Halton Vita Lab and Clean room

Laboratory and Clean room ventilation solutions

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Offering Manager, professional flow

Enabling Wellbeing

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Halton Vita Lab System

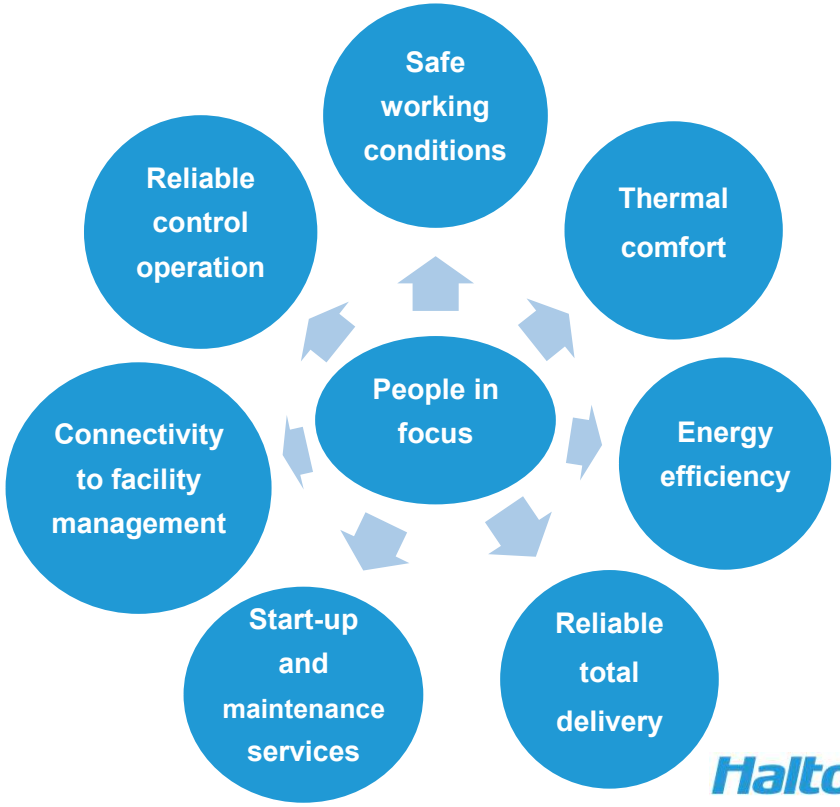


Halton Vita Lab System Characteristics

Halton Vita Lab applications adjust the exhaust air flow of the fume cupboards and the biosafety cabinets as required and control the supply airflow or pressure of the laboratory room as desired.

Halton Vita Lab system characteristics are:

- Total delivery, including
  - project design support
  - product deliveries
  - start-up and commissioning
  - maintenance service
- Reliable, fast and stable control functions
- User safety
- Versatile Solutions
- Energy-efficient solutions
- Data transfer between different systems



Halton Vita Laboratory Solutions

Halton Vita Lab Solo

Fast and accurate airflow management for all types of fume cupboards

- Suited for fume cupboards in research, production and educational laboratories

Halton Vita Lab Room

Intelligent and efficient management of laboratory ventilation, room air flow and pressurization

- Suited for health care, pharmacy, industrial and other clean room laboratories

Halton Vita Lab Zone (optional)

Provides stable system operation in larger ductworks with integrated ductwork zone pressure management.

- *Suited for airflow and pressure-controlled spaces and room zones*



Solution description

Halton Vita Lab Solo (VLS) fume cupboard control

- the airflow rate of fume cupboards and different local exhaust units based on demand

Supply airflow control Vita Lab Room (VLR) is realized by

- tracking the measured exhaust units; fumehoods and local exhausts
- setting the supply airflow setpoint to correspond the exhaust airflow rate
- applying a defined deviation between the exhaust and supply airflow

Halton Vita Lab Room can also control

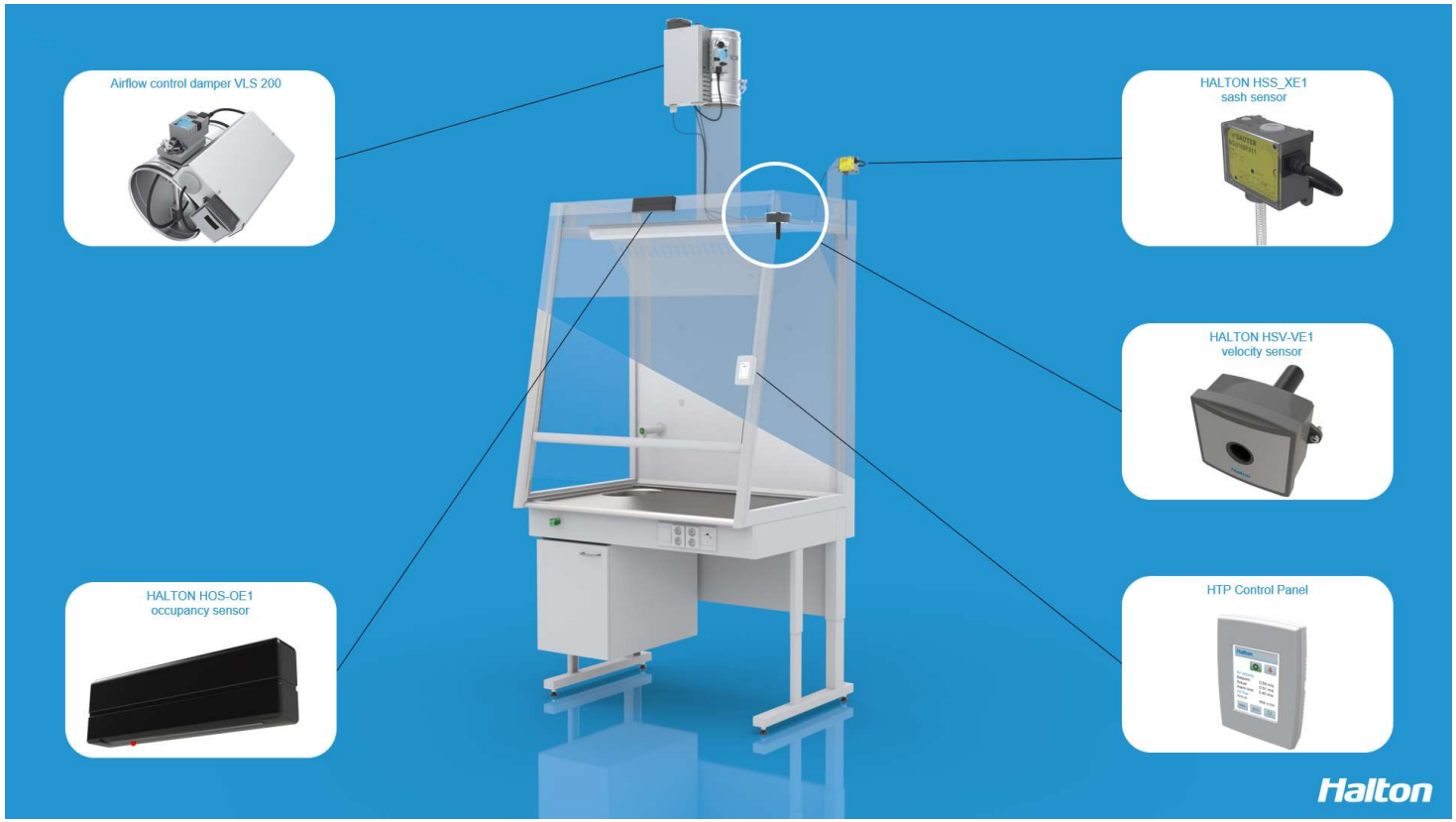
- the pressurization of the laboratory space based on the differential pressure measurement between the space and the ambient reference space

Halton Vita Lab Room –system can also maintain

- **desired minimum air change** in the room when exhaust airflow from exhaust units is insufficient
- **room temperature** either by general ventilation airflow rate control and/or by controlling the supply air temperature



Halton Vita Lab Solo VLS; Components



Halton Vita Lab Solo VLS

Airflow control of a fume cupboard, biosafety cabinet or a local exhaust unit. Airflow control can be realised in different ways:

A. Double sensor control

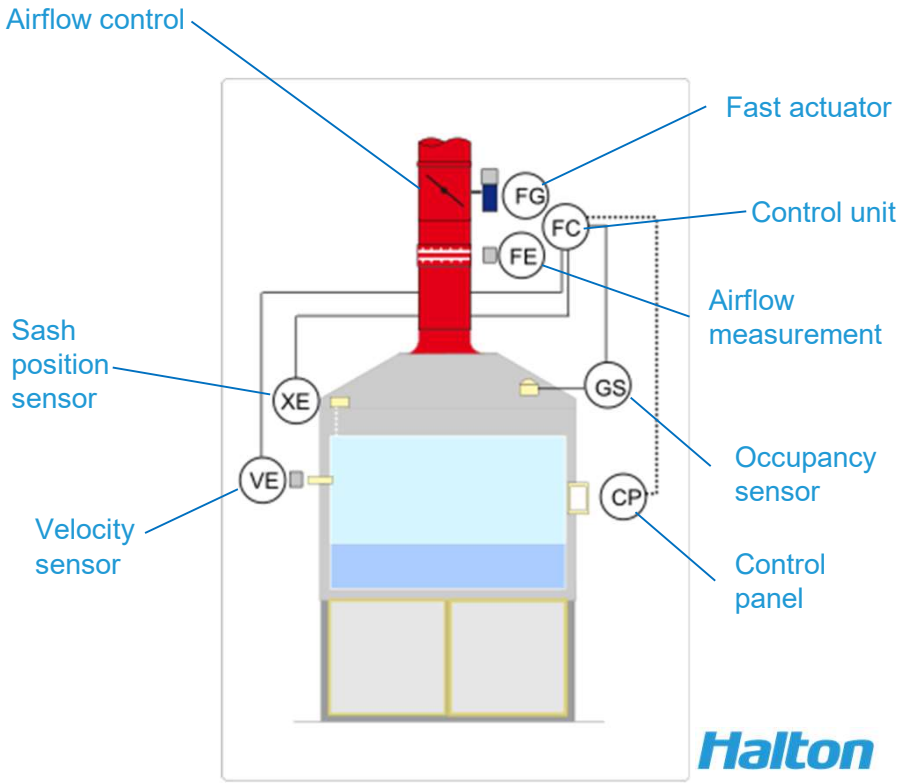
The face velocity control using a velocity and sash sensor; the face velocity is kept constant (e.g. 0.5 m/s)

Direct control of control damper position as when sash position changes based on sash position sensor

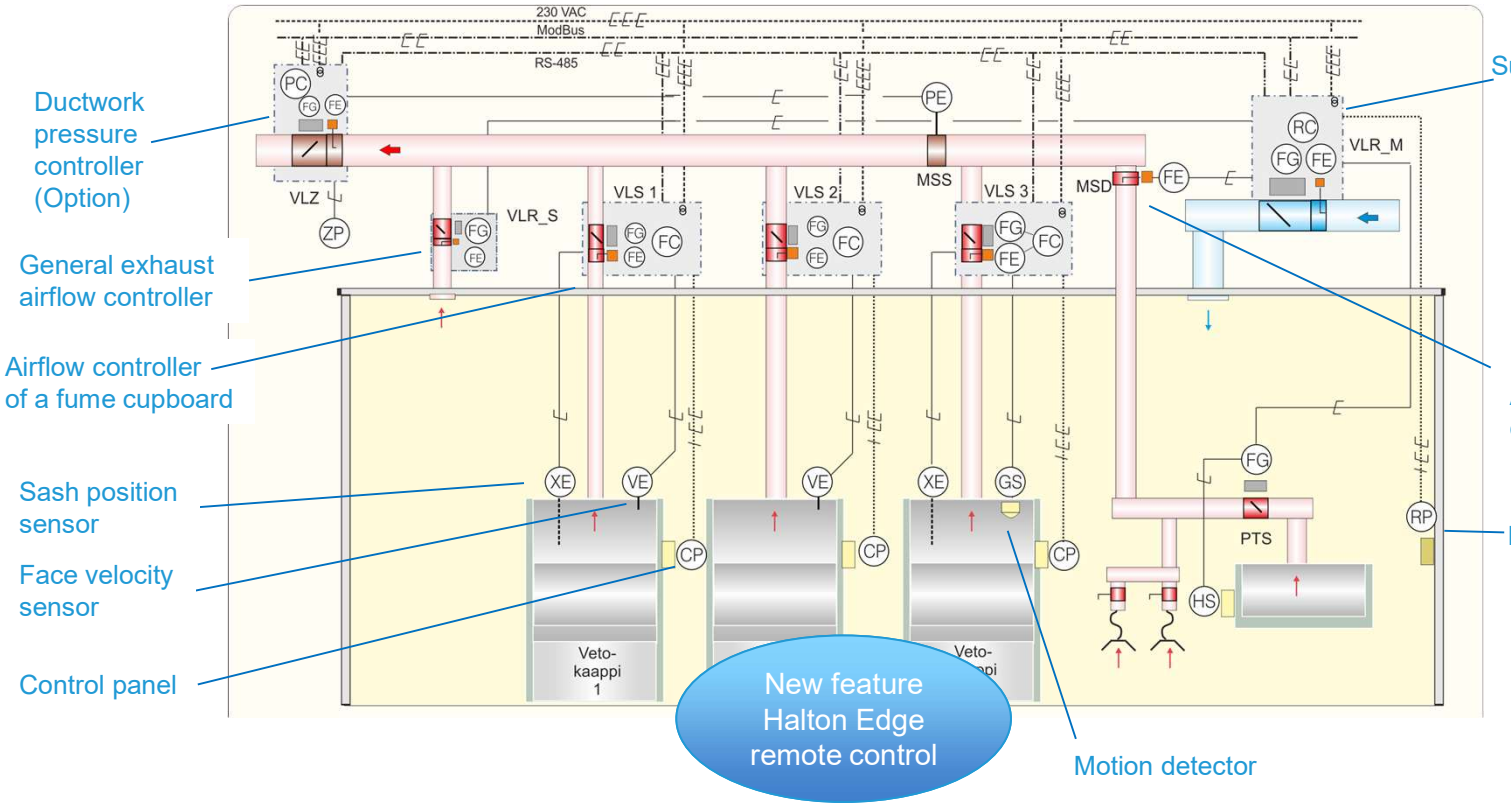
Follows standard EN14175-6.

B. 2-step (min/max) airflow control of a fume cupboard or a local exhaust unit using a limit switch or a 2-position switch

The setpoint of the face velocity or the airflow rate can be shifted to a defined value in order to save energy always there are no occupants in the vicinity of the fume cupboard.

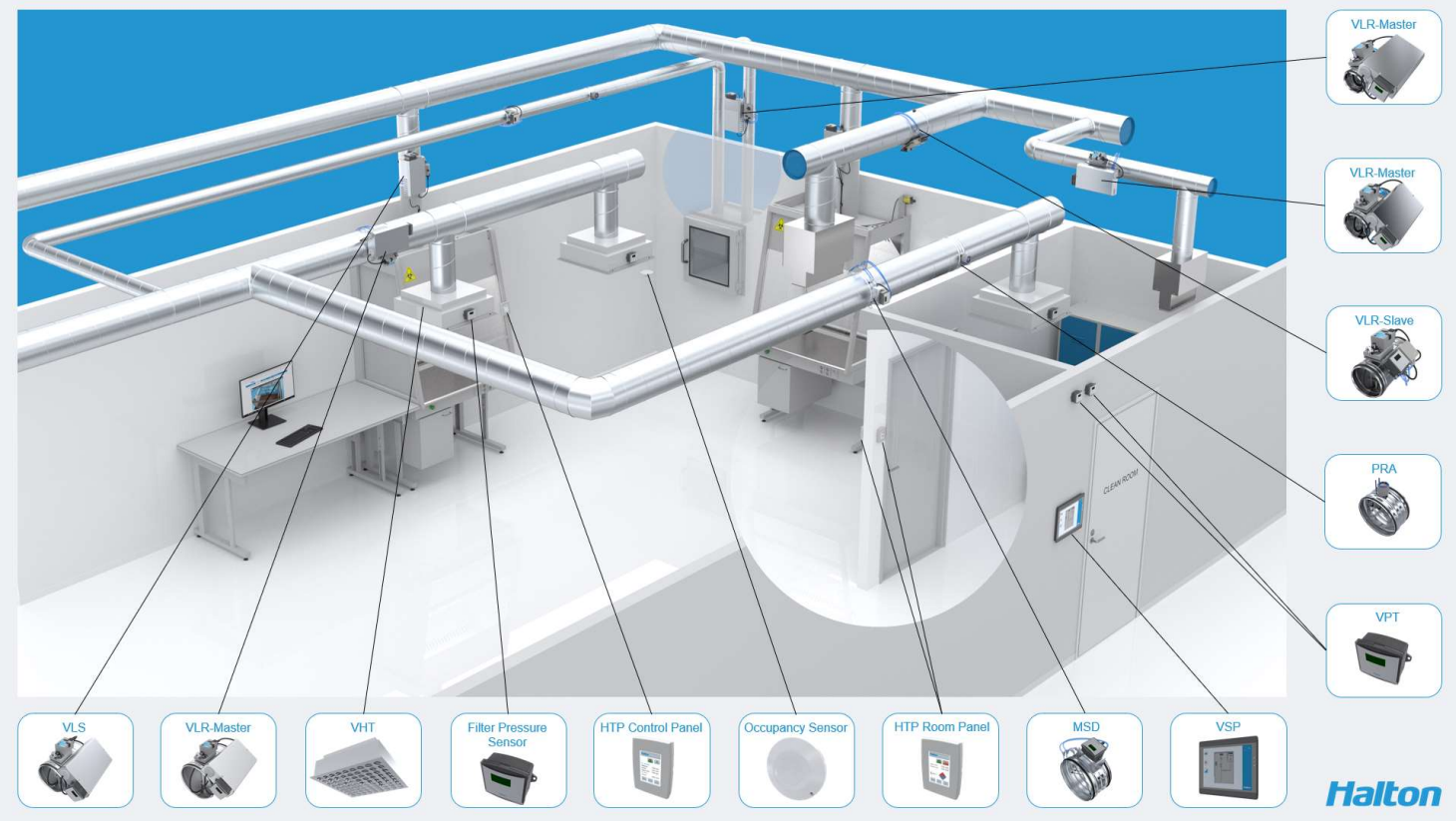


Laboratory room control diagram example



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Halton Vita Clean room solution



What is a clean room?

A cleanroom has a special meaning and it's defined in the EU GMP standard Annex 1:

> *"A room in which the concentration of airborne particles is controlled and which contains one or more clean zones."*

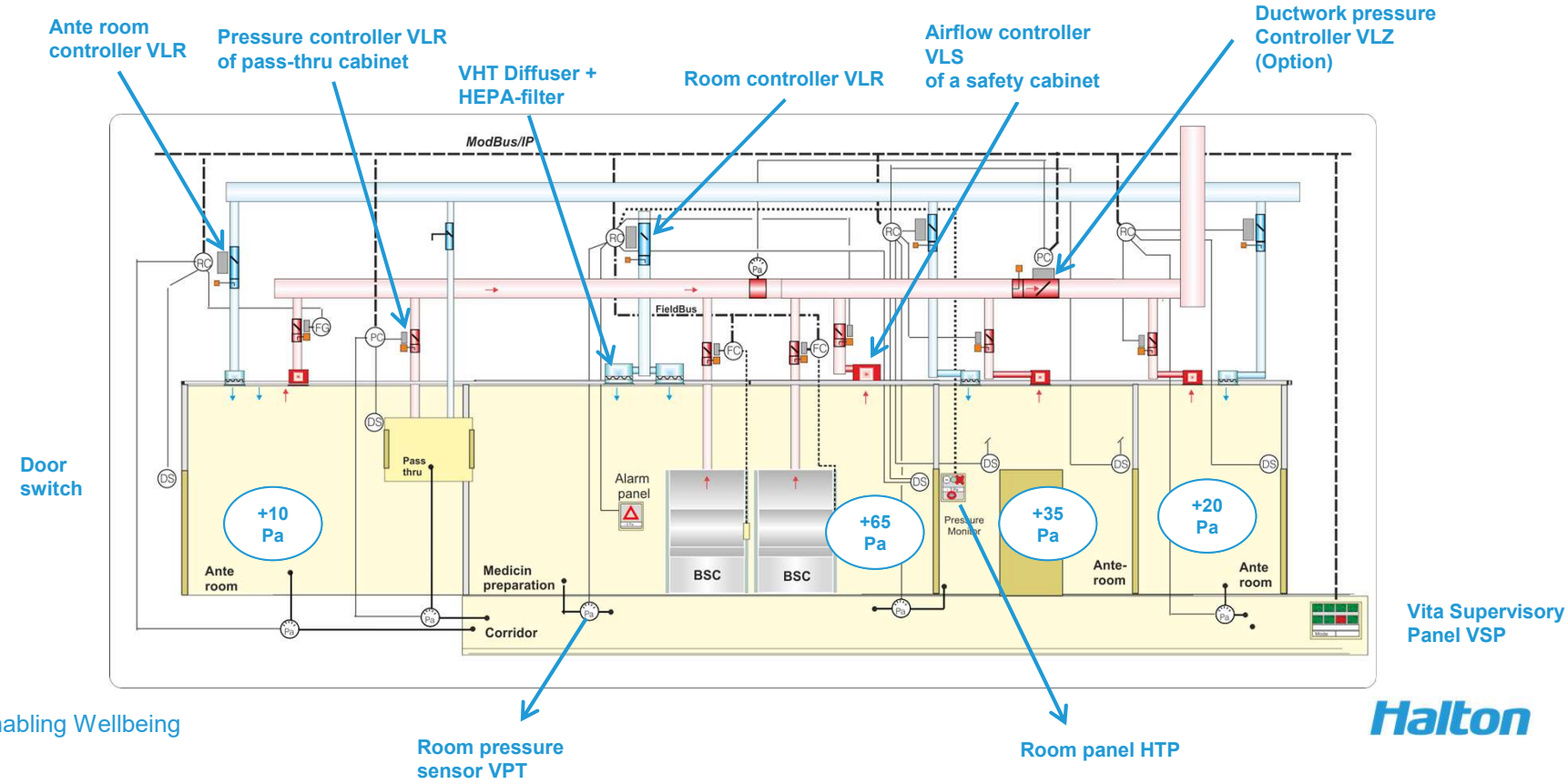
A cleanroom is any given **contained and controlled space** where pollutants like **dust, airborne microbes, and aerosol particles are filtered out** in order to provide the cleanest area possible.

Cleanrooms also control variables like **room pressure, temperature, airflow, and humidity**.

Where do Clean rooms exist?

- FOOD MANUFACTURING CLEAN ROOMS
- AUTOMOTIVE CLEAN ROOMS
- BIOTECH CLEAN ROOMS
- QUALITY CONTROL CLEAN ROOMS
- UNIVERSITY RESEARCH & STUDY CLEAN ROOMS
- MICROBIOLOGY CLEAN ROOMS
- MEDICAL DEVICE CLEAN ROOMS
- FORENSIC SCIENCE CLEAN ROOMS
- AGRICULTURE CLEAN ROOMS
- MANUFACTURING CLEAN ROOMS
- PHARMACEUTICAL CLEAN ROOMS
- HOSPITAL CLEAN ROOMS
- BIOSAFETY CLEAN ROOMS
- SEMICONDUCTOR CLEAN ROOMS
- MEDICAL MANUFACTURING AND STORAGE CLEAN ROOMS

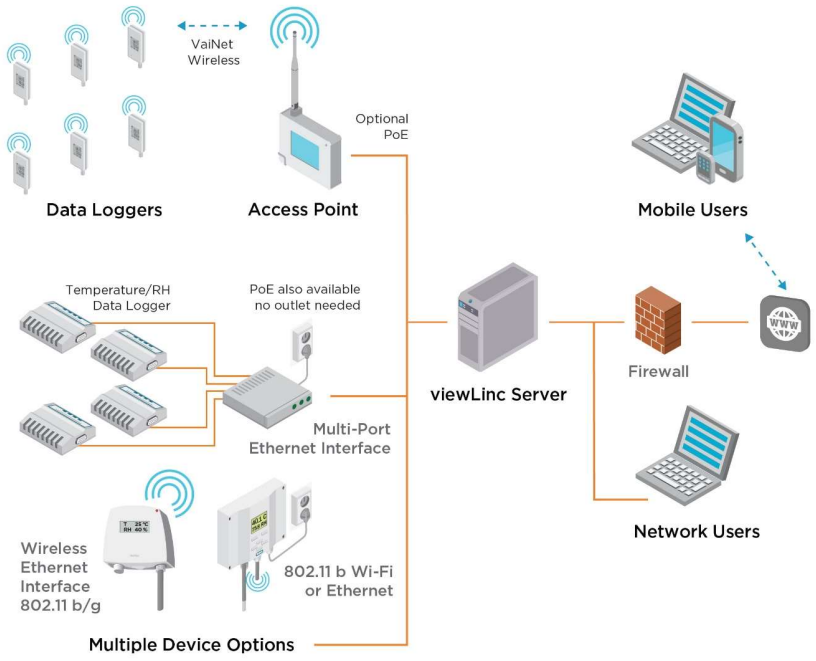
Clean room control diagram example



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Halton Vita Clean room Monitoring

Empowered by Vaisala viewLinc™



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Validated monitoring system
compliant to EU GMP regulations

Complete system delivery

Real-time data trending & complete data protection
Logging of all necessary environmental parameters
Connected with Ethernet / Wireless
Gap-free data acquisition
Redundant recording running parallel to control systems

Flexible alarming & automated reporting
User friendly interfaces for system users
- Graphical interfaces for data monitoring
- Mobile optimized interface for smart phones and tablets.
- Browser based access

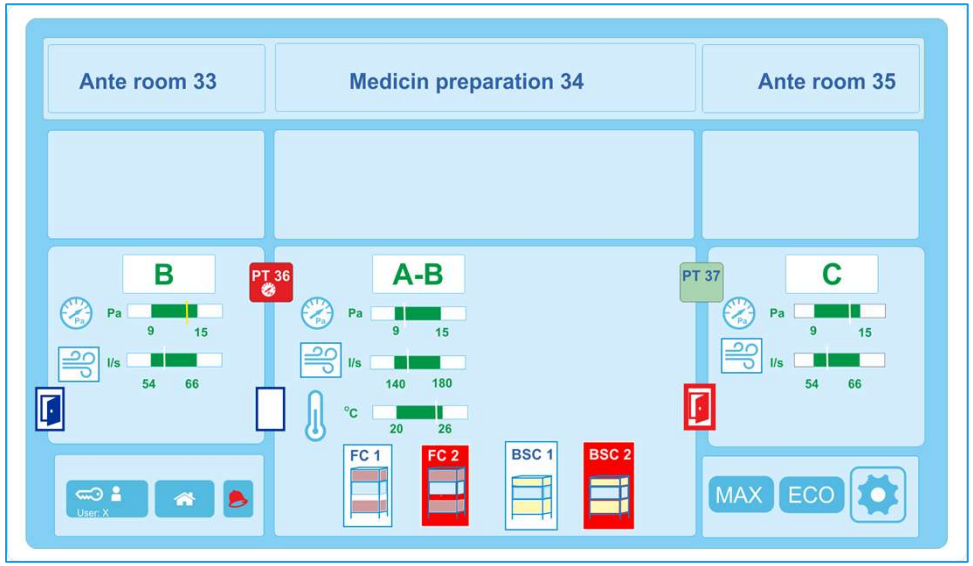
Custom reports on demand

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Control and Room panel HTP



Supervisory panel VSP



User interface for end users and service personnel

- Display and management of operation parameters and operation parameter changes
- Password protection for different user groups

Visual and acoustic alarm

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Airflow controllers for room supply air and fume cupboard exhaust control



Size	100	125	160	200	250	315	400	500
	l/s	l/s	l/s	l/s	l/s	l/s	l/s	l/s
VFC,VFA, VFN,VSC	6…39	10…61	16…101	25…157	39…245	62…390	101…628	157…982
VFH,VFI,VSD	9…47	12…74	20…121	49…188	44…295	78…468	126…754	196…1178

Recommended air flow range		Recommended application
VFC,VFA,VFN	0.8…5 m/s	Fume cupboard control VLS
x	0.8…5 m/s	Fume cupboard control VLS Separate exhaust fan
VFH,VFI	1…6 m/s	Room control VLR
VVI,VVH,VVP	1…6 m/s	Room control VLR Separate exhaust fan

Used for supply airflow control of a laboratory room or exhaust airflow control of fume cupboards using integrated control units

Material

- Material galvanized steel / stainless steel AISI 316L/PVC/PPS
- Option: antibacterial finishing

Fast actuator	LMQ24A-SR HI	NMQ24A-SR HI
• Running time 90 ^{O}	1,9 s / 2,5 s	4 s
• Torque	4Nm	8 Nm
• Sizes	100-250	315-500

Control cabinet

- Integrated into control damper; option separate control cabinet as option
- Galvanized steel

Airflow measurement

- Differential pressure measurement using orifice or differential pressure tube
- Pressure sensor PELH 2500-N
- Default range 0…200 Pa, changeable > 0…100 Pa tai 0…500 Pa
- Display for measurement value
- Inaccuracy +- 3 Pa, automatic zero-calibration

Airflow controller VLC

- Communication; Modbus RTU, Modbus/IP or BACnet/IP
- Exhaust unit communication to room controller: field bus RS-485

Transformer 230/24 VAC

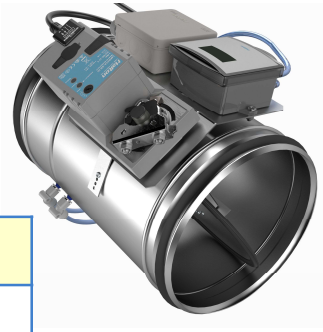
- Power supply for controller, actuator and sensors
- Capacity 32 VA; options 60 VA & 120 VA
- Option; no transformer, when centralized 24 VAC power supply for all units

Installation

- Safety distance 3 D from flow disturbances

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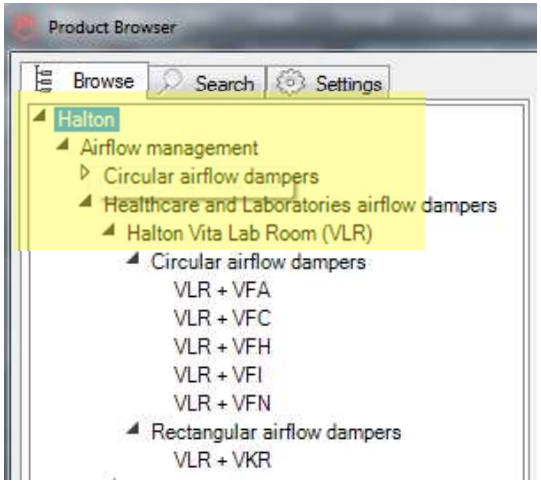
Airflow control damper & airflow control unit

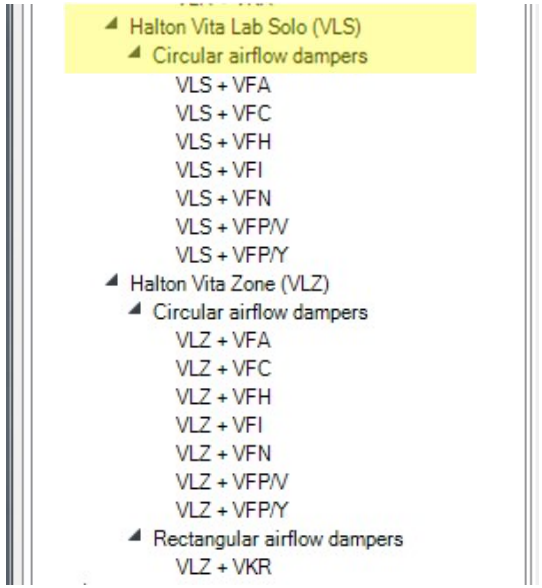


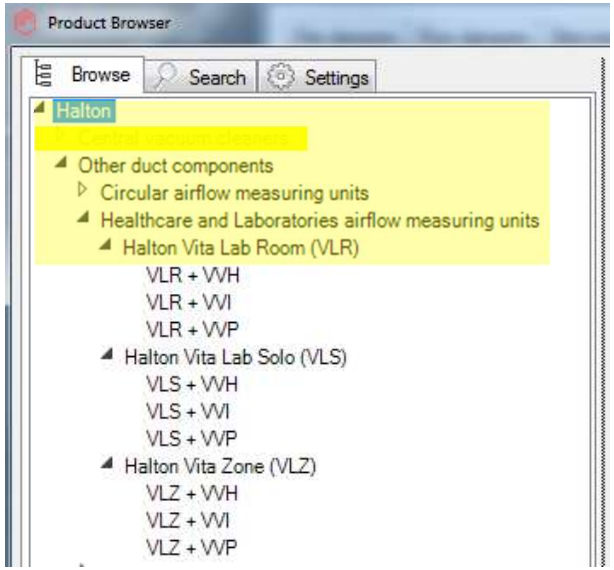
Code	Material	Sizes	Airflow measurement	Shape	Huom.
VFC	Galvanized steel	125...500	Orifice	O	
VFH	Galvanized steel	100...500	Pressure measurement tube	O	
VFA	Galvanized steel	125...500	Orifice	O	Antibacterial finishing
VFN	Stainless steel AISI 316L	125...500	Orifice	O	
VVI	Stainless steel AISI 316L	125...500	Pressure measurement tube	O	
VVH	Galvanized steel	100...500	Pressure measurement tube	O	Control unit for separate exhaust fan; no control damper
VVP	PVC/PPS Plastic	125...500	Pressure measurement tube	O	
VSD	Galvanized steel	100...500	Orifice	O	Control unit for separate exhaust fan; no control damper
VKR	Galvanized steel		Pressure measurement tube		

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Airflow control dampers & airflow control units in MagicCad









Ena VFC

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Integration of the Laboratory ventilation system

Communication

Room controller VLR communicates with fume cupboard controllers VLS via RS-485 field bus. The room controller receives continuously the updated airflow data from fume cupboard controllers. Additionally the room controller receives the measured airflows from local exhaust units in the room using voltage signals. Eventual constant airflow rates are also connected to the airflow calculation of the room.

The setpoints, measurement values and alarms of room controller VLR and zone controller VLZ can be communicated to building management system (BMS) for monitoring and the setpoints can be changed from the BMS system using ModBus RTU, Modbus/IP or BACnet/IP protocols.

Controllers can also be connected to building management system substation using standard voltage signals e.g. measurement values and common alarm.

Typical data to building management system via automation bus are:

Measurements

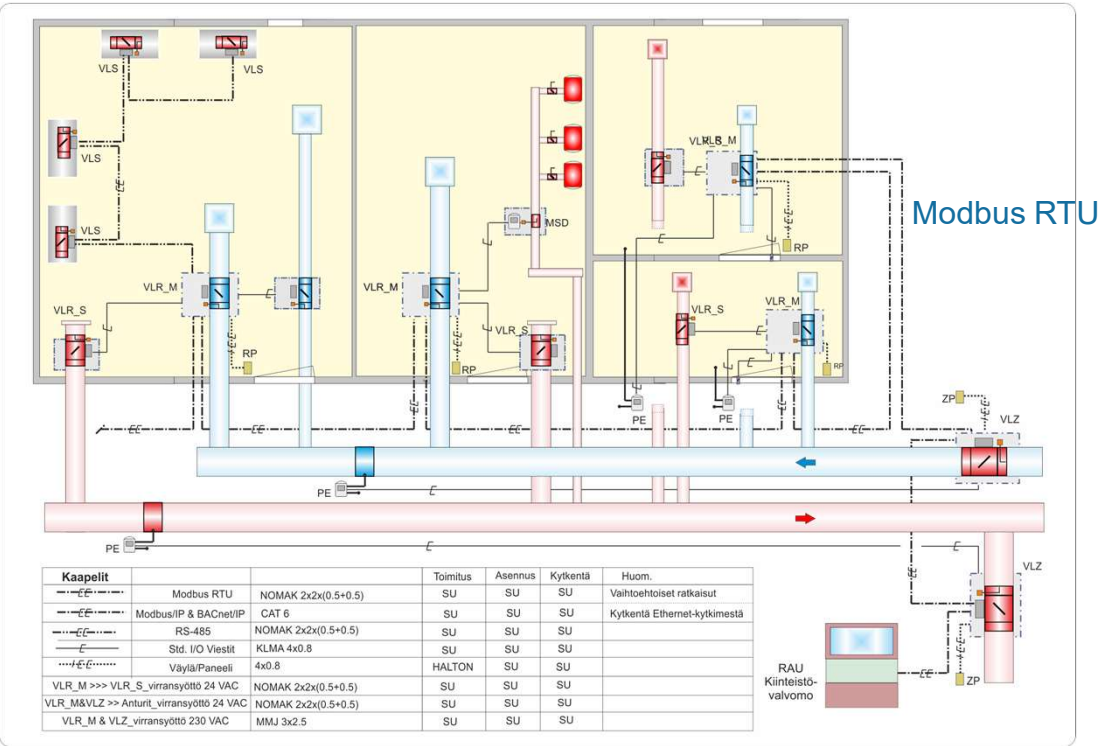
- Airflow rates
  - Exhaust air
    - Total exhaust air
    - Local exhaust units
  - Supply air
  - Total supply air
- Room pressure (in pressurized rooms)
- Room temperature

Alarms

- The room airflow is too low

Setpoints

- Airflow rate setpoints
- Airflow rate alarm limits



Kaapelit			Toimitus	Asennus	Kytkentä	Huom.
	Modbus RTU	NOMAK 2x2x(0.5+0.5)	SU	SU	SU	Vaihtoehtoiset ratkaisut
	Modbus/IP & BACnet/IP	CAT 6	SU	SU	SU	Kytkentä Ethernet-kytkimestä
	RS-485	NOMAK 2x2x(0.5+0.5)	SU	SU	SU	
	Std. I/O Viestit	KLMA 4x0.8	SU	SU	SU	
	Väylä/Paneeli	4x0.8	HALTON	SU	SU	
VLR_M >>> VLR_S_virransyöttö 24 VAC		NOMAK 2x2x(0.5+0.5)	SU	SU	SU	
VLR_M&VLZ >> Anturit_virransyöttö 24 VAC		NOMAK 2x2x(0.5+0.5)	SU	SU	SU	
VLR_M & VLZ_virransyöttö 230 VAC		MMJ 3x2.5	SU	SU	SU	

Integration of the Laboratory ventilation system; Modbus/IP, BACnet/IP

Communication

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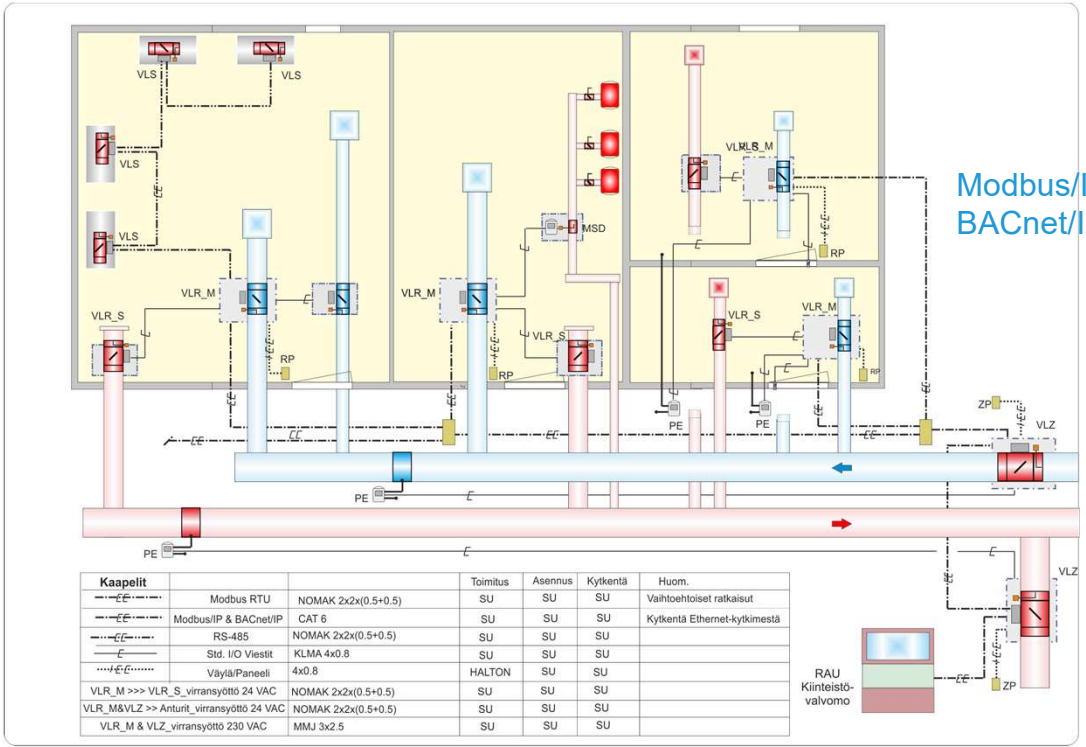
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	RS-485	NOMAK 2x2x(0.5+0.5)	SU	SU	SU	
	Std. I/O Viestit	KLMA 4x0.8	SU	SU	SU	
	Väylä/Paneeli	4x0.8	HALTON	SU	SU	
VLR_M >>> VLR_S_virransyöttö 24 VAC		NOMAK 2x2x(0.5+0.5)	SU	SU	SU	
VLR_M&VLZ >> Anturit_virransyöttö 24 VAC		NOMAK 2x2x(0.5+0.5)	SU	SU	SU	
VLR_M & VLZ_virransyöttö 230 VAC		MMJ 3x2.5	SU	SU	SU	

Halton Vita Lab System

Scope of Delivery

Code	Material	Installation	Cabling	Wiring connections	Note
1.1	Airflow control dampers; duct installation VLS,VLR VLZ	HVAC	EL	EL	
1.2	Airflow measurement unit MSD Duct pressure measurement unit MSS				
1.3	Supply and exhaust terminal unit equipped with filters		-	-	
2.1	Sash position sensor	Halton / Fume cupboard supplier according to agreement	EL	EL	
2.2	Velocity sensor				
2.3	Motion detector of fume cupboard				
2.4	Fume cupboard control panel HTP (VLS_CP)				
3.1	Room control panel HTP (VLR_RP)	EL	EL	EL	
3.2	Field bus RS-485				
3.3	Automation bus • Modbus RTU > RS-485 • Modbus/IP tai BACnet/IP > Ethernet				
3.4	Local exhaust units				
3.5	Airflow measurement sensor MSD				
3.6	Room pressure sensor VPT (VLR_PE)				
3.7	Duct pressure sensor MSS (VLZ_PE)				
3.8	Door switches				

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Halton Services for Halton Vita Solutions







Halton Design Support	Halton Start-up	Halton Life Cycle
• Co-designing with the customer: defining the requirements and performance targets, matching targets to optimal Lab solution • Halton Computational Fluid Dynamics (CFD) - Computational simulations are used for laboratory space design to ensure that the room air flow pattern does not interrupt the fume cupboard operation. This way, safe working conditions are guaranteed already at the design phase • Possibility for full-scale mock-up test for indoor environments conducted in Halton Innovation Hubs	• Vita Lab Solution includes always on site commissioning to ensure the safety and functionality of spaces and working conditions • Verifying and adjusting the optimal performance of room systems • Service people and end-user training	• Maintenance • **Remote control Halton Edge** • Regular system functionality evaluation

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Why choose Halton

Halton has vast experience in supplying solutions for various laboratory environments, such as university, pharmacy and industry laboratories.

- 30 years of experience in laboratory ventilation
- Unique double sensor technology for intelligent operation
- Europe’s largest hospital laboratory relies on Halton technology
- Improved safety conditions, energy efficiency and thermal comfort
- State-of-the-art innovations



References

- **HUSLAB** Tullinpuomi laboratory, Helsinki
    - Research laboratories, clean spaces
- **University of Eastern Finland**, SYK, Joensuu
    - Faculty of Chemistry
- **Snellmania** laboratory, SYK, Kuopio
- **Satakunta Central Hospital**
    - Pharmacy
- **Nya Karolinska Sjukhuset** (NKS), Stockholm, Sweden
- **Nytt Østfold Sykehus** (NØS), Kalnes, Norway
- **Grenoble Biological Research Center**, France
- **Bialystok University**, Poland

More at www.halton.com





