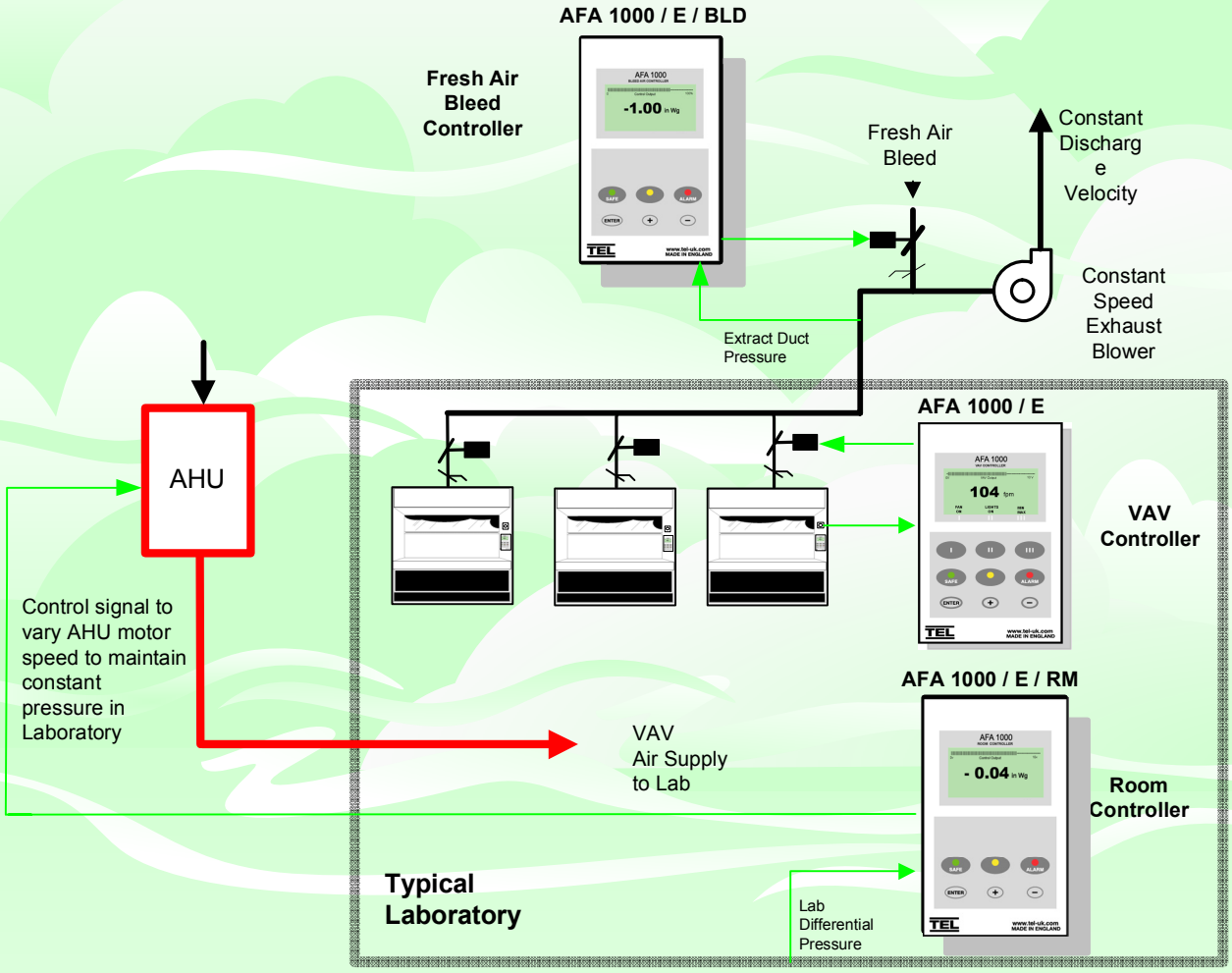
Fume Hood

ECON VAV Controls

Increases Safety , Conserves Energy and Save You Money



The **ECON VAV Controls for Fume Hood**s are primarily designed to **REDUCE the ENERGY COSTS** associated with running a **Lab Facility** :-

1. Typical **CAV Fume Hoods** will consume a **constant volume of air from the lab regardless of the Sash position** and this volume of air has to be supplied in to the lab from outside the building and heated or cooled for the comfort of the lab personnel. It is the energy costs associated with the heating and cooling of this outside air and the fan motor electrical power consumption that is one of the **major costs of operating a lab**.

2. Fitting a **ECON VAV** controls system to the Fume Hoods and the air supply system can typically **reduce the energy running costs by up to 75%**

3. ECON VAV controls can be fitted to **NEW** Fume Hoods or can be **RETRO - FITTED** to virtually all types of **EXISTING** Fume Hoods.

4. To **Maximize the Energy Cost Savings** the Fume Hood can also be fitted with the **Green Sash Auto Closer** system (See details overleaf)

5. Detailed **Site Surveys** and **Energy Calculations** are available -- typical **PAY-BACK** periods are from **12 to 24 months** depending on the site location , local energy costs and the total package supplied.

Fume Hood

ECON VAV Controls

Features and Benefits

1. The **ECON VAV system for Fume Hoods** operates by measuring the **FACE VELOCITY** on the Fume Hood and providing a controlled output to maintain the **SET POINT** face velocity as the Sash is opened or closed.
   No additional sensors are required for COMBINATION SASHES with horizontal sliding windows and a vertical sash.

2. The **ECON VAV FH controller** can be used to drive **VFDs** to vary the exhaust fan speed for installations with one exhaust fan per Fume Hood or to drive a **VAV damper** in the Fume Hood exhaust duct for installations with multiple Fume Hoods on a common exhaust fan.

3. The **ECON VAV FH controller** can be retrofitted to the Fume Hood and used **to drive VAV Dampers or Venturi valves** on **EXISTING** VAV control systems.

4. The **ECON VAV** system **Room Controllers** will directly control the **air supply VAV boxes or dedicated AHU with VFD** to balance the variable exhaust from the Fume Hoods. Alternatively the **Summation Unit** can be used to control the air supply by summing the exhausts from each FH

5. The **Bleed Controller** can be used to controls the main **exhaust fan speed via a VFD** to maintain a constant pressure in the exhaust system as the volume from the Fume Hoods varies or to control the **speed of the AHU** fan as the volumes in to each lab varies via the VAV boxes

We can provide a **'one stop shop'** facility for both **NEW and RETRO - FITTING** existing installations based on our many years of experience in the Lab VAV Control industry :-

1. For **NEW** installation we can provide assistance for **CONSULTANTS and LAB DESIGNERS**

2. For **RETROFITTING EXISTING INSTALLATIONS** we can provide a survey of the installation and a VAV system design **to the end user or to BMS Controls Companies** - including **ENERGY CALCULATIONS and PAY-BACK projections** for specific locations.

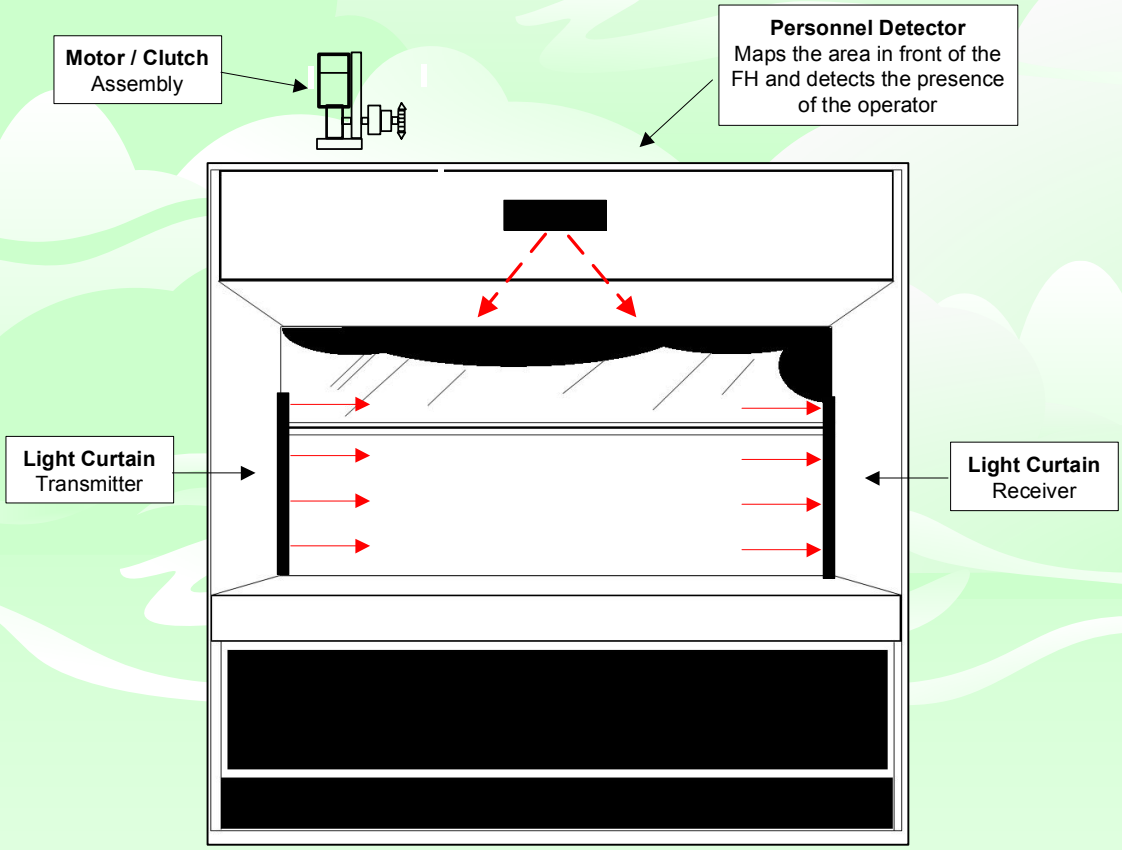
3. We can provide a **FULL INSTALLATION** service or we can work with and advise engineering contractors working in the lab industry.

Fume Hood

Green Sash System®

Auto Sash Closer for Fume Hoods

Increases Safety , Conserves Energy and Save You Money



The Green Sash System auto Sash Closer for Fume Hoods is primarily designed for operation on Fume Hoods with VAV controls and has the following features and benefits :-

1. Can be fitted to **NEW** Fume Hoods or can be **RETRO - FITTED** to virtually all types of **EXISTING** Fume Hoods.

2. Will **FORCE** the **ENERGY COST SAVINGS** on the end user by ensuring that the Sash is closed whenever the operator is not present

3. Can be fitted to **EXISTING** Fume Hoods with **EXISTING VAV CONTROLS** or can be supplied as a package with retro fitted **ECON VAV CONTROLS** fitted to the exhaust and air supply systems

4. Detailed **Site Surveys** and **Energy Calculations** are available -- typical **PAY-BACK** periods are from **12 to 24 months** depending on the site location , local energy costs and the total package supplied.

(See overleaf for a detailed description of the system and method of control)

Fume Hood — GSS Auto Sash Closer

1. Overview

The Auto Sash Controls are designed to close the Fume Hood Sash automatically when the operator is not present at the Fume Hood to maximise the Energy Saving from the VAV control system and to give additional safety to personnel walking past the Fume Hood.

The control system comprises of the following parts:-

a. **Personnel sensor** -- to detect the presence of the user. The Sash will not automatically close when the user is present at the Cupboard. The sensor will re-learn the background at regular intervals so will detect if a stool or other item is left in the detection area and incorporate it into the background.

b. **Alarm panel** -- Red LED / Pushbutton -- gives visual indication of a fault and also used to reset the once the fault has been cleared. There are two fault conditions:-

Sash closing time – The control system monitors the time the Sash takes to close, if the Sash has not closed in a preset time the fault indicator will illuminate and the output to the Sash drive will be disabled. Once the fault has been checked and cleared pressing the alarm panel reset pushbutton will reset the controls.
Sash obstruction – The control system has a safety light curtain sensor that checks that the Sash opening is clear before the drive operates. If an obstruction is detected the fault indicator will illuminate and the output to the Sash drive will be disabled. Once the fault has been
checked and cleared pressing the alarm panel reset pushbutton will reset the controls.

c. **Sash sensor** -- The Sash control system uses a Safety Light Curtain to detect that the opening below the Sash is clear before the Sash is driven closed.The Safety Light Curtain consists of an Infra Red transmitter on one side of the fume hood inner chamber and an Infra Red detector on the opposite side of the inner chamber. The Transmitter and Receiver are approx 28" high and have multiple close positioned LED to detect small objects – the Light Curtain will also detect Glass objects.

d. **Sash Low switch** – used to detect that the Sash is closed.

e. **Sash Drive Unit** – a geared motor and clutch assembly used to drive the Sash.
The motor is a 24V DC geared motor complete with a speed controller to adjust the speed of the closing Sash.
The clutch assembly is connected to the motor and is only energised when the Sash is driving – this ensures that the Sash and the Sash mechanism are disconnected from the drive when the operator is present at the Fume Hood and the Sash can be operated manually open or closed with no additional resistance to movement

2. Method of Operation

a. When the operator stands in front of the Fume Hood the Personnel Detector will 'see' the operator and reset the controls so that the Sash drive is mechanically disconnected via the Clutch mechanism. The operator can then operate the sash manually in the normal manner

b. When the operator leaves the Fume Hood the Personnel Detector will 'see' this and will initiate a run-down time (adjustable on site). At the end of this time delay the sash will drive to the closed position only if the Safety Light Curtain detects that there are no objects present that could be struck by the moving sash. If any objects enter the field of the Safety Light Curtain when the Sash is driving closed or the operator returns to the Fume Hood then the sash drive will disconnect and the Sash will stop.

b. As an additional safety feature the controls include a delay timer which is set to the time period that the sash is expected to take to close from the fully open position. If for any reason the Sash does not reach the Sash closed switch within this time period then the drive mechanism will lock out and will activate the illuminated pushbutton on the Alarm panel. The unit will remain locked out until the problem is resolved and the illuminated alarm button is pressed – during this time the sash can be operated manually as normal.

Fume Hood
Energy Savings

Sample Energy Calculations

Typical Lab in Wisconsin with 4 x 6ft Fume Hoods and 8 x 8ft Fume Hoods

During the site survey it was found that the fume hood volumes were at approx 20% higher than the design value of 100fpm @ 18" sash opening (this is a typical scenario)

AIR LOAD CALCULATIONS		
Typical Lab in Wisconsin with 4 x 6ft Fume Hoods and 8 x 8ft Fume Hoods		
General Parameters	**Cost and Efficiency Parameters**	**Energy Costs**
		Electric: 9.75 cents/kWh
Summer Room Temperature: 72.0F	**Fans**	
Summer Room Humidity : 60.0 percent	**Supply Pressure : 2.0 in. w.c.**	
Winter Room Temperature: 68.0F	**Exhaust Pressure: 2.0 in. w.c.**	
Winter Room Humidity : 40.0 percent	**Motor Efficiency: 85.00 percent**	
	Fan Efficiency : 65.00 percent	
	Cooling	
	Cost : 10.50 $/10^6BTU	
	Heating and Humidification	
	Heat Method : Gas	
	Humid Method : None	
	Heat Method : Gas	
	Heat Cost: 14.50 $/10^6BTU	
SUMMARY		
Calculation # 1 -- Current Situation with all FHs operating 24 / 7 -- Total Volume 7754 cfm (20% above Design Volume for FHs)		
TOTAL YEARLY ENERGY $ 38,701.78 AT AN AVERAGE $ 4.99/CFM		
Weekday Profile: Constant Volume		
Weekend Profile: Constant Volume		
Holiday Profile: Constant Volume		
Calculation # 2 - All FHs fitted with VAV controls and Auto Sash and operating at the FH design volume at 18" Sash opening @ 100 fpm		
Operating from 8:00am to 8:00pm Monday to Friday with average usage per FH at full volume of 1 hour per day -- all other times at 20% volume		
TOTAL YEARLY ENERGY $ 7,125.80 AT AN AVERAGE $ 4.99/CFM		
Weekday Profile: Probability Based		
Weekend Profile: Constant Volume		
Holiday Profile: Constant Volume		

The above calculation is based on an actual lab and the above is a short form version of the actual calculation.

It can be see that the method of operation described in Calculation # 2 with **after retro-fitting ECON VAV controls and Green Sash Auto Closer** would result in an **81.6 % reduction in Energy Cost per year giving an annual saving of $ 31,575.98**