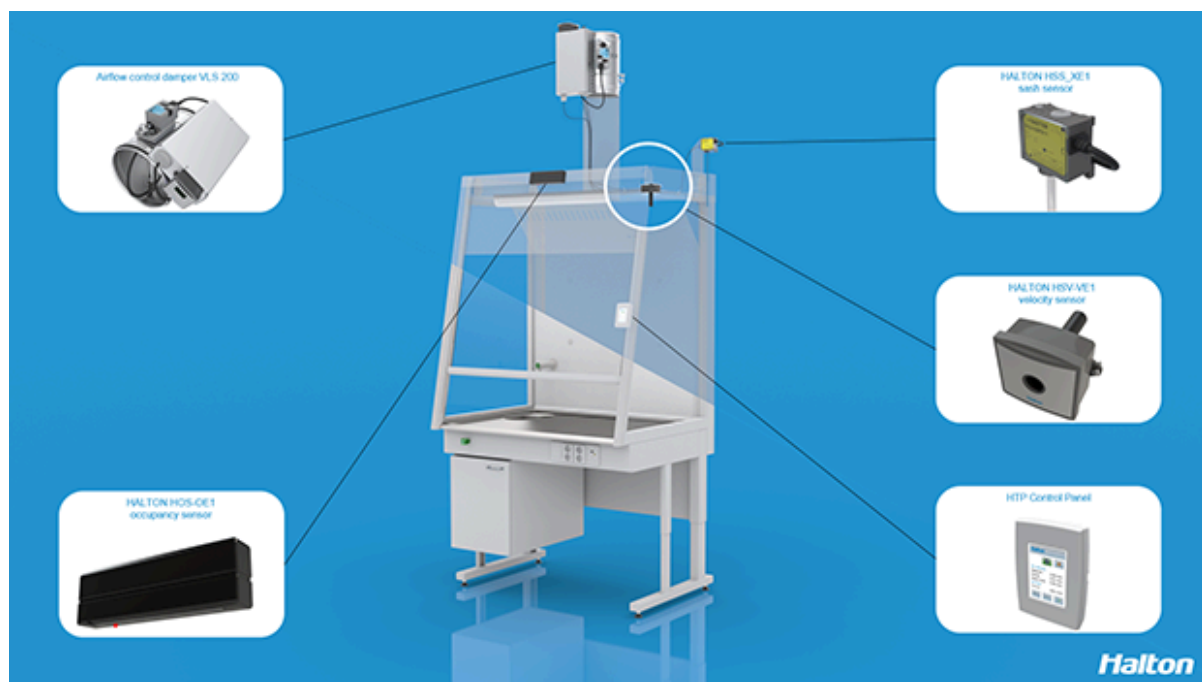


# Private: Halton Vita Lab Solo (VLS)



## Yleiskuvaus

Halton Vita Lab Solo provides fast and accurate airflow management for all types of fume cupboards. It is

- Designed for the ventilation control of fume cupboards in laboratories where safety, air quality and comfort need to be maintained at the required level regardless of external conditions
- Suitable for fume cupboards in research, production and educational laboratories

Halton Vita Lab Solo is available with different control concepts, depending on the application needs.

**Basic applications** for normal laboratory conditions:

- Face velocity control – maintains a constant face velocity regardless of the sash position
- Dual position airflow control – maintains a minimum face velocity by detecting if the sash is open or closed
- Sash position control – maintains a constant face velocity depending on the sash position

**Advanced solutions** that meet the requirements for the most demanding laboratory spaces:

- Sash movement control – controls the sash movement to provide a quick increase of the exhaust airflow, while also controlling the sash position in order to maintain a constant face velocity
- Double sensor control – maintains the face velocity at a predefined level and controls the sash movement in order to provide an exceptionally quick increase of the exhaust airflow

# Face velocity (A)

The Face Velocity control application maintains a constant face velocity in the fume cupboard regardless of the sash position.

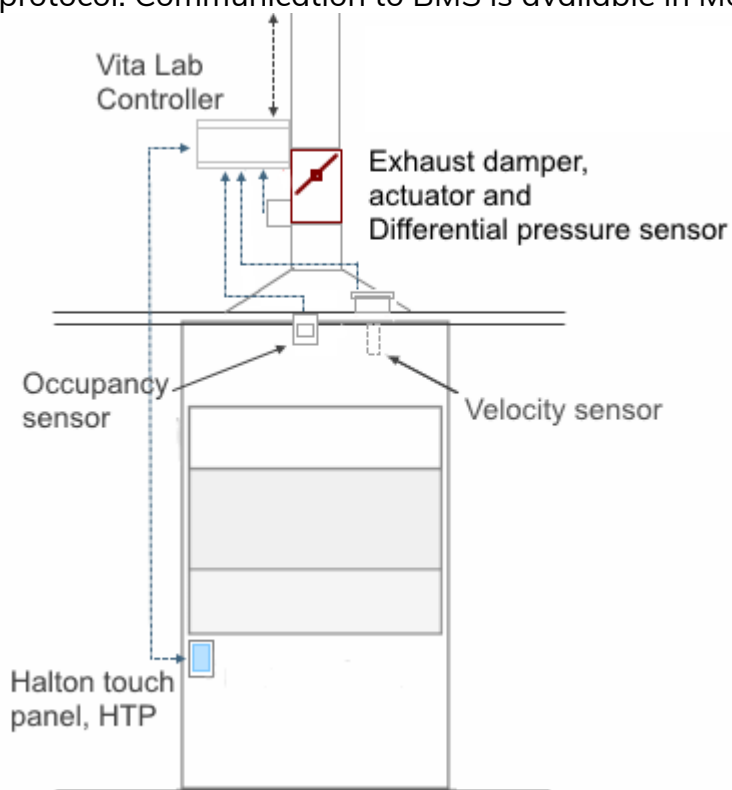
**The advantages and applications of the system include:**

- Constant face velocity control
- Variable airflow operation for energy efficiency
- Automatic ECO mode with an occupancy sensor (optional) for enhanced energy efficiency
- For fume cupboards with vertical and horizontal sashes
- Low installation cost

The Velocity sensor measures the face velocity and sends the value to the Halton VLC fume cupboard controller (VLC/FC). The VLC retrieves the face velocity measured and compares it with the assigned set-point. It then adapts the damper position or frequency to maintain a constant face velocity. It also sends the exhaust flow rate, alarm and function state to the room controller.

The Halton HTP touch panel displays the essential parameters, such as the measured velocity and the assigned set-point, the audio-visual alarm and the exhaust flow rate. The occupancy sensor (optional) switches the system to ECO mode when there is no presence in front of the cupboard.

The communication between the fume cupboard controller and the room controller uses local protocol. Communication to BMS is available in Modbus or BACnet IP.



## Dual position airflow (B)

The Dual position airflow control application adapts the airflow rate in order to maintain a minimum face velocity by detecting if the sash is open or closed.

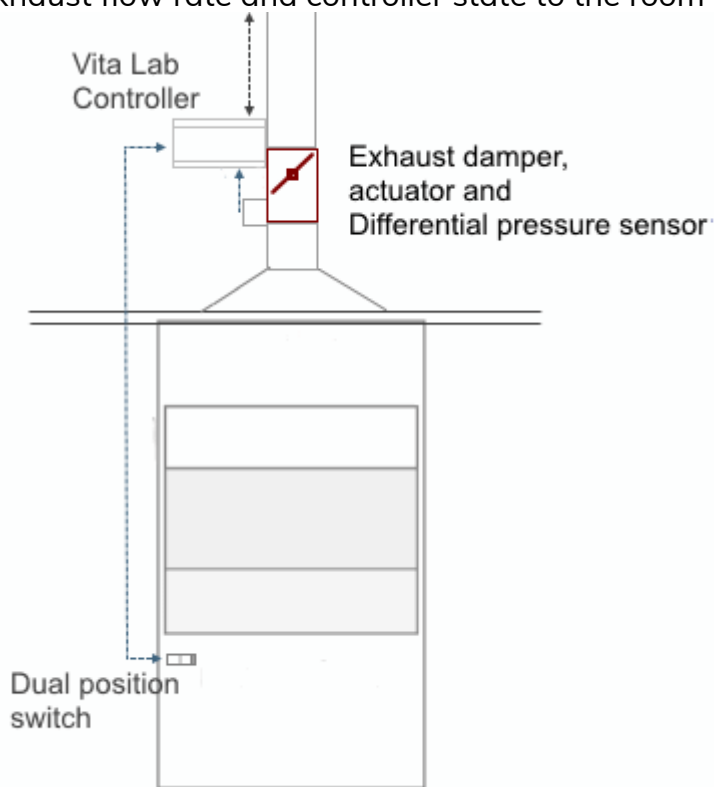
**Advantages and application areas for this control concept include:**

- Low installation costs
- Variable airflow control
- Fume cupboards with high heat load inside
- Low-airflow fume cupboards
- Fume cupboards with vertical sash

In the Dual position control application, the airflow is controlled by an on/off switch instead of the HTP touch panel. The value of the exhaust airflow setpoint is controlled by the signal emitted by a contact switch situated at the lower part of the fume cupboard. The switch allows the system to detect when the sash is closed:

- Sash closed / Switch closed = Min airflow rate set-point
- Sash open / Switch open = Max airflow rate set-point

It then adapts the damper position or frequency to maintain the airflow set-point and sends the exhaust flow rate and controller state to the room controller.



## Sash position (C)

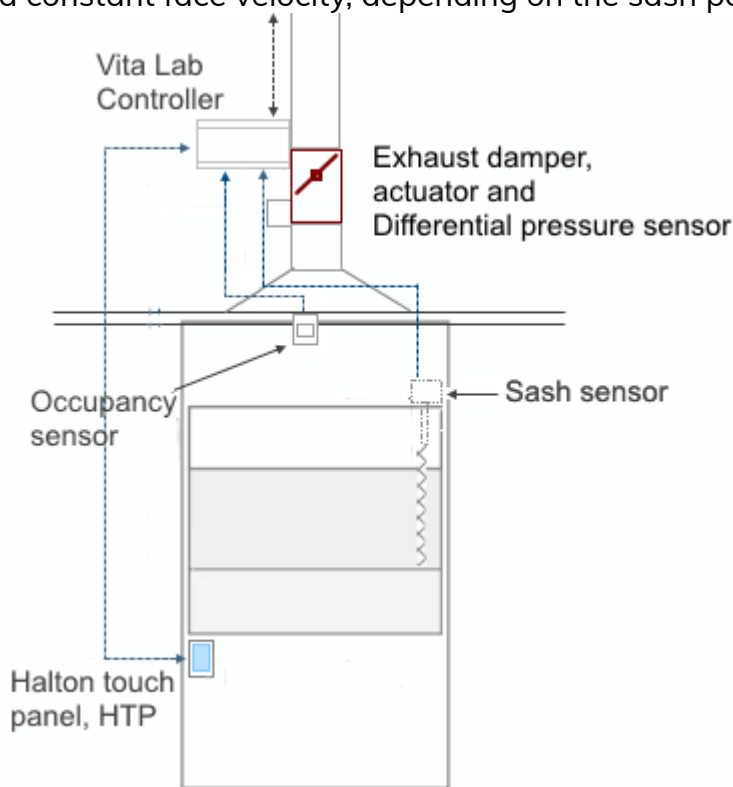
The Sash Position control application maintains a constant face velocity in the fume cupboard

depending on the sash position.

**Advantages and application areas for this control concept include:**

- Constant face velocity control
- Variable airflow operation for energy efficiency
- Automatic ECO mode with an occupancy sensor (optional) for enhanced energy efficiency
- Fume cupboards with a heat load inside
- Low airflow fume cupboards
- Only for fume cupboards with vertical sashes

In the Sash Position control application, the system receives the opening percentage data of the sash from the Sash sensor and then adjusts the exhaust to the right amount of airflow to maintain a constant face velocity, depending on the sash position.



The sash sensor (0-10 V) detects and sends the position of the sash to the Halton VLC fume cupboard controller (VLC/FC). The VLC retrieves the measured sash position, compares it with a configurable set-point and adapts the damper position or frequency, using the Proportional Integral Derivate (PID), in order to maintain a constant face velocity. It also sends the state of the exhaust airflow rate, alarm and function to the room controller.

The fan can be turned off or on manually.

The Halton HTP touch panel displays the essential parameters, the audio-visual alarm and the exhaust flow rate. The occupancy sensor (optional) switches the system to ECO mode when there is no presence in front of the cupboard.

Local Communication is used between the fume cupboard controller and the compensation unit. Communication to the BMS in Modbus (VLC/FC 15 I/O) or BACnet IP (VLC/FC 28 I/O).

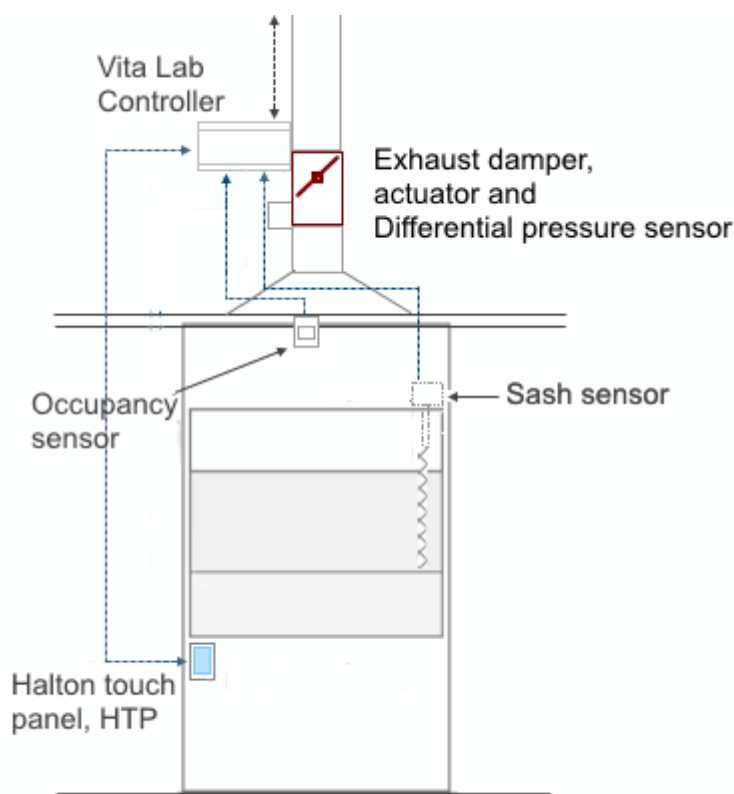
# Sash movement (D)

The Sash Movement control application has a dual control function:

- Control of the sash movement in order to obtain a quick increase of the exhaust airflow
- Control of the sash position in order to maintain a constant face velocity

**Advantages and application areas for this control concept include:**

- Extremely fast response time, suitable for fume cupboards with high safety requirements
- Constant face velocity control
- Variable airflow operation for energy efficiency
- Automatic ECO mode with an occupancy sensor (optional) for enhanced energy efficiency
- Fume cupboards with a high heat load inside
- Low airflow fume cupboards
- Fume cupboards with vertical sashes only



The Halton VLC fume cupboard controller detects the movement of the sash by using a sash sensor and adjusts the damper position or frequency to a predefined setpoint based on the sash movement. It then adapts the damper position or the frequency by using a PID control in order to reach the face velocity setpoint. Once the damper reaches its position, the control maintains the set airflow based on the position of the sash in order to maintain a constant face velocity.

The use of the two controls allows the control system to have a fast response time and reduced delays without compromising the stability of the system.

The Halton HTP touch panel displays the essential parameters such as the measured airflow and its setpoint. The occupancy sensor (optional) switches the system to ECO mode when there is no

presence in front of the cupboard.

The use of a duct pressure control (VLZ) on the fume cupboard exhaust duct is highly recommended in combination with this application.

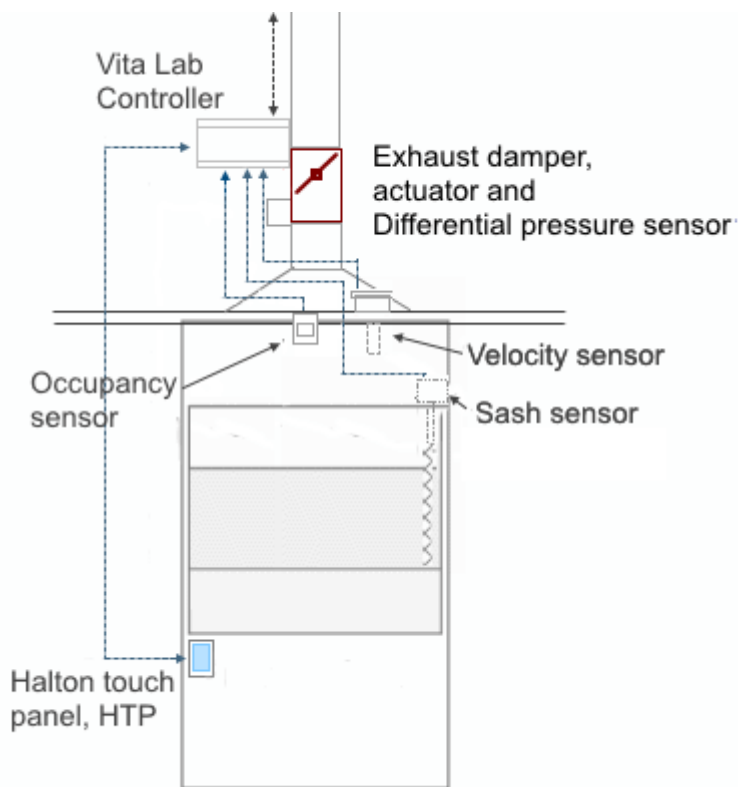
## Double sensor (E)

The Double Sensor control offers the fastest response time and a high system stability for the most demanding laboratory environments. The solution uses two sensor controls to provide the best solution:

- Control of the sash movement in order to provide a quick increase of the exhaust airflow
- Control the face velocity in order to maintain the face velocity at its setpoint

### Advantages of Double Sensor control:

- Extremely fast response time, suitable for fume cupboards with high safety requirements
- Stable steady-state flow conditions at different sash positions
- Adaptation to fume cupboard airflow conditions, especially the ability to recognize blockage in front of an open sash allows the system to adjust the face velocity and airflow accordingly
- Constant face velocity control
- Variable airflow operation for energy efficiency
- Automatic ECO mode with an occupancy sensor (optional) for enhanced energy efficiency
- Low airflow fume cupboards
- Fume cupboards with both vertical and horizontal sashes



## Response time and system stability

The time in which stable control velocity is reached after the fume cupboard opening has a significant effect on the exposure; once the response time exceeds 3 seconds, the exposure risk increases significantly. After 5 seconds from the sash movement, the maximum concentrations at the fume cupboard opening may reach the exhaust concentration.

The Halton Vita Lab Solo Double sensor control application has been tested by Halton according to EN 14175-6 with the following results:

- Fast stabilization – even after maximum change, less than 3 seconds from min to max position
- Immediate reaction to change was less than 1 second
- Fast and steady response to sash movement for both from minimum to maximum and maximum to minimum

## Halton Services



### Halton Design Studio

Selecting, planning and designing the optimal solution are the first steps of a successful implementation. Halton offers the following services in the design and planning phase to help you reach the best possible end result and life cycle performance of your Halton Vita Lab solution:

- Advanced project design and support in the concept creation and design phase to specify and customize the optimal solution in co-operation with your design team, when safety, comfort and life cycle performance targets are set.
- Halton computational fluid dynamics (CFD) simulation is a cost-effective method of testing and validating the selected solution before realization. Computer-based flow simulations are used to optimize room conditions and compare alternative solutions during the design or the pre-design phase.
- Halton Mock-up services are used to ensure that the indoor climate conditions are in accordance with the system safety and comfort design and features. Tailored tests and mock-ups are strongly recommended especially for special rooms and other demanding situations where the loads and the ventilation system differ from standard applications. Mock-ups are performed in Halton Innovation Hubs.



### Halton Tune

Halton offers comprehensive commissioning and start-up services for demanding Halton Vita Lab solutions, in order to ensure optimal safety and comfort conditions, as well as functionality and energy performance of the delivered solution according to industry standards. Standard commissioning and start-up services include:

- Checking of the following prerequisites, which are to be performed by the customer or

subcontractors of the customer, prior to implementation of any Halton Services on site:

- General power supply is turned on
- Ventilation is stabilized and pressure rates between spaces are set correctly
- All units and components related to the Halton project scope are installed correctly, including all sensors and panels
- Air-handling unit, airflow control damper and duct pressure adjustment functionality is verified
- Supply and exhaust airflows are measured and set correctly
- Power is supplied to all controllers, airflow control dampers and actuators
- All required controllers are connected to the BMS
- All other cabling and connection tasks specified in the order documentation are done correctly
- Verification of general system implementation according to good practice
- Start-up of the system:
  - Finalization of operational parameter settings to controller software and actuators
- Calibration of all sensors
- Airflow measurements and finalization of ductwork balancing
- Testing of system functionality and performance
- User training for all space users and technical personnel, concerning system characteristics, performance, operation principles (with regard to the automation system) and proper maintenance of potential faults.



## Halton Life Cycle

Halton offers preventive maintenance services for all demanding solutions. Our maintenance services include performance validation of the system and changing of spare parts, according to solution-specific maintenance agreements. With our maintenance services, we offer extended warranties for all Halton Vita Lab solutions.

For further information of our services, please contact sales.