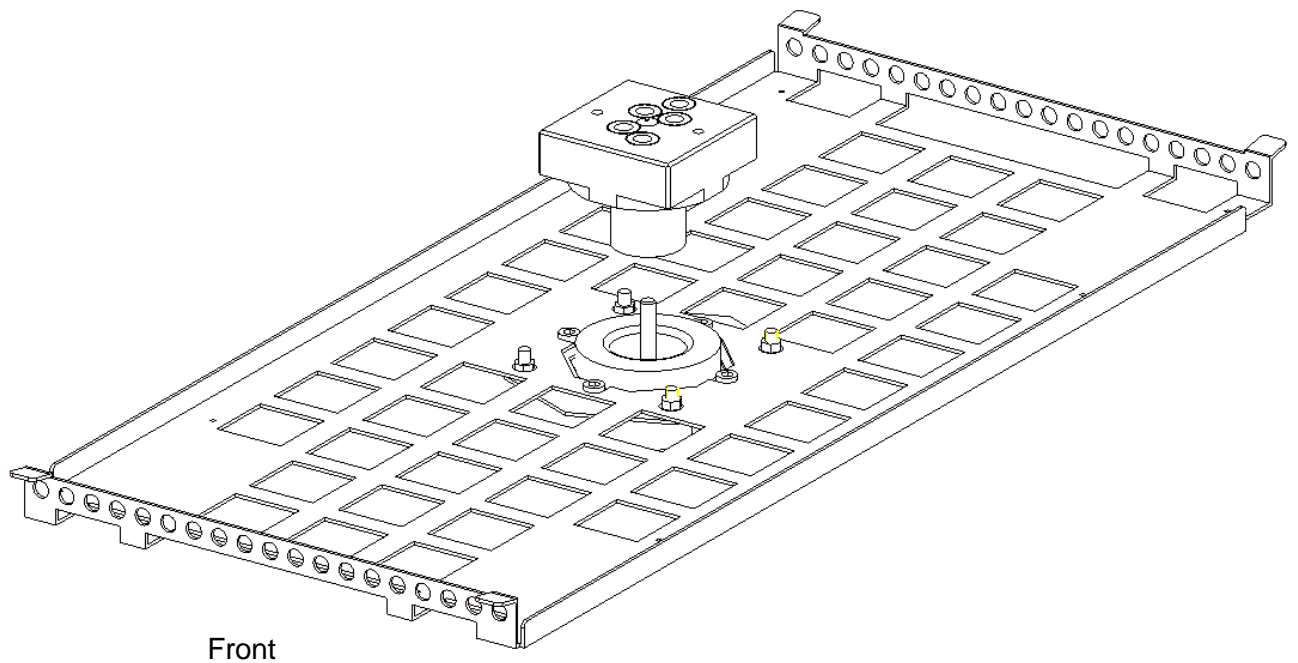


Figure 1

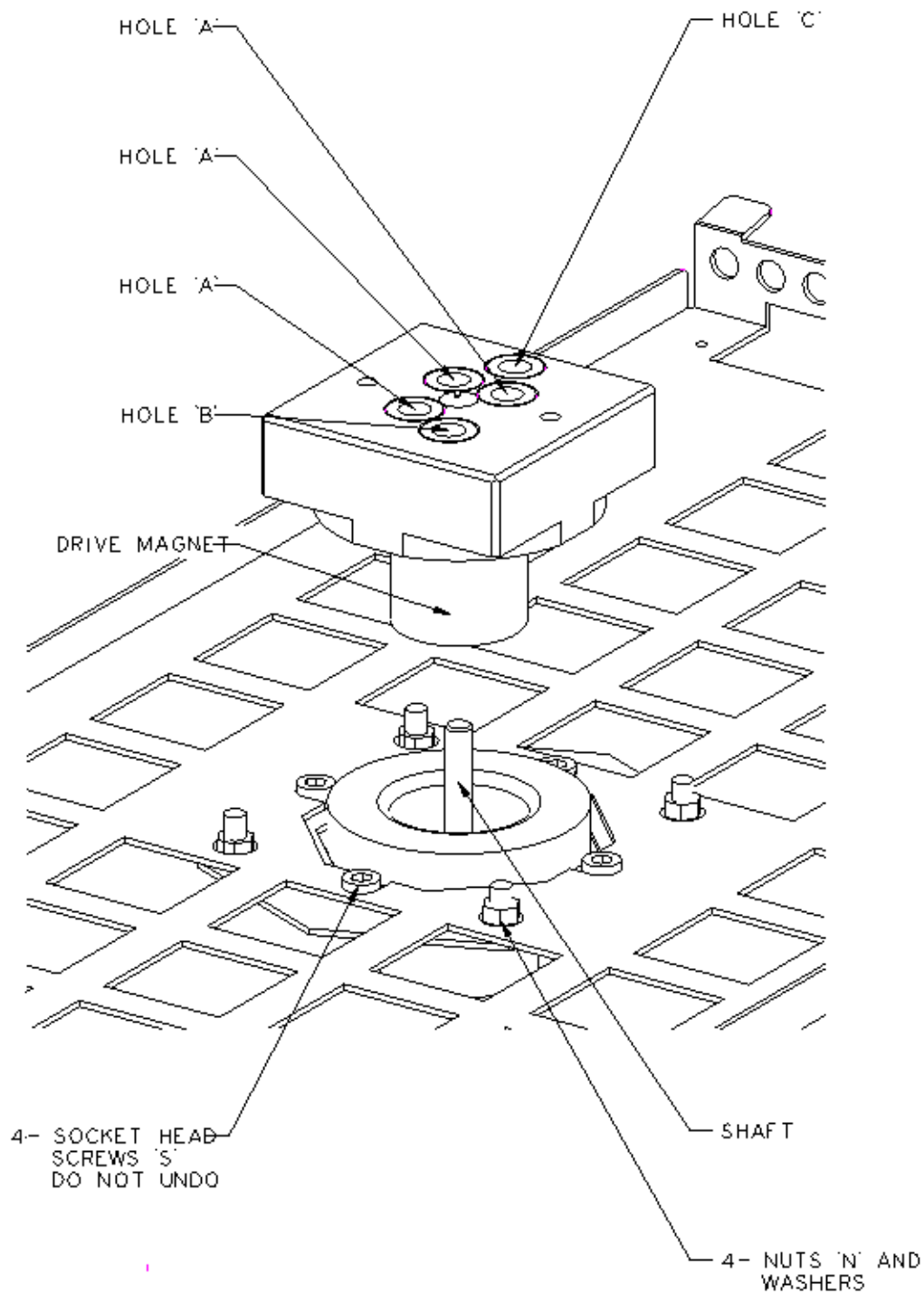


Figure 2



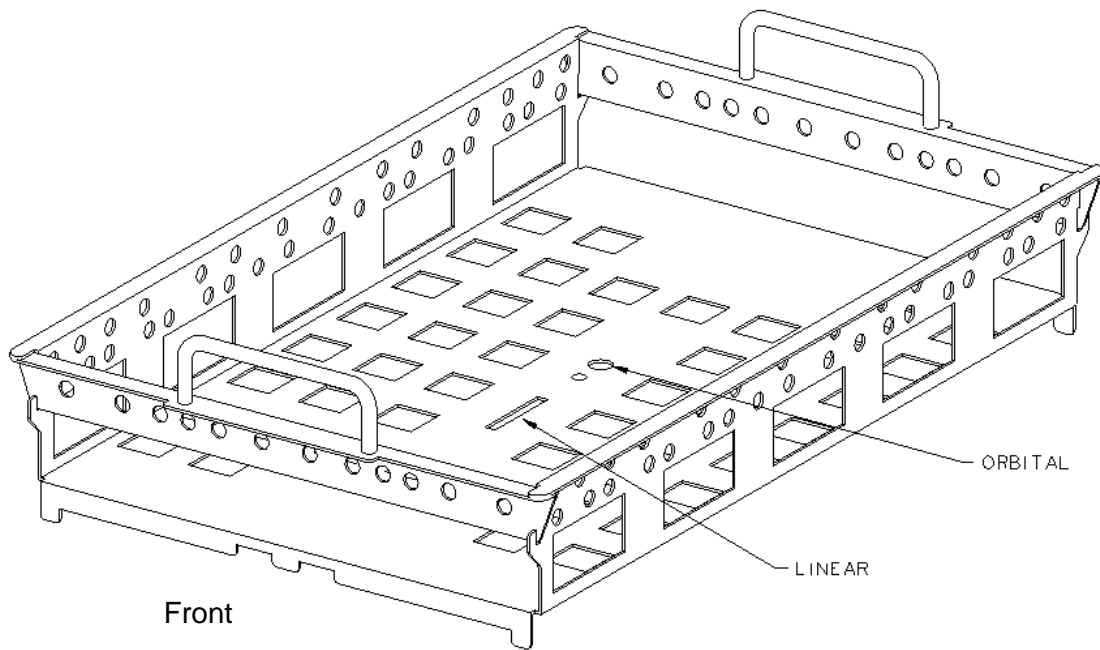


Figure 3

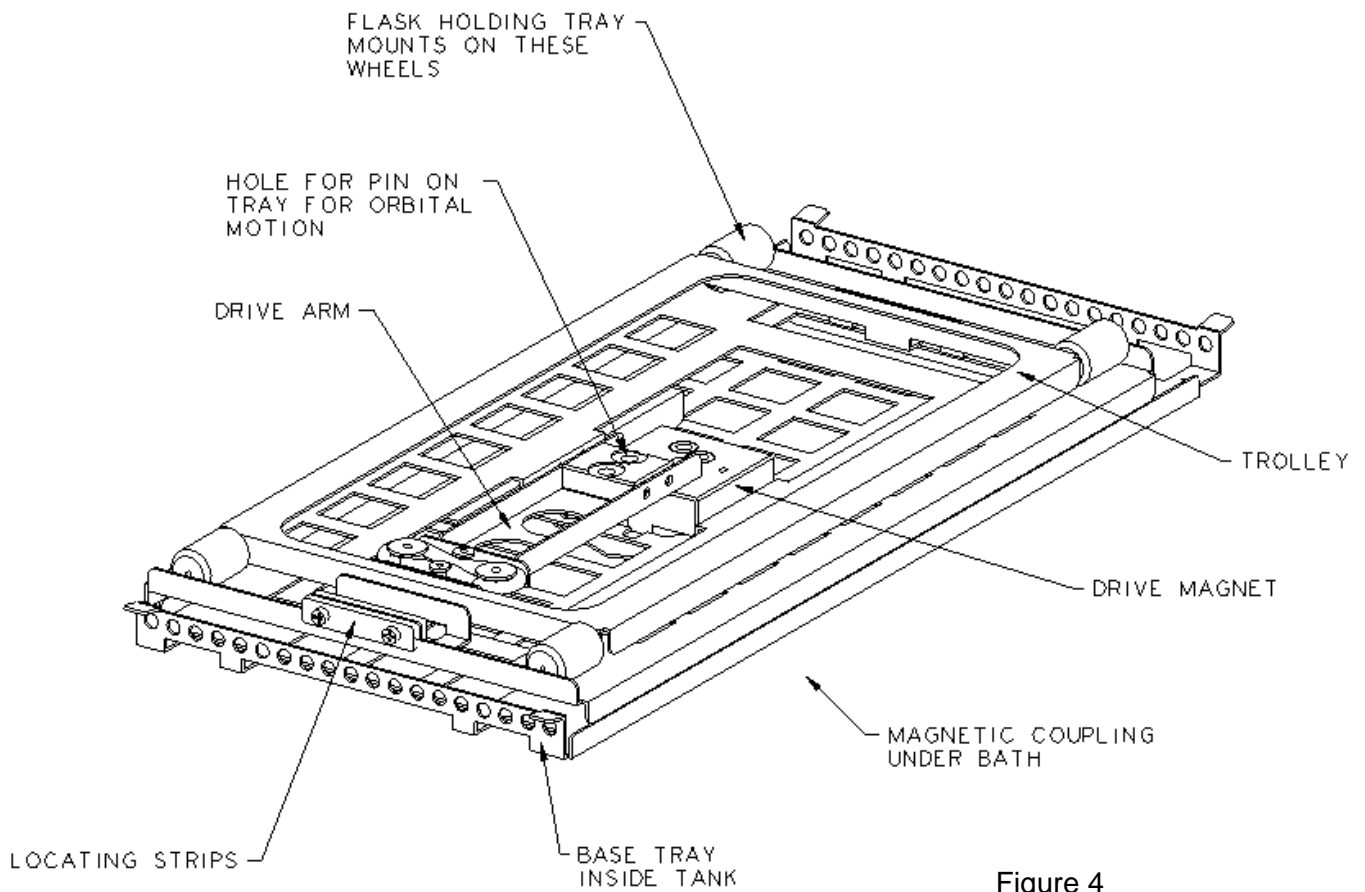


Figure 4

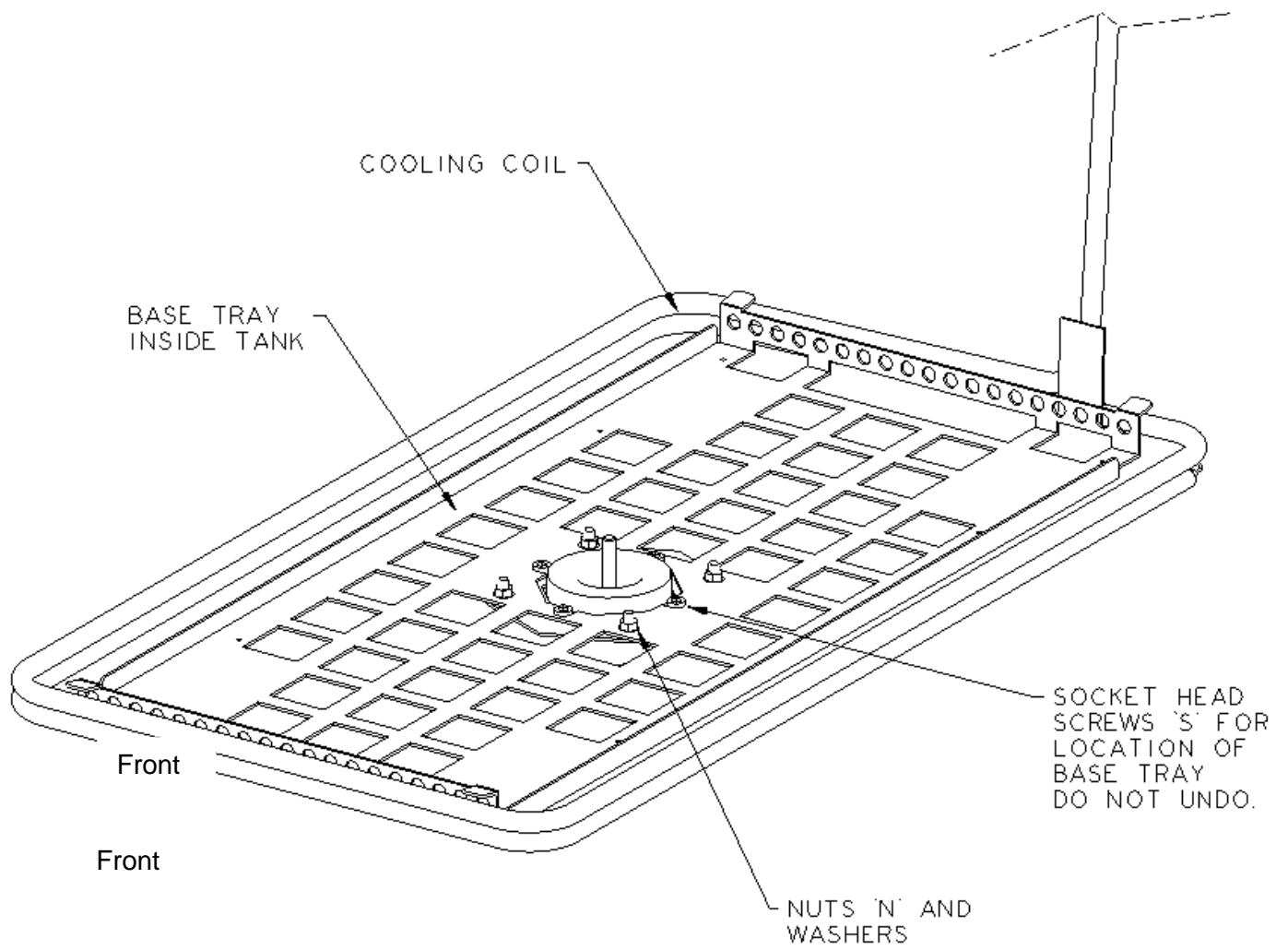


Figure 5

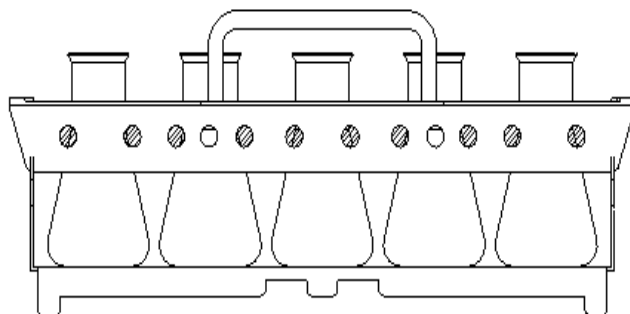
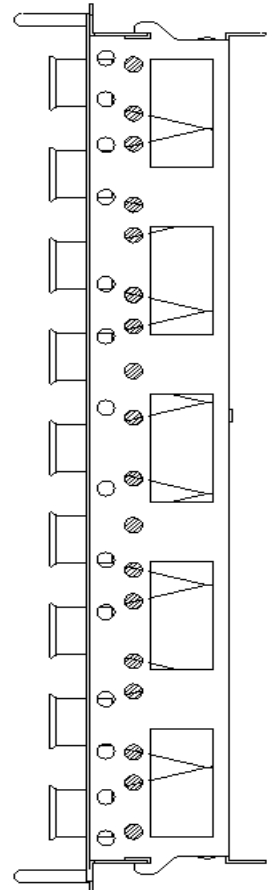
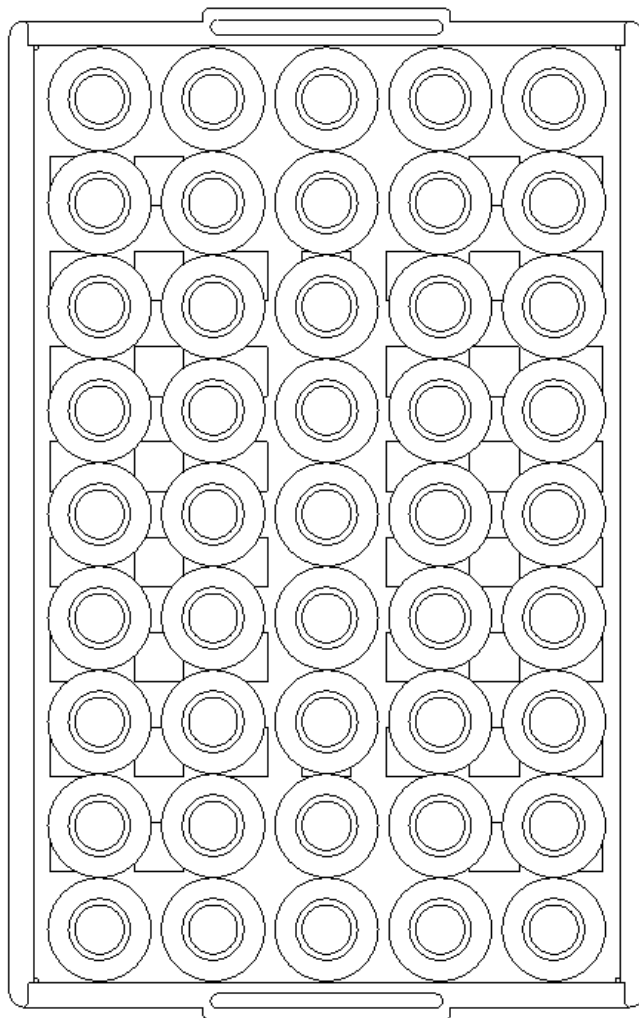


Figure 6  
Layout of springs and flasks  
For 45 off 25ml flasks

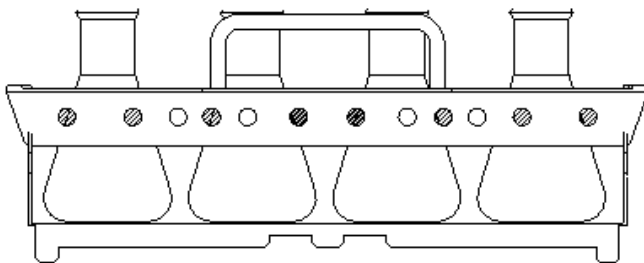
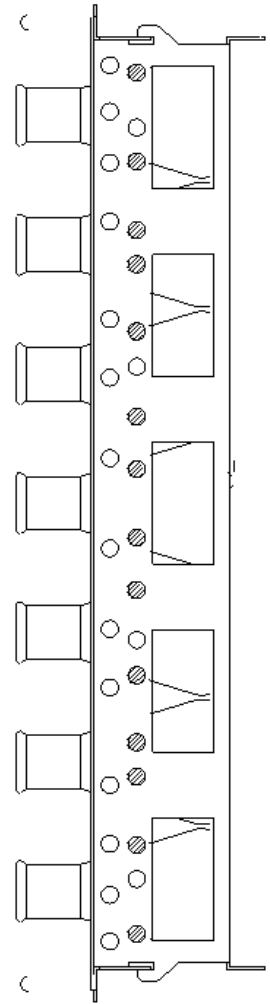
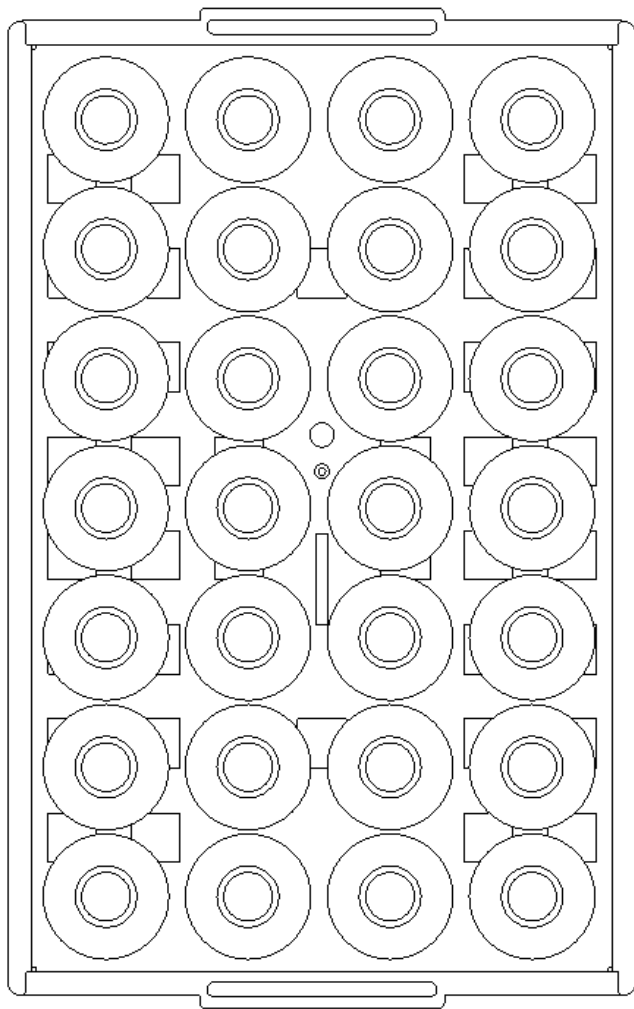


Figure 7  
Layout of springs and flasks  
For 28 off 50ml flasks

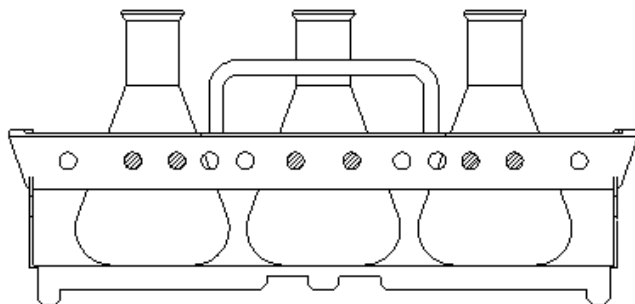
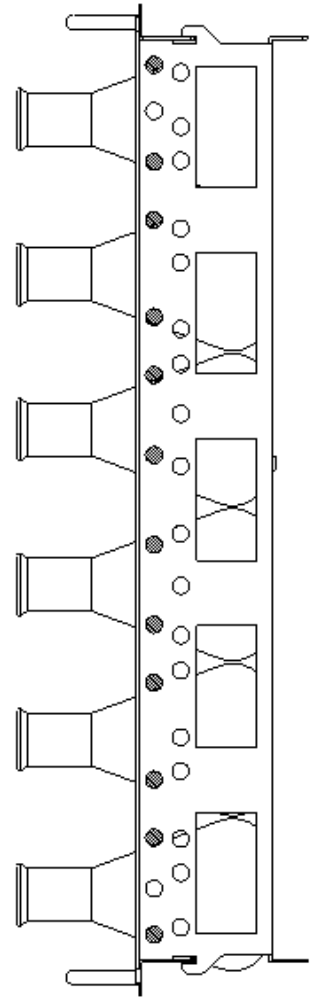
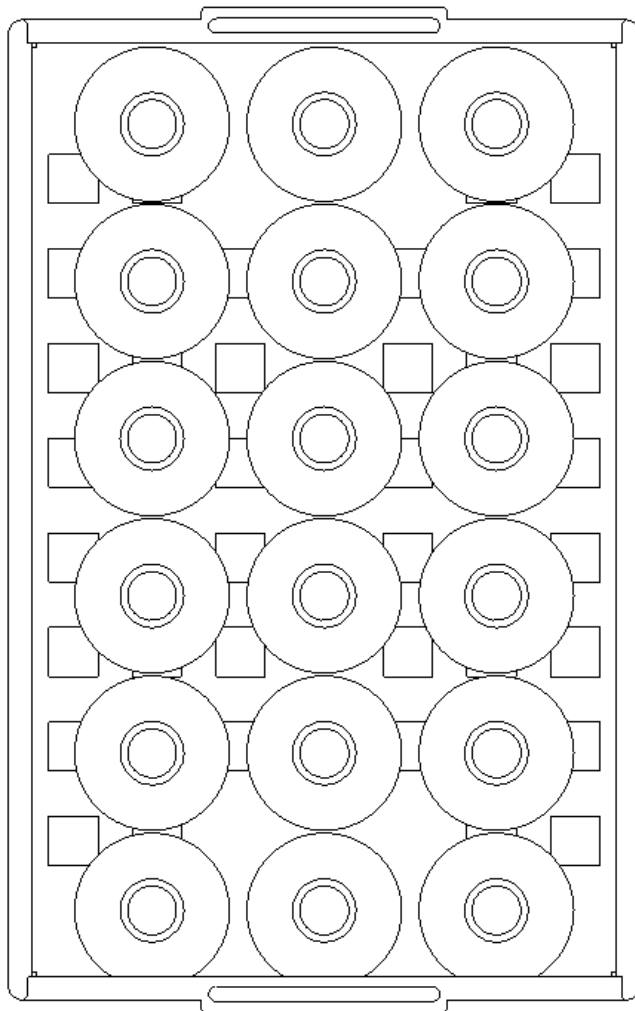


Figure 8  
Layout of springs and flasks  
For 18 off 100ml flasks

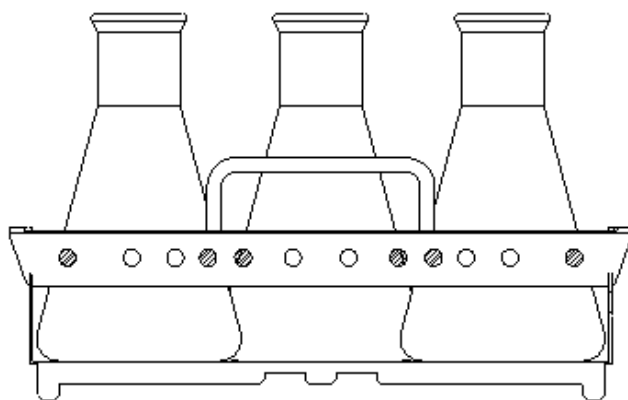
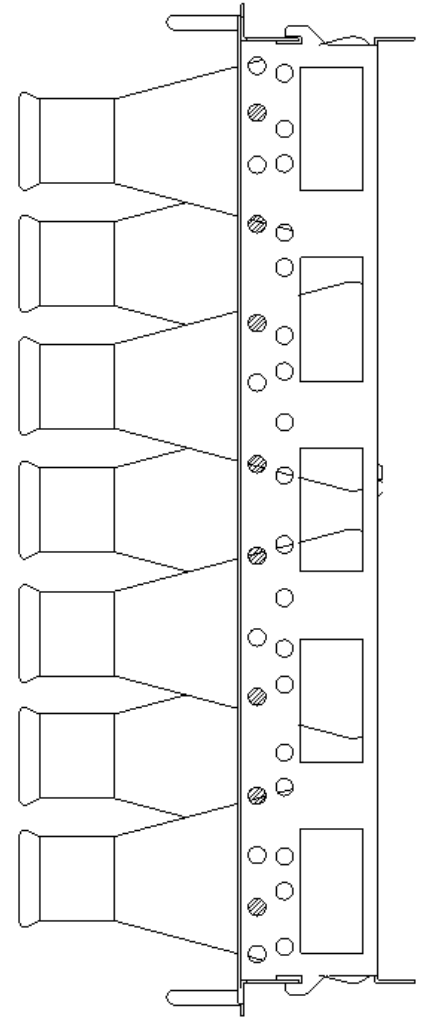
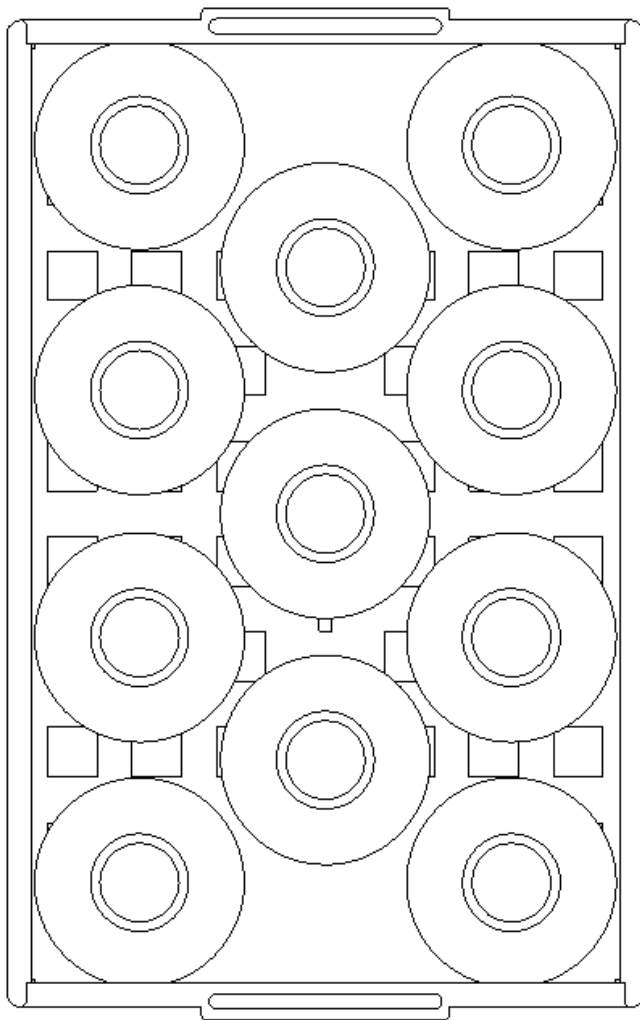


Figure 9  
Layout of springs and flasks  
For 11 off 250ml flasks

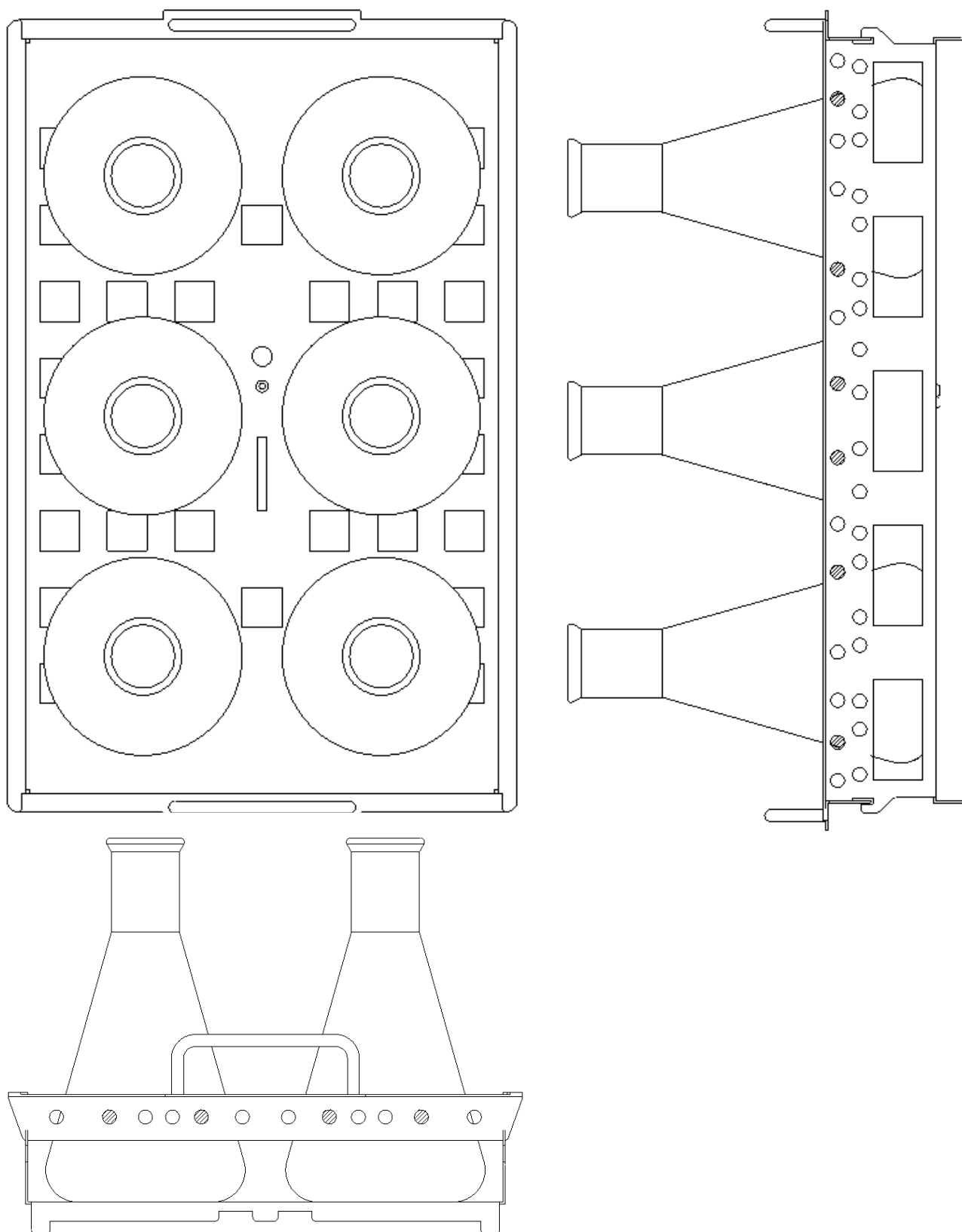


Figure 10  
 Layout of springs and flasks  
 For 6 off 500ml flasks

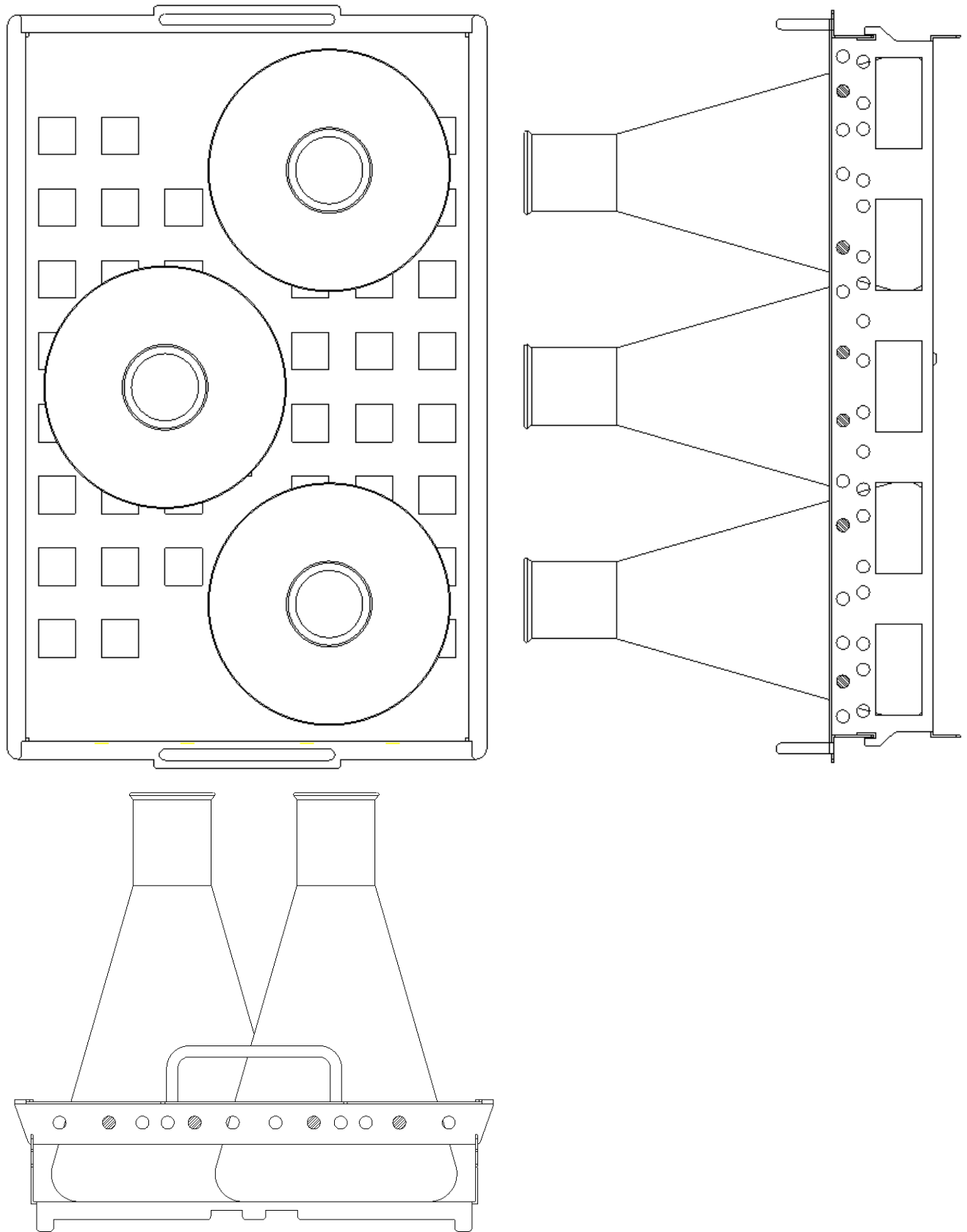


Figure 11  
 Layout of springs and flasks  
 For 3 off 1000ml flasks



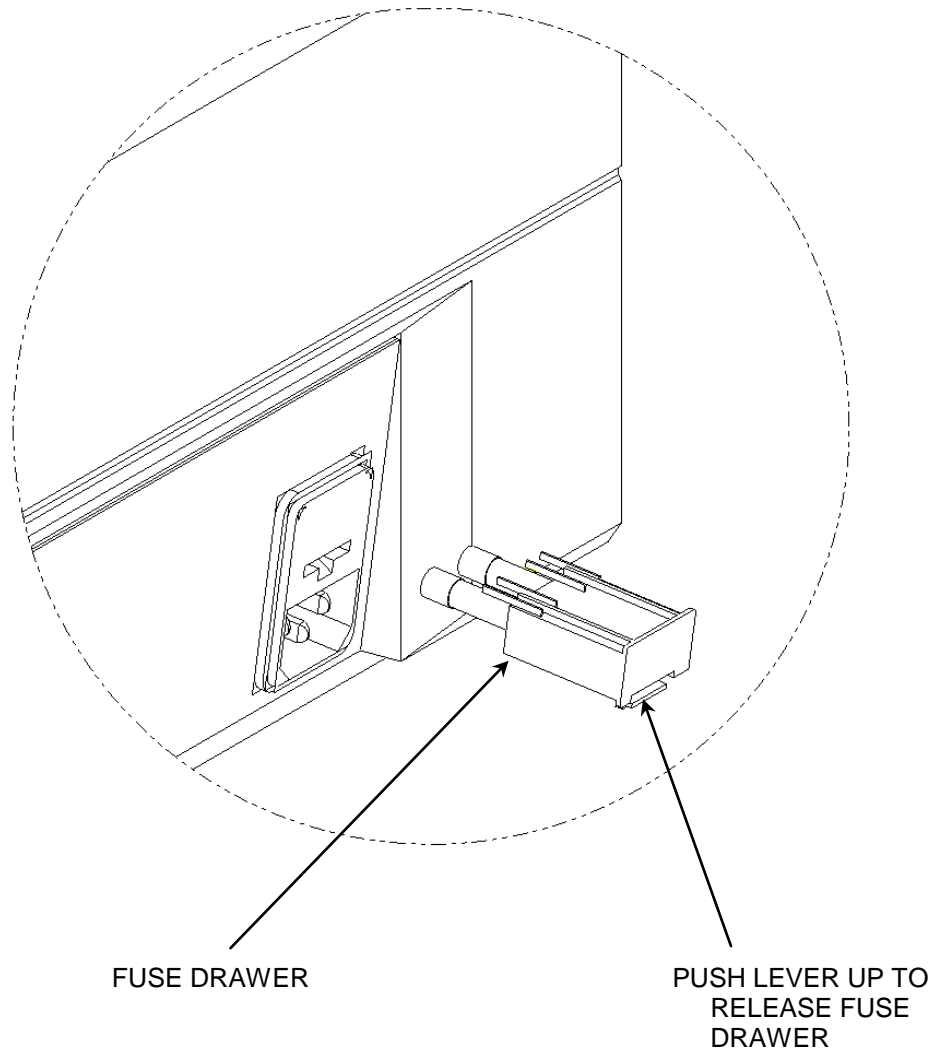


Figure 12  
Replacement of mains fuses on rear panel




# Declaration of Conformity

<b>Manufacturer</b>	GRANT INSTRUMENTS (CAMBRIDGE) LTD, Shepreth, Cambridgeshire SG8 6GB
<b>Equipment Name</b>	OLS200
<b>Equipment Description</b>	Combined orbital/linear thermostatically-controlled shaking water bath
<b>Directives</b>	EMC Directive 2004/108/EC LVD Directive 2006/95/EC
<b>CE mark first applied</b>	1996

<b>Applied Harmonised Standards</b>	BS EN 61326-1:2006 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements  BS EN 61010-1:2001 Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements  BS EN 61010-2-010:2003 Safety requirements for electrical equipment for measurement, control and laboratory use. Particular requirements for laboratory equipment for the heating of material
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This product complies with the requirements of the above Directives when used with leads up to 3m long, compliance may be affected by using longer leads.

I confirm that this apparatus conforms to the requirements of the above Directives

  
.....

Dated... 20/07/09 .....

Ludo Chapman  
Managing Director  
Grant Instruments (Cambridge) Ltd.

# Grant

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(Cambridge) Ltd**

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