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# **‘SMOOTHFLOW’ Fume Cupboard and Fumeflow Fan USER MANUAL**

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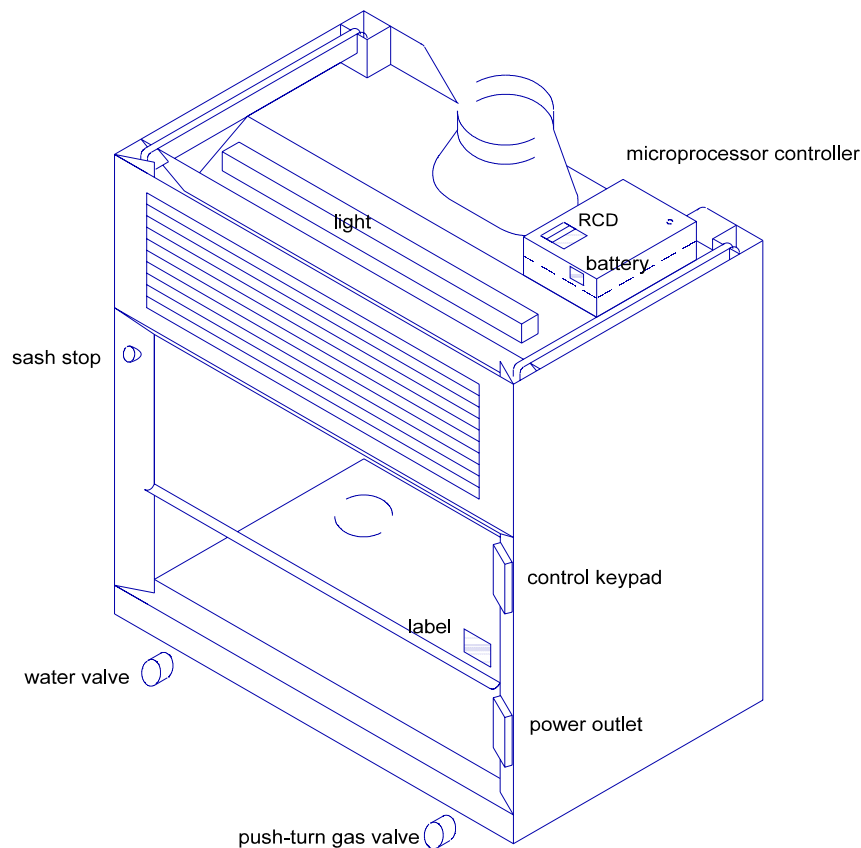
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## Smoothflow Fume Cupboard Features



### **Microprocessor controller**

controls all aspects of operation via the control keypad  
the controller is located on top of the fume cupboard  
RCD\* protection device for the power sockets  
battery\* energy for the mains power failure alarm  
\*refer maintenance instructions

**Light** illuminates the work area  
the light is located on top of the fume cupboard

**Sash stop**  
limits the opening height of the sash in normal operation  
releases the sash to full height for service access  
located on the left front pillar

## **Smoothflow Fume Cupboard Features (cont.)**

### **Control keypad**

input keys to start, stop and activate the fume cupboard  
displays the fume cupboard status and alarms  
\*refer operating instructions  
located on the right front pillar

### **Power outlet**

double socket for electrical appliances  
availability of power strictly controlled  
\*refer operating instructions  
located on the right front pillar

**Label** important user information  
spillage capacity  
warning notice  
fume cupboard serial number  
located on the right corner of the sash

### **Water valve**

controls water flow to water spout inside the fume cupboard  
located under the sill

### **Gas valve**

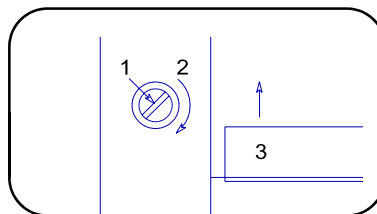
controls gas flow to gas spout inside the fume cupboard  
flammable gases have push-turn mechanism  
availability of flammable gases strictly controlled  
\*refer operating instructions  
located under the sill

## SASH STOP

The sash stop is located on the left front pillar  
The sash stop limits the sash opening height to about 480mm.  
With the opening restricted, less air flow is required to achieve fume capture.  
The sash can be released for maximum opening for cleaning inside the fume cupboard, or setting up equipment before the work starts.

**ALWAYS** lower the sash before commencing work

**NEVER** use the fume cupboard with the sash above the stop.



To release the sash:

Raise the sash until it reaches the upper stop position

1. Insert a coin or key in the slot of the sash stop
2. Twist the sash stop clockwise about a quarter turn and hold
3. Raise the sash above the stop

Release the stop and withdraw the coin or key.

The stop will automatically reset when the sash is lowered

**ALWAYS** lower the sash before commencing work.

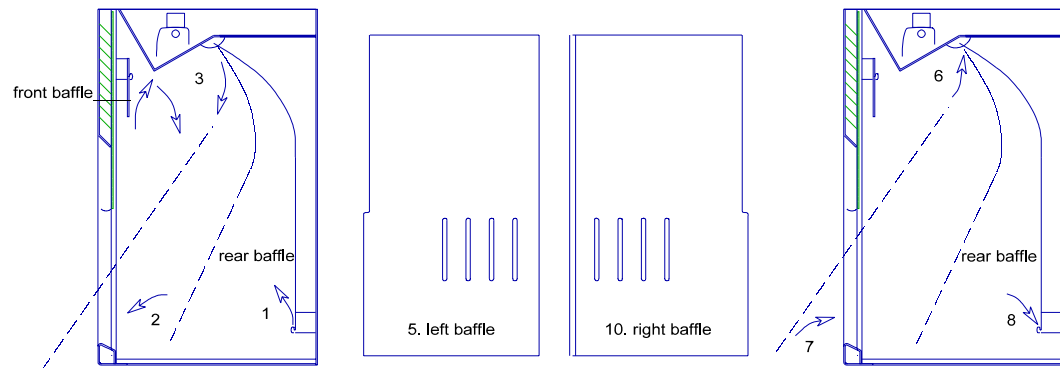
**NEVER** use the fume cupboard with the sash above the stop.

## BAFFLES

There are two baffles in the fume cupboard. The baffles are easily removed to facilitate cleaning of the entire fume chamber. This should be done as often as the work requires, and at least monthly (refer maintenance instructions)

**ALWAYS** remove ALL chemicals and equipment from the fume cupboard.

**ALWAYS** wear personal protective equipment before handling baffles. Protective equipment must be suitable for the chemicals used inside the fume cupboard. Refer to Supervisor. Minimum requirements are overalls or coat with **long sleeves**; suitable **eye protection** - glasses, goggles or mask; and suitable **gloves**.



Removing & Replacing Baffles

### Front Baffle

The front baffle hangs just behind the bypass grille and sash (see drawing). The clear PVC baffle hangs from two hooks, one on each sash guide. Carefully lift the baffle off both hooks at once to avoid fracture of a hook.

Replace the baffle by reverse action. Carefully hang the baffle on both hooks at once to avoid fracture of a hook.

### Rear Baffles

The rear baffles are sprung between a row of hooks inside the back of the fume cupboard, and a corresponding row of hooks under the roof (see drawing). The baffle is in two pieces, with a vertical join in the centre. The join cover strip is attached to the RIGHT hand baffle. Remove this baffle first.

1. To remove the baffle, place both (gloved) hands, palms up, under the bottom edge of the baffle. Raise the baffle and bring it forward, over the hooks.
2. Bring the bottom edge of the baffle forward over the sill,
3. Disengage the top edge of the baffle from the upper hooks.
4. Repeat the action with the left baffle.

Replace the baffles by reverse action.

5. Replace the left baffle (without cover strip) first. Hold the baffle with the edge notch at the top left corner, and the slots offset towards the centre of the fume cupboard (see diagram).
6. Lift the baffle into the fume cupboard and engage the top edge of the baffle in the upper hooks.
7. Lift the bottom edge of the baffle over the sill,
8. Carry the baffle to the back of the fume cupboard, and lift the bottom edge onto the rear hooks.
9. Check alignment in top and bottom hooks.
10. Hold the right baffle with the edge notch at the top right corner, and the cover strip towards the centre of the fume cupboard.
11. Repeat actions 6 - 9 above with the right baffle.

1. ....

2. ....

3. ....

4. ....

5. ....

**WARNING**  
Spillage volume 20 L  
Observe chemical limits  
specified by Supervisor

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No ignition sources in sump  
**ISOLATE FUME CUPBOARD**  
in case of spills or fire

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**Smoothflow**  
Fume Cupboard Serial No. XXX  
Calibre Plastics Ltd  
Auckland

The label located at the bottom right corner of the sash has important user information.

1. The spill containment volume of this fume cupboard is stated on the label. The Supervisor may use this volume to limit quantities of chemicals permitted in the fume cupboard.
2. ***BEFORE*** the fume cupboard is used, the **Supervisor** is responsible for carrying out a **RISK ANALYSIS** of the work. Consider the nature of chemicals and processes to be used, to determine limiting quantities of hazardous, flammable, oxidizing and corrosive substances allowed within the fume cupboard. Remember that all liquids within the fume cupboard (including water) may displace other substances during an incident. The supervisor is to make a list of chemical quantity limits, which is to be readily accessible to all persons using the fume cupboard.
3. Ignition sources are not to be placed within the sump of the fume cupboard.
4. In the event of a spill or fire, **ISOLATE** the fume cupboard. Press the (red) “fume cupboard emergency isolator” button on the keypad. This will immediately shut off the power and flammable gas outlets. The fan will keep going. Refer operating instructions.
5. The serial number of this fume cupboard may be requested when seeking technical support, available Toll Free in New Zealand: **0800 422 542**

## GUIDELINES FOR USING FUME CUPBOARDS

The fume cupboard is a ventilated work space designed aerodynamically for the safety of the operator. It will not work properly if it is cluttered up with excess equipment or vessels, which affect the air flow.

Before starting work, clean out the fume cupboard. Remove everything which is not needed. All chemicals from the fume cupboard should be removed to a suitable store. Cleaning the internal surfaces will reduce the risk of contamination. It will also reduce the risk of mixing incompatible substances.

Before starting work, refer to the Laboratory Supervisor's risk analysis and schedule of chemical quantities permitted in the fume cupboard. Make sure that the fume cupboard is suitable for the intended use, and has enough space to do the work safely.

Adopt work methods that minimise the release of fumes. Consider appropriate quantities of substances involved, the rate of reaction, and design of apparatus.

Make sure the fume cupboard is working. Start up the fume cupboard (see operating instructions), and check the status of all alarms, especially air flow. Look around the room and close any windows or doors which could cause cross-draughts

Set up all the equipment required for the work inside the fume cupboard, with sufficient quantity of reagents. Position apparatus and materials near the centre and rear of the work space. Ignition sources are not to be placed within the sump of the fume cupboard. Check that a suitable fire extinguisher is at hand.

The fume cupboard is now ready for use.

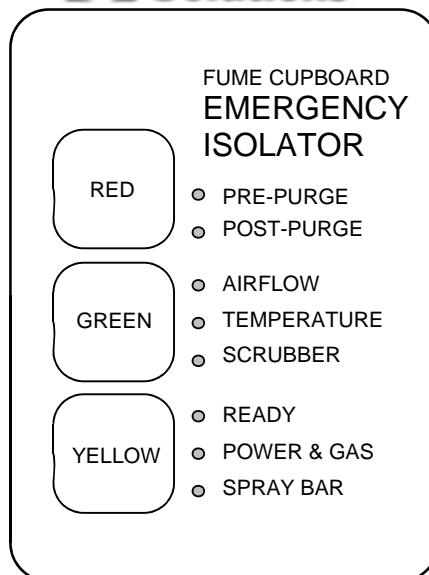
Wear protective equipment appropriate to the task.

Keep the sash lowered as much as practical during use.

In the event of a spill or fire, **ISOLATE** the fume cupboard. Press the (red) "fume cupboard emergency isolator" button on the keypad. This will immediately shut off the power and flammable gas outlets. The fan will keep going. Refer operating instructions.

After use, dispose of waste substances with due regard for their potential to create hazards, and within the rules of the local water authority. Refer also to the Laboratory Supervisor, and the laboratory risk analysis.

Maintain the fume chamber in clean condition to avoid chemical contamination and damage to the fume cupboard. Remove unused chemicals to a suitable store. Do not use a fume cupboard for storage of chemicals. Lower the sash.



## OPERATING THE FUME CUPBOARD

- Start up** Press the green button  
The fan and light turn on  
The **TEMPERATURE LED** will be green  
The controller waits 7 seconds for airflow
- Pre-purge** The **AIRFLOW LED** turns green  
The **PRE-PURGE LED** will be amber for 50 seconds then flash for another 10 seconds, then go out
- Ready** The **READY LED** turns green  
Four beeps sound
- Active** Press the yellow button  
The **POWER & GAS LED** turns green  
The fume cupboard is now operational - power & gas can be used
- Isolate / Ready** Press the red button  
Power & Gas turn off automatically  
The **POWER & GAS LED** goes out  
The **READY LED** turns green  
Press the yellow button to re-activate, or
- Shut down** Press the red button again
- Post-purge** The fan and light continue to operate  
The **POST-PURGE LED** will be amber for 4 minutes then flash for another 1 minute, then go out.  
The light and fan turn off automatically
- Re-start** Press the green button to return from post-purge to pre-purge

## FAULT ALARMS

If the **Power** is cut, an alarm will sound a slow beep

The **READY LED** will flash red

Press the red button to mute the alarm

A long beep will sound as the controller shuts down.

When the **Power** is restored,

The fan will automatically turn on for 20 minutes then turn off;

An alarm will sound for 30 seconds, then turn off

The **LED's** will keep flashing.

Press the red button to reset the controller and stop the fan.

Press the green button for normal start up.

If the **Airflow** gets low

An alarm will sound , and the **AIRFLOW LED** will flash

Press the red button to mute the alarm

The fume cupboard will go into normal post-purge,

but the **AIRFLOW LED** will be red

Check out what caused the alarm.

Get it fixed before using the fume cupboard again.

If the **Temperature** inside the fume cupboard gets high

The **TEMPERATURE LED** will flash green as a warning

Turn down the heat inside the fume cupboard

If the temperature inside the fume cupboard gets higher

An alarm will sound , and the **TEMPERATURE LED** will flash

Press the red button to mute the alarm

The fume cupboard will go into normal post-purge,

but the **TEMPERATURE LED** will be red

Check out what caused the alarm.

Get it fixed before using the fume cupboard again.

The temperature sensor works even when the fume cupboard is turned off.

Press the red button to mute the alarm

**TECHNICAL SUPPORT FREEPHONE 0800-422-542**



## **TROUBLE SHOOTING**

### **No power at power socket**

Power is made available to the socket outlet only during “Active” status. Refer operating instructions. After the pre-purge is complete and the Ready LED lights up green, press the yellow button to activate the power outlet.

If the Power & Gas LED is lit up and there is still no power, check the RCD breaker (the blue switch visible in the lid of the control box on top of the fume cupboard).

When it is on, the switch lever is inclined toward the back of the fume cupboard. If the switch will not latch on, there is an electrical fault in the circuit. Call an electrician.

### **No gas at gas outlet**

Gas is made available to the outlet only during “Active” status. Refer operating instructions. After the pre-purge is complete and the Ready LED lights up green, press the yellow button to activate the gas outlet.

If the Power & Gas LED is lit up and there is still no gas, check the RCD breaker (the blue switch visible in the lid of the control box on top of the fume cupboard).

When it is on, the switch lever is inclined toward the back of the fume cupboard. If the switch will not latch on, there is an electrical fault in the circuit. Call an electrician.

If the power socket is live but there is still no gas, the gas mains may be isolated. Some laboratories have a master gas isolator.

### **Controller does not respond to keypad**

If the control sequence has become corrupted, the controller needs to re-load the program from memory, which happens automatically on power restore.

The mains isolator switch is visible in the lid of the control box on top of the fume cupboard. The mains isolator is the switch on the left. When it is on, the switch lever is inclined toward the back of the fume cupboard.

Turn off mains supply to the fume cupboard controller. Wait 5 seconds, then turn the mains isolator on again. The processor will reboot, and signal a power restore alarm (see operating instructions) Press the red button to reset the controller, and start the fume cupboard as normal.

## **MAINTENANCE**

BEFORE undertaking any maintenance of the fume cupboard, obtain a summary of chemical or other hazards from the laboratory supervisor

BEFORE undertaking any maintenance of the duct or fan, isolate the power supply and tag the fume cupboard “system under maintenance - do not use”

### **Monthly Maintenance**

Remove all chemicals and equipment from the fume chamber.  
Remove the rear baffles as described in Section 3 of this manual  
Clean the fume chamber with dilute detergent  
Replace the baffles

Test the RCD (earth leakage) circuit breaker  
Refer to “Features” Section of this manual for location of the RCD.  
Press the blue “Test” button. The breaker should immediately trip “off”  
Reset the breaker to the “on” position.

### **Six Monthly Maintenance**

In addition to monthly tasks, clean the fluorescent light tube, and the light panel in the roof of the fume chamber.

Inspect and maintain fans, motors, drive belts and bearings  
Check all plastic bolts, and replace if UV-brittle.

Perform smoke and velocity tests as AS/NZS 2243.8 Appendices F and E  
Submit a maintenance and test report to the laboratory supervisor

### **Annual Maintenance**

In addition to six monthly tasks, carefully inspect the fume chamber for defects, and repair as required.  
Check the sash counterweight cords for wear.  
Ensure that service controls and outlets are in good condition.  
Check operation of controller and automatic isolators.

Replace 9V battery for power failure alarm  
Refer to “Features” Section of this manual for location of the battery.  
Lift and pull the battery drawer on the front of the control box.  
Observe polarity carefully when fitting the new battery.  
Close the battery drawer.

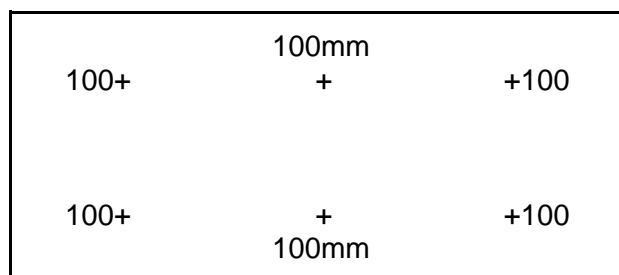
Inspect the exhaust duct from fume chamber to stack  
Assess the whole system for compliance with AS/NZS 2243.8  
Perform smoke and velocity tests as AS/NZS 2243.8 Appendices F and E  
Submit a maintenance, audit and test report to the laboratory supervisor.  
Affix a label to the fume cupboard showing date of inspection and overall test result.

## COMMISSIONING

Refer the operating instructions  
Turn the power on and reset the controller.  
Start the fume cupboard.  
If the airflow alarm goes off, mute the alarm.

### Measure the airflow

Raise the sash to the maximum operating position (sash stop)  
Measure the air velocity in the plane of the sash at six (6) positions



The average velocity must be more than 0.5 m/sec. We recommend commissioning to 0.55 m/sec. Adjust the fan speed as below.  
Record the velocity measurements in a commissioning report.  
Conduct a smoke test (AS/NZS 2243.8) and record the observations.

### Adjust the fan speed (Fumeflow D250 fan with Danfoss VLT):

The Fumeflow D250 fan is usually installed above the roof, and the Danfoss variable frequency drive should be mounted adjacent to the fume cupboard.  
Adjust parameter 3-11 (jog speed) of the Danfoss VLT  
Make sure the Danfoss VLT has "Auto On" selected.

### Adjust the airflow alarm sensor (pressure switch):

The pressure switch is mounted in the lid of the fume cupboard controller.  
Adjust the white plastic cross-head screw clockwise to raise the set point (more sensitive) or anticlockwise to reduce the set point (less sensitive).

A practical guide:

1. Turn the set point up until the Airflow alarm sounds
2. Press the red button to mute the alarm.
3. The Airflow LED should still be red.
4. Turn the set-screw down until the LED turns green.

To check the alarm, pull the clear PVC pilot tube out of the duct.  
The alarm should sound after 2-3 seconds.  
Ensure the pilot tube is re-fitted in the duct.