



T400

Mobile Fume Cabinet
For use in Schools and Colleges



Operators Manual

Issue 04 – August 2010



CE Marking certifies that this equipment conforms to the following EEC directives: -
Low Voltage Equipment – 72/23/EEC & 93/68 EEC
Electromagnetic Compatibility – 89/336/EEC



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Certificate No: 0954499

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INTRODUCTION

The Labcaire T300D/T400D is a recirculatory fume cabinet, which has been designed for use in Educational Establishments and requires no connection to ducting.

The cabinet has clear glazing all round and when fitted with the particulate pre-filter, Activated Carbon fume filter and used with the door in the CLOSED position, conforms to the requirements of DFE Design Note 29 and BB88. The cabinet will satisfactorily absorb the substances released in normal education activities up to 'A' Level, namely those listed in Section 7.

Filters have a high efficiency but, because the nose is very sensitive, the residual gases passing through the filter may sometimes be noticed, even though their level is not hazardous. However, should they cause distress, the operation should be finished and the filter saturation monitored.

During use the filters will absorb chemicals and particulates and the cabinet must be inspected at least every 14 months to ensure it is operating satisfactorily and to comply with C.O.S.H.H. regulations (Control of Substances Hazardous to Health). A low airflow alarm is fitted to indicate when the pre-filter requires changing.

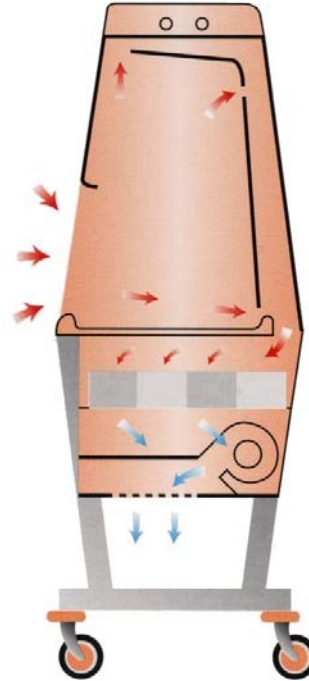
Please keep this manual in an accessible but secure place. Further copies are available from Labcaire if required.



PRINCIPLES OF OPERATION

The fan draws air through the front of the cabinet and the slots at the lower, middle and top of the cabinet ensure fumes lighter or heavier than air are drawn down through the filters. The design of the baffle panel ensures that pockets of gas cannot build up inside the cabinet.

The ED. Filter must be fitted Labcaire part No. (LA-3416).





SPECIFICATION

The cabinet is constructed of Zintec coated steel epoxy powder coated for maximum corrosion protection. All glazing is in 6mm clear acrylic with polished edges. The unit is mobile with 2 locking front castors.

The work surface is manufactured from fibreglass with integral moulded sink if water services are specified.

Face Velocity	> 0,4 m/sec min
Lighting	> 700 Lux at work surface
Noise	< 55 d(B) A
Volume Air Flow	> 350 m ³ /HR
Aperture Size	Average width 700mm Average height 400mm to work surface



INSTALLATION

The machine will be supplied ready assembled and with a correctly fused mains 3 pin plug fitted. The filter and pre-filter will be fitted into the unit at Labcaire Systems, (Plug Fuse is 5A)

The cabinet will be tested at Labcaire and a test certificate supplied. Since damage could occur in transportation, the cabinet filters should be checked before use i.e. the pre-filter and main filter is in the correct position. The cabinet should be checked before use for airflow and efficiency of filter seal.

IMPORTANT

THE APPLIANCE MUST BE CORRECTLY EARTHED. THE CABINET USES THE EARTH IN A NORMAL 13amp SOCKET.

SERVICES - OPTIONAL

If the cabinet is ordered with gas and water services the hoses will be stored inside the services module - accessed through the panel on the right hand side.

The services are connected using the quick-release fittings.

NOTE

All gas connections should be checked by a Registered Gas Engineer prior to use. See Appendix B for full details and an installation drawing.



CONTROL PANEL

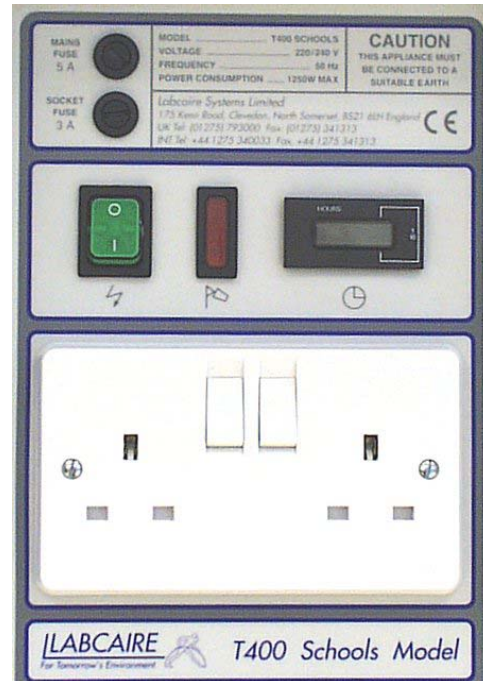
THE FUME CUPBOARD IS FITTED WITH THE FOLLOWING INSTRUMENTATION AND CONTROLS:

- 1) Mains on/off rocker switch - Green Illuminated
- 2) Light switch
- 3) Operating hours display counter
- 4) Low airflow alarm

The unit is started by switching on the mains rocker switch and the light switch. The low airflow alarm warning light will indicate an alarm for a few seconds until the fan has reached it's normal operating speed.

If the warning light is flickering or remains on constantly, this can indicate the filters require attention or possibly the alarm needs re-calibrating - see section 6 on maintenance.

The saturation of the filter and the airflow must be checked at routine intervals - see monitoring.





OPERATION AND SAFE USE

SITING OF FUME CUPBOARD

The siting of the fume cupboard is important and since this model is mobile, it should be checked in all potential locations of use.

A safe siting is:

- (A) Away from any cross draughts from doors, open windows, ventilation outlets etc.
- (B) Not adjacent to side walls and not within a wall 2m from the front of the cabinet.
- (C) Not impeding any fire safety exit points.

SASH ARRANGEMENT

To meet the recommendations of Design Note 29 and to ensure safety, hazardous gases or vapors should not be released in this cupboard unless the flaps are down.

Flaps should only be lifted to install apparatus or for cleaning.

NOTE

The sash can be retained in the open position if required using the location holes in the glazing and the studs on the top of the head unit.



PRECAUTIONS DURING OPERATION

- A) Remove unwanted apparatus etc from the fume cupboard.
- B) Switch cabinet on and verify ventilation system is functioning.
- C) Prior to release of hazardous gases or vapours, as far as possible, install apparatus and check service connections for leaks etc.
- D) Wear eye protection whilst using the cabinet.
- E) Ensure flaps are fully down before releasing hazardous vapours or gases.
- F) A Bunsen Burner should not be placed within 150mm of the sides or back of the cabinet and the flame kept below 100mm high.
- G) The operator should move their arms carefully so as not to draw fumes out of the cabinet.
- H) The fume cupboard is designed for normal experimental release rates and should not be used for boiling off large quantities of acids or solvents.
- I) Please consult Labcaire before using cabinet outside normal schools curriculum.
- J) The cabinet should not be switched off at the end of an experiment until the cabinet has purged itself of fumes.

SPILLAGES

Spillages should be mopped up immediately with absorbent granules.

NOTE

Absorbent cloths should not be used as they can increase the evaporation rate of Solvents.

The fiberglass tray is resistant to most chemicals but spillages should be quickly dealt with to avoid staining.



FILTERS

The filtration system is mounted inside the cabinet underneath the work surface.

PARTICULATE PRE FILTER

The particulate pre filter (white fibrous cloth) is mounted on top of the carbon filter and secured with a frame.

This filter removes dusts, mists and smoke although the smallest particles (below 0,5 micron) will pass through. The filter prevents these contaminants being recirculated back into the laboratory as well as preventing the main carbon filter from becoming blocked.

MAIN ACTIVATED CARBON FILTER

The filter is of large capacity (22kg of carbon) and will retain and absorb chemicals.

The formulation of the schools filter has been specially selected to give good absorption of the main chemicals in use in the schools curriculum and to give an extended filter life.

Typical Efficiency percentages for chemicals used in schools:

Ammonia	99%
Bromine	99%
Carbon Tetrachloride	99%
Chlorine	99%
Ethanol	99%
Ethoxyethane	99%
Hydrochloric Acid	99%
Hydrogen Sulphide	99%
Methanal	99%
Sulphur Dioxide	99%
Sulphuric Acid	99%
Trichloroethane	99%
Trichloroethylene	99%

Hydrogen, methane, carbon monoxide and nitrogen monoxide will not be absorbed by the Activated Carbon filter on account of their low molar mass. However, in schools and if produced in small amounts, eg emitted from a test tube, then there is sufficient dilution by the incoming air to render the exhaust gas relatively harmless.



It should be noted that certain chemicals such as ammonia and Hydrogen Sulphide have a disagreeable odour at concentrations well below the O.E.S. (Occupational Exposure Standard).

The cabinet will be fitted with a Label detailing the chemicals in the Schools Curriculum.

INORGANIC

aluminium chloride and bromide
ammonia
ammonium chloride fumes
bromine
chlorine
chromium (VI) dichloride dioxide
(chromyl chloride)
hydrochloric acid vapour
hydrogen chloride
hydrogen sulphide
iodine
iodine chlorides
lead fumes
lead bromide fumes
mercury and its compounds
nitric acid vapour
acidic nitrogen oxides
phosphine
phosphorus (white)
phosphorus chlorides and bromides
phosphorus oxides
silicon tetrachloride
sulphur chlorides
sulphur dioxide
thionyl chloride
tin (IV) chloride
titanium tetrachloride
zinc chloride fumes

ORGANIC

acid amides
acid anhydrides
acid chlorides
alcohols
aldehydes
aliphatic amines and
their salts
aliphatic hydrocarbons
aromatic amines and
aromatic hydrocarbons
aromatic nitro compounds
carboxylic acids
esters
ethers
ketones
nitriles
organo halogens
phenols
pyridine

Dusts, etc

dyes
enzymes
smoke



FILTER REMOVAL AND FITTING

The filters are easily accessed from the front of the base section by turning the catches through 180 degrees. The filter can be slid out (ready for disposal) and can be changed in the school laboratory.

CAUTION

- a) **Used filters should only be handled when wearing rubber gloves.**
- b) **Used filters should be sealed inside a polythene bag for disposal by incineration or with your normal laboratory non-hazardous waste.**
- c) **The carbon filter is high capacity and heavy (22kg) it is recommended that two people fit the filter.**

FITTING THE FILTER

The main filter should be removed from the polythene wrapping and after checking the filter identity (Labcaire part No LA-3416) slide back into the locating frame. Care should be taken that the filter seal is in a good condition prior to assembly and that no damage occurs to this seal during the assembly process.

The filter seal MUST be on the bottom face of the filter for assembly purposes.

It is important that the filter is shaken from side to side in the horizontal plane (filter seal underneath) before fitting. This will equalise the carbon granules in the filter.

Silicone grease on the seal face will help assembly and sealing.

The pre-filter (Labcaire part No. LA-3413) is placed into the locating frame and placed on top of the carbon filter. The pre-filter will require replacement more frequently than the main carbon filter.



DATE OF INSTALLATION

Record the date of installation on the filter label for future reference.

The access panel can now be refitted using the 180 degree turn fasteners.
The filter should be checked with a chemical challenge before use. Trichloroethane is suitable for this purpose with appropriate gas detection tube.

NOTE: THE PANEL CANNOT BE REFITTED IF THE FILTER HAS NOT BEEN FULLY INSERTED.

FILTER PART Nos.

	MAIN	PRE-FILTER
T300	LA1816	LA1813
T400	LA3416	LA3413



MONITORING

This fume cupboard is a portable appliance, powered by mains electricity and must meet the requirements of the Electricity at Work Regulations 1989. As for other such appliances, the correct fuse should be fitted to the mains plug and this and other exposed parts of the electrical system should be examined frequently for obvious damage. There should be regular formal inspections, including earth bonding and insulation testing.

It is a requirement of the COSHH Regulations that this fume cupboard should be monitored every 14 months. In particular, the **face velocity** and **filter efficiency** need checking. (The calibration of the airflow detectors should be checked.) If the fan motor is vibrating, it requires attention from LABCAIRE.

(If there are gas and water supplies, these should be checked, particularly the hoses and connectors; so also should the drainage system).

Labcaire has a Service Department and can carry out the monitoring. Please contact Labcaire for details of the contracts available. The notes below are for the benefit of customers who wish to do their own.

A rotating-vane airflow meter with vane diameter between 60 and 100mm and with a facility for **averaging readings over periods of 10 seconds** is suitable. A unidirectional hot-wire airflow meter with the same facility is also suitable but is more expensive.

A gas detection kit consists of a disposable tube used with a special hand pump which draws a measured volume of air through the tube. The length of the colour change within the tube indicates the concentration of the gas tested. This equipment is available from Labcaire.



INSTRUCTIONS FOR FACE VELOCITY MEASUREMENTS

Procedure

1. Imagine the face of the fume cupboard divided into nine cells.

Stand as far as practicable from the fume cupboard with the sensing head **in the plane of the sash** and take airflow readings at approximately the centres of the nine cells.

2. Record for each cell the approximate average reading over a period of at least ten seconds, applying any correction from the calibration chart. See form on Page 22
3. Look at the table and repeat any reading which seems to be very different from the general pattern. Record the average of this and the previous reading.

Calculation Minimum face velocity

Record which of a,b,c,d,e,f,g,h,i, is the smallest. i.e. record the minimum face velocity.

Is it above or below 0.3 m s^{-1} ? If below, the fume cupboard **fails**.

Variation

(Useful for checking if sites are suitable)

Add a,b,c,d,e,f,g,h,i and divide by 9 to get the average.

Find the highest and lowest out of a,b,c,d,e,f,g,h,i.

Work out; highest minus average. Divide the answer by the average and multiply by 100 to obtain the upper percentage variation.

Work out; average minus smallest. Divide the answer by the average and multiply by 100 to obtain the lower percentage variation.

Is each of these less than 30%? If not, the site of the fume cupboard is not suitable. Is the failure due to cross draughts, the nearness of walls etc.



INSTRUCTIONS FOR FILTER SATURATION TESTING OF FILTER FUME CUPBOARDS

Electronic detectors for monitoring filter saturation have not yet been shown to be sufficiently reliable for the range of gases used in school science therefore chemical tests are needed.

Pre-filter

The purpose of this filter is to absorb dust, smoke and mists. It is a layer of white Filtrete through which air passes before reaching the main filter. As it becomes clogged, the face velocity reading of the fume cupboard will fall.

Main filter

The purpose of this filter is to absorb hazardous gases.

Frequency of saturation testing

As there are strict limits to the concentrations of hazardous gases in which air could be breathed, it is necessary to test the efficiency of the filter regularly. Further, it is prudent to conduct an initial test to ensure that the filter is seated properly and that its contents have not been displaced in transit. It is sensible to test for this every time the filter is replaced.

What test to carry out

In normal school use, the layer of the filter treated to absorb acid gases will almost certainly saturate first. Therefore, it is recommended that the only test needed is one using an acid gas. The trichloroethylene test is an alternative test useful for testing filter seating.

The general procedure

This involves releasing a gas, eg, sulphur dioxide, inside the fume cupboard at a known rate and comparing that rate with the concentration of gas in the air coming out of the exhaust. A gas detection kit is used to measure the concentration of the gas emitted in the fume cupboard exhaust.



TESTS FOR SATURATION BY ACID GASES

Method using a canister

This method has ceased to be practicable because canisters of sulphur dioxide are no longer readily available. It is included because contractors may prefer to use a similar method using small cylinders. Schools may prefer to use the burning sulphur method; see below.

The canister providing the sulphur dioxide is weighed before and after some gas has been released inside the fume cupboard for a measured time, enabling the rate of release to be calculated. The rate of flow is set first by observing the gas displacing water into a measuring cylinder. The concentration of sulphur dioxide in the exhaust is measured with a gas detection tube, as described above.

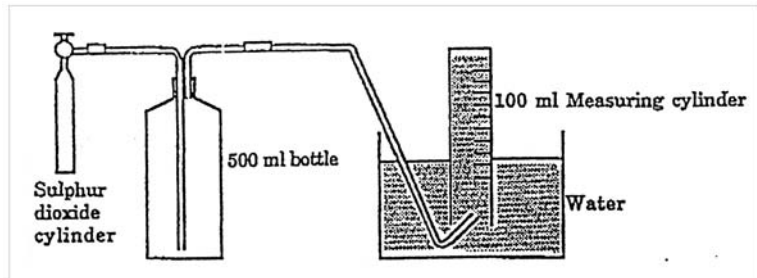
Items required are a gas detection kit, a sulphur dioxide canister (TOXIC), a balance weighing to 0.1 g or less, a stop clock plus the glassware shown on the next page.

Wear eye protection

Sulphur dioxide is a toxic gas, so do not breathe it in.



SETTING THE RATE OF FLOW OF SULPHUR DIOXIDE



1. Find the mass of the sulphur dioxide canister (M_1 g)
2. Set up the apparatus in the fume cupboard, as shown above. Switch the fume cupboard on.
3. Open the valve on the gas canister very slowly. When bubbles appear in the measuring cylinder, start the stop clock. Adjust the valve so that 100ml of gas bubbles into the measuring cylinder during a period of between 10 and 20 seconds.
4. Without touching the valve, break the connection between the canister and the apparatus.
5. After 60 seconds take a reading of the concentration of sulphur dioxide in the exhaust gas with the gas detection kit with a suitable tube³. (A slight smell of sulphur dioxide should be ignored but, if the exhaust gas causes breathing difficulties, stop the test).
6. Close the valve on the gas canister and stop the clock, noting the time of the run (t seconds).
7. Find the mass of the sulphur dioxide canister (M_2 g).

Calculation

$$\text{Rate of release of sulphur dioxide} = \frac{(M_1 - M_2) \times 750}{t} \text{ cm}_3 \text{ s}^{-1}$$

Now check your results with Table

Filter efficiency

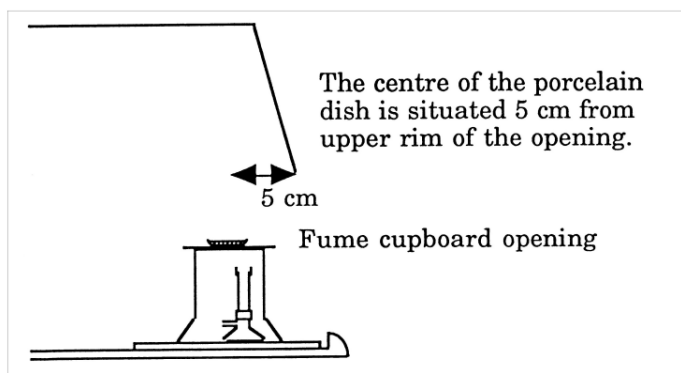
Compare your value of the rate with the concentration of sulphur dioxide in the exhaust gas. If the concentration of sulphur dioxide is **greater** than the value in the table then a new filter is required⁴.



SAFE FILTER EFFICIENCIES FOR SULPHUR DIOXIDE

Rate of Sulphur Dioxide Released ($\text{cm}^3 \text{ 5}^{-1}$)	Maximum Permitted concentration of sulphur dioxide in the exhaust gas (ppm)
5	1
10	2
15	3
20	4
25	5
30	6

Method using burning sulphur



This method can be used if sulphur dioxide in a small cartridge or cylinder, which can be weighed, cannot be obtained at a reasonable price. The rate of release of sulphur dioxide is calculated by weighing the vessel containing the sulphur before and after it has burned for a measured time. It is satisfactory provided a) the Bunsen burner is turned off once the burning of sulphur starts and b) the apparatus is sited as far forward in the fume cupboard as possible, as shown in Figure 5.2, to obtain complete combustion⁵.

The items required are powdered roll sulphur (1150-200gm), a balance weighing to 0.1 g or less, a flat bottom porcelain evaporating basin, a gas detection kit for Sulphur Dioxide, a stop clock, a Bunsen burner, two gauze squares both with ceramic circular centres, a tripod, a heat-proof mat and a ruler. Wear eye protection. Sulphur dioxide is a toxic gas, so do not breathe it in.

1. Powder roll sulphur in a mortar with a pestle.
2. Fill a porcelain flat-bottom evaporating basin with the sulphur so that it is with the rim.
3. Weigh the porcelain basin, the sulphur and one of the gauzes (M_1 g).



4. Set up the Bunsen burner, tripod, the **other** gauze and the evaporating basin on a heat proof mat so that the centre of the basin is **5 cm inside the upper rim of the aperture**. (This places the sulphur in the maximum incoming draught and encourages complete combustion).
5. Switch on the fume cupboard.
6. Light the Bunsen burner with the gas tap half-open and the collar open enough so that the flame is non-luminous. (The incoming draught may require you to place the burner a little more forward than under the centre of the basin. (Figure 5.2)
7. The sulphur melts slowly to a pale amber liquid. Extreme care is now required not to knock the tripod base with your hands or the Bunsen burner; molten sulphur can cause severe burns. Remove the Bunsen burner from under the gauze and adjust the collar so that it is half-open. Place it back under the gauze very carefully. (The liquid will quickly darken. Changes in the appearance of the liquid surface indicate that burning is about to start. Sulphur catches light with a blue flame).
8. Start the stop-clock when half of the surface of sulphur has caught alight. **Immediately turn off the Bunsen burner at the gas tap**. (The flame above the sulphur has two coloured areas, the inner brown flame of incomplete combustion and the outer flame of complete combustion. Extinguishing the Bunsen burner causes the area of brown flame to diminish leaving the blue flame).
9. After 60 seconds, take a reading of the concentration of the sulphur dioxide being emitted through the exhaust with a gas detection kit⁸. A slight smell of sulphur dioxide should be ignored but, if the exhaust gas causes breathing difficulties, stop the test).
10. Place the other gauze (which was used in the weighing) on top of the basin and stop the clock, noting the time (seconds). (The gauze puts out the flame but some sulphur condenses onto it, which is why it should be included in the weighing).
11. When the sulphur has cooled down for about 20 minutes and solidified, reweigh the basin, the remaining sulphur and the gauze (M 2 g).

The sulphur and dish may be kept and used the next time the test is carried out. A Little more powered roll sulphur may need to be added to make up for any lost in the previous burning.

Calculation

$$\text{Rate of release of sulphur dioxide} = \frac{(M_1 - M_2) \times 750}{t} \text{ cm}^3 \text{ s}^{-1}$$

Now check your results with Table.



TEST FOR SATURATION BY ORGANIC GASES

Method using trichloroethylene

Since in normal school use a filter is most likely to saturate with acid gases long before it saturates with organic vapours, this test has only a limited use. It is an alternative test for seeing whether a filter is properly seated, and the seals round it are effective. The rate of release of trichloroethylene vapour is calculated by weighing a vessel containing trichloroethylene liquid before and after it has been boiled for a measured time.

Items required are a gas detection kit⁷, trichloroethylene, anti-bumping granules, a balance weighing to 0.1 g or less, a stop clock, a 100ml conical flask with a bung, about 25ml of cold water in a 250ml beaker, a Bunsen burner, tripod and gauze square. (A hot plate is a suitable alternative).

NOTE:

Trichloroethylene is classified as **HARMFUL** and possibly has carcinogenic effects, but there is inadequate evidence for a satisfactory assessment.

1. Pour about 25ml of trichloroethylene into the conical flask, add a few anti-bumping granules, attach the bung and find the overall mass (M_1 g).
2. Set up the Bunsen burner, tripod and gauze in the fume cupboard and light the gas. Switch on the fume cupboard, remove the bung from the flask and place the flask on the gauze.
3. As the trichloroethylene begins to boil, the vapour condenses on the cooler parts of the flask forming a boundary line. When the boundary reaches the top of the flask, start the stop clock.
4. After 60 seconds, take a reading of the concentration of trichloroethylene in the exhaust gas, using a gas detection kit with a suitable tube⁷.
5. Turn off the Bunsen burner. Place the conical flask (**Care necessary as the glass is hot**) into the beaker of cold water in the fume cupboard and replace the bung. Stop the clock, noting the time of the run (t seconds).
6. After 3 minutes, remove the flask from the water, dry the outside of the conical flask and find the mass of the flask, contents and bung (M_2 g).



Calculation

Rate of release of trichloroethylene vapour =

$$\frac{(M_1 - M_2) \times 183}{t} \text{ cm}^3 \text{ s}^{-1}$$

Now check your results with the table.

Filter efficiency

Compare your value of the rate with the concentration of trichloroethylene vapour in the exhaust gas. If the concentration of trichloroethylene vapour is **greater** than the value in the Table, the filter is not properly seated or a new filter is required⁸.

Safe filter efficiencies for trichloroethylene

Rate of Sulphur Dioxide Vapour Released ($\text{cm}^3 \text{ s}^{-1}$)	Maximum Permitted concentration of trichloroethylene in the exhaust gas (ppm)
10	4
15	6
20	9
25	11
30	13
35	15
40	18
45	20



NOTES

1. Guidance is given in the HSE's Guidance Note GS23 Electricity in Schools, revised 1990, from HSE books.
2. Equipment can be obtained from either Detectawl Ltd, 2 Cochran Close, Crownhill, Milton Keynes, MK8 OAJ (Gastec) or from Draeger Ltd, Ullswater Close, Kitty Brewster Industrial Estate, Blyth, NE24 4RG.
3. Use either a Gastec Precision Pump with a sulphur dioxide tube 5Lb (Low range, 0.05-10 ppm) or a Draeger Gas Detection Pump with a sulphur dioxide Draeger tube 0.5/a (0.05-25 ppm). See reference 7.
4. This assumes that the efficiency of the filter has fallen to 98% for sulphur dioxide; at this level, the fume cupboard will still not emit a dangerous level of gas in a well-ventilated laboratory.
5. SSERC earlier developed a similar method, See 'Monitoring of recirculatory filters', Science and Technology Bulletin (177), June 1993 from SSERC.
6. Available from Griffin and George, Cat No BHW-300-010 V (63mm diameter x 13mm) or Cat No BHW-300-030 P (80 mm diameter x 20mm) or Philip Harris, Cat No R25900/5 (75mm diameter x 20mm) or Cat No R25902/9 (93mm diameter x 25mm).
7. Use either a Gastec Precision Pump with a trichloroethylene tube 132L (low range 1 - 50 ppm) or a Draeger Gas Detection Pump with a trichloroethylene tube 2/a (2 - 200 ppm)
8. This assumes that the efficiency of the filter has dropped to 96% for organo halogens; at this level, the fume cupboard will still not emit a dangerous level of any organic vapour a school is likely to use in a normal sized laboratory.



SERVICING

Whilst schools can carry out their own monitoring, an annual service by a Labcaire engineer is recommended and will cover the following points:-

Airflow check with new pre-filter fitted.

Filter condition check by chemical testing.

Re-calibration of the low airflow alarm.

Inspection of electrical components, lighting cables etc.

Earth bonding of electrical components.

Cleaning and checking the condition of the glazing, hinges, castors etc.

Issuing of a test report complete with an airflow certificate.

Examination of services if fitted. The gas supply line must be checked carefully for leaks and damage.

LABCAIRE have a national team of service engineers who can offer a comprehensive service at very competitive rates on all types of equipment from air purifiers to clean rooms.



FAULT FINDING

WARNING 240V - ONLY QUALIFIED PERSONNEL TO CHECK ELECTRICAL CIRCUIT AND COMPONENTS.

1. Unit will not switch on fan or lighting circuit.

CHECK:

- a) Main fuse in plug and that electricity is turned on at the mains switch.
- b) Circuit breaker in Head unit.
- c) Condition of mains inlet cable

2. Lighting Fault on one or both lights.

CHECK:

- a) Circuit breaker by mains inlet cable.
- b) Starter switches inside Head unit - access is via top cover.
- c) Replace fluorescent tube/starter inside the Head unit.

3. Fan off but Lights on

CHECK:

- a) Circuit breakers on Head unit by mains inlet cable.
- b) SWITCH OFF - Allow unit to cool (if warm) and restart. If fan now starts then the thermal overload in the fan has been tripped.
- c) Failure of fan or fan capacitor - contact LABCAIRE for replacement items.

4. Low Airflow Alarm

a.) Warning light does not illuminate briefly at start up.

CHECK:

- a) Calibration
- b) Indicator Lamp



b.) Warning light does not go off after start up.

CHECK:

- a) Filter seals
- b) Fan Failure
- c) Calibration

c.) Warning light comes on, goes off, and then comes on and flickers after start up.

CHECK:

- a) Condition of particulate pre filter - replace if required.
- b) Calibration of pressure switches.

5. *Filter Saturation Alarm if fitted (See Optional Services)*

Warning light on.

- (a) Reduce/stop chemical challenge.
- (b) Replace main filter.
- (c) Check filter seal (after fitting new filter)
- (d) Recalibrate alarm. (contact Labcaire for assistance)



MAINTENANCE

WARNING - Removal of the right hand side panel will expose electrical contacts. Disconnect electrical supply before opening.

1. FILTERS

Particulate pre filter - This filter will need changing if the airflow drops below 0.3 m/sec. The low airflow alarm will indicate when changing is required.

2. CARBON FILTER

The carbon filter will need testing every 14 months and after a major spillage has occurred, which may have saturated the filter, please see section on monitoring and section on Filters.

3. LIGHTING

The starters and tubes are accessible through the access panel on top of the unit. The unit **MUST** be disconnected from the mains before opening the panel. The lights are protected by a circuit breaker.

4. LOW AIRFLOW ALARM

Two pressure switches are fitted between the fan and filter to detect too low or too high a vacuum. The low vacuum switch indicates that there is a lower than normal pressure and can be due to fan failure or the filters not sealing. During use, the pre-filter will gradually block and this will increase the vacuum in the plenum chamber. When the vacuum reaches a pre-determined level, the red indicator will be illuminated.

CALIBRATION OF AIRFLOW ALARM

- a) Insert new particulate pre filter into the cabinet.
- b) Switch on and leave for a few moments to allow airflow to stabilise.
- c) Remove the right hand end panel adjacent to the mains in cable, to expose the pressure gauge.

WARNING - This will expose contacts at **MAINS VOLTAGE** and only qualified personnel must perform this calibration.



- d) Switch unit off and open the filter access panel (lower front). Partially cover the filter with paper (approx. 75% of the area) and replace the panel to check the airflow. The area of paper requires adjusting until the airflow through the aperture reduces to 0.3m/sec.
- e) Remove the transparent cover off the pressure gauge and slowly rotate until warning light flickers and then adjust further until light is almost continuously on.
- f) Switch off and remove paper from the filter in the filter box.
- g) Replace the access panel.
- h) Check the face velocity has returned to give an average above 0.3m/s and then return the unit to service.

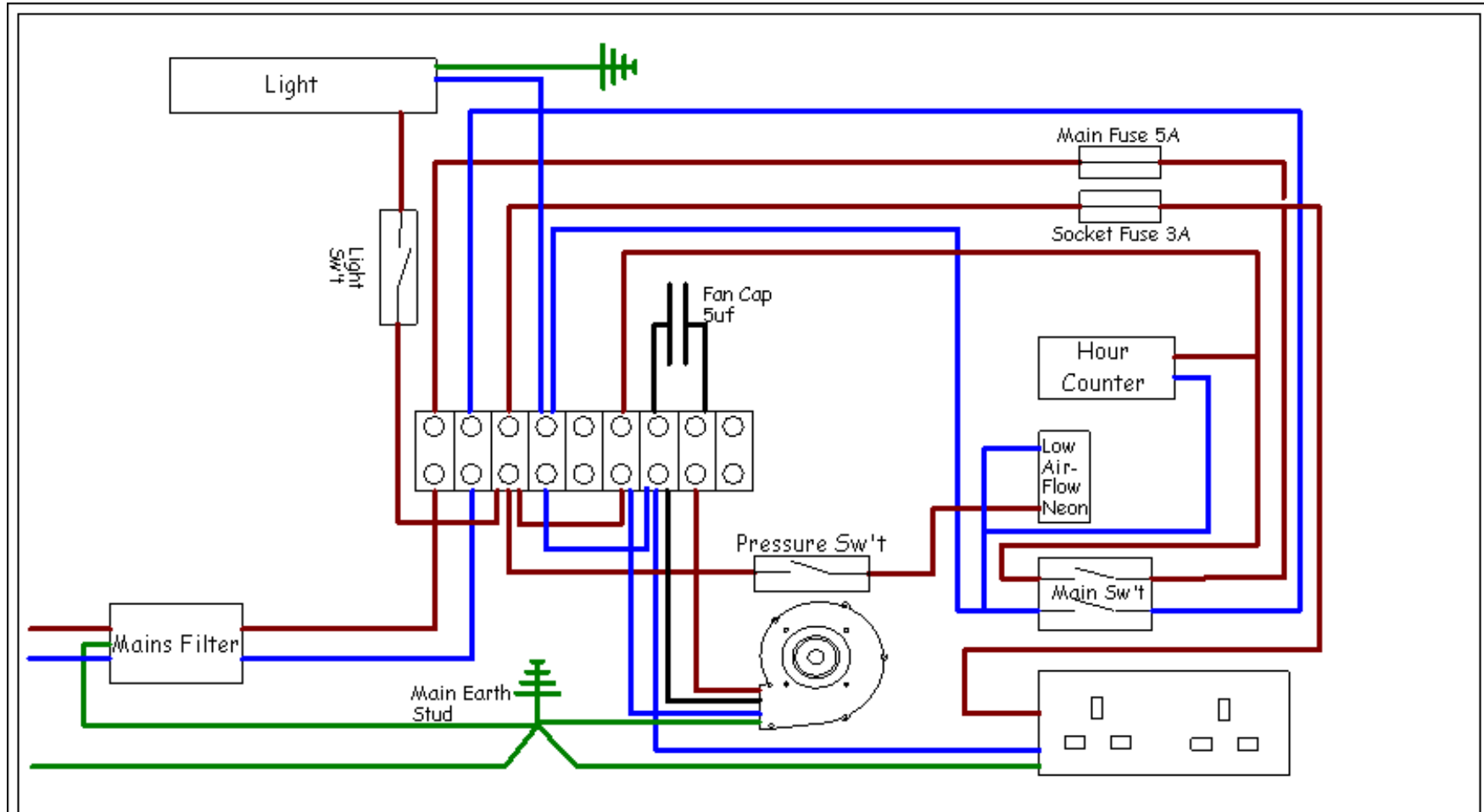
5. FAN

The fan requires no normal maintenance. A thermal cutout is fitted into the wiring of the fan to prevent overheating. This will reset on cooling but the cause of overheating should be investigated.

6. ENCLOSURE

- a.) The Glazing Panels etc. should be examined for mechanical damage and the condition of the friction hinges checked. ADJUST AS REQUIRED.
- b.) The spillage tray and glazing should be cleaned with a dilute detergent solution.

T400 - ELECTRICAL WIRING SCHEMATIC



LABCAIRE

For Tomorrow's Environment



175 Kenn Rd, Clevedon, Somerset, BS21 6LH.
UK Tel. (01275) 793000 Fax: (01275) 341313

MATERIAL		N/A		FINISH	
PRIVATE & CONFIDENTIAL				TITLE	
DRAWN G.B.	DATE 09/10/98	CHECKED		T400	
DIMENSIONS IN mm		SCALE N/A		PRODUCTION DRAWING No	ISSUE
					B



OPTIONAL SERVICES

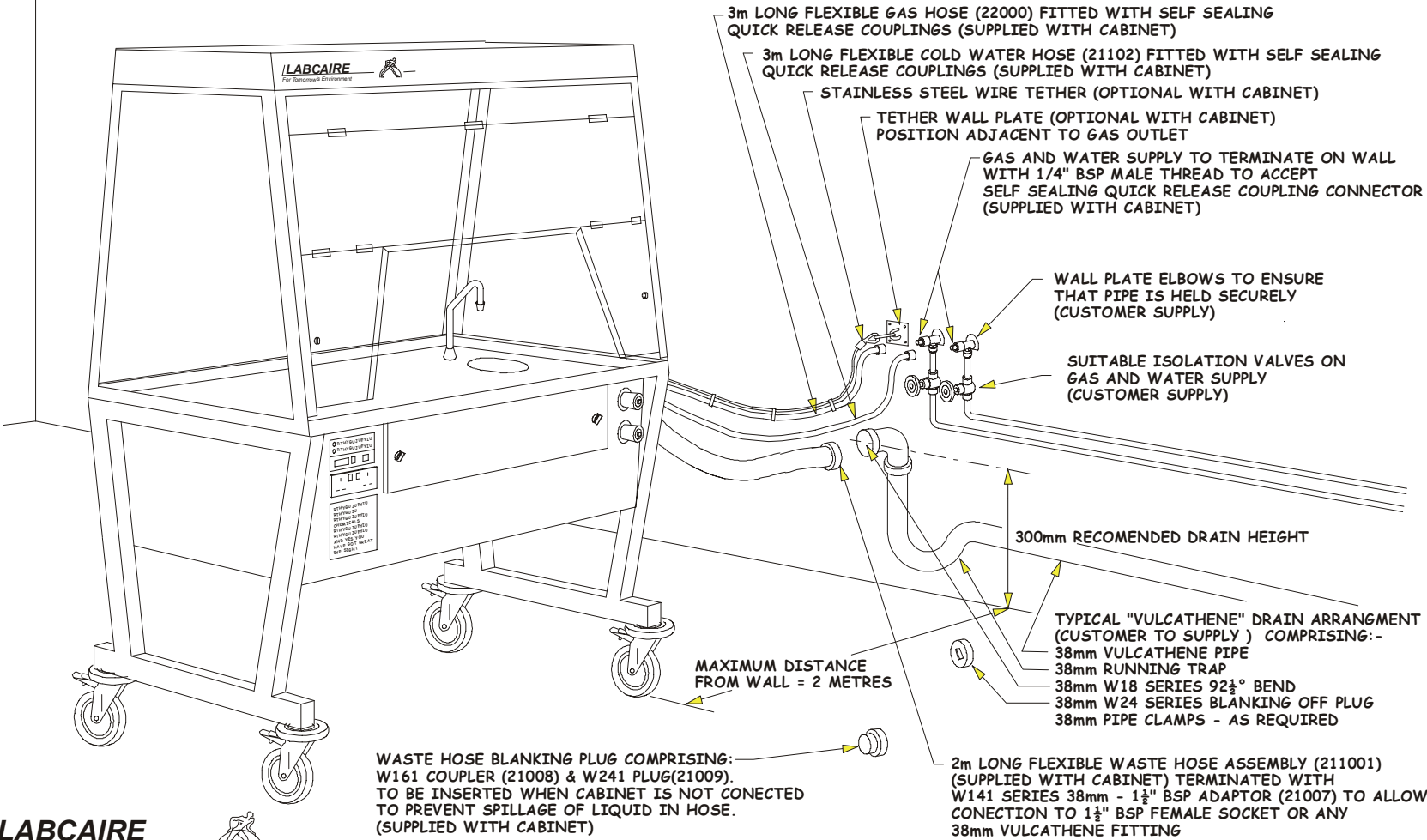
The work surface will be fitted with a moulded drip cup, and a services module will be fitted on the right hand side of the unit. The service will comprise of:

- 1) A gas supply through a remote valve on the front of the module, which connects to a Gas Board approved quick release connector. (Service connector required is a 1/8" NPTF Male outlet).
- 2) A water supply through a remote valve on the front of the service module. The water hose is fitted with a quick release sealed connector. (Service connector required is a 1/4" BSP male thread water outlet).
- 3) The waste service is through a 1.5" Vulcathene flexible hose, which requires a 1.5" BSP female thread drain point. (A sealing cap is required when the drain is not in use. A waste trap should be installed downstream of the connection point).

The services outlet from the module is from the rear right hand side and the hoses can be stored inside the module when not in use.

Extra fittings are available for use in several locations.

Labcaire T400-LS Mobile Fume Cabinet



NOTE:
 WHEN IN USE POSITION FUME CUPBOARD SO THAT THE DRAIN HOSE HAS A CONSTANT FALL TO DRAIN.

LABCAIRE
 For Tomorrow's Environment
 175 Kenn Road, Clevedon, North Somerset, BS21 6LH.
 Tel: (01275) 793000 Fax: (01275) 341313
 e mail: info@labcaire.co.uk



OPTIONAL FILTER SATURATION ALARM

DESCRIPTION

The sensor is situated to allow exhaust air from the fume cabinet to pass over the sensor.

The sensor will detect Hydrocarbons fumes passing through the filter and the signal (after processing) is displayed on the green LED if in normal condition.

The gas sensor is very responsive to hydrocarbon fumes and will indicate when the main carbon filter requires replacement.

The sensor is electrically heated and will take a short time to reach operating temperature. During this period the alarm will be activated, the audio may be muted at this time. The signal will reduce to normal levels after approximately 60 seconds, when the normal green LED's will illuminate.

The normal reasons for the alarm sounding are:

- i) Excessive challenge to the filters caused by evaporation of large quantities of Hydrocarbons.
- ii) The filter is approaching the end of its life.
- iii) Leakage of fumes past the filter seals if the filter has not been fitted correctly.

ACTIONS:

- I. Remove the challenge to the filters. The sensor will return to its normal state after the filter stabilises. The alarm mute can be used and the cabinet should be left running during this time.
- II. As the filter reaches the end of its life, the condition will be reached with very low challenge rates. The filter will now need to be replaced.
- III. If a new filter has been fitted and the alarm activated by low challenge rates to the filter, the filter seals should be checked.



COMMISSIONING

The unit should be switched on for approximately 20 minutes to reach a stable operating condition. Follow calibration procedure.

It is not possible to commission with previously used filters, these should be removed and new filters fitted to commission. The previously used filters should be refitted afterwards.

NB: The unit may require recalibration after the first 3-4 weeks of use, once the sensor has fully established.

TESTING

The sensor can be tested by raising the filter off of its seal, releasing a small quantity of alcohol on a cloth, (or a spray). The alarm will sound at low levels of release.

CALIBRATION

Please contact Puricore International Ltd for more information regarding the calibration of the unit.

Puricore International Ltd

175 Kenn Road, Clevedon, North Somerset, BS21 6LH England

UK Tel: (01275) 793000

UK Fax: (01275) 341313

INT Tel: +44 1275 793000

INT Fax: +44 1275 341313

E-mail: labcaire@puricore.com

Website: <http://www.puricore.com>

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