

VtV Solutions™ – The Variflow

Specialists in Ventilation to Validation

General Specification

Self Contained Unit

The Variflow is a new concept in Ultra Clean Ventilation Systems (UCV) giving users a variable speed unit, whilst using green technology fans.

Each of the three procedure settings maintain air quality and entrainment levels as set out in HTM 03. The users then benefit on energy savings whilst not using the UCV for orthopaedic surgery and have a facility that exceeds the cleanliness levels of a conventional theatre.

Final filtration is by eight HEPA filters of a 99.997% efficiency at 0.3 microns using H14 filters; accessed from within the clean zone, by removal of the hinged diffusers.

The fresh air and recirculation air is filtered by the use of G3 panel filters, positioned within the fan chamber and accessed from the underside of the canopy via hinged doors. The fresh air is ducted into the units above the false ceiling; recirculated air is via four linear grilles on the underside of the UCV.

Integrally built in are four fans, double inlet with built in rotor motors. Using EC technology fans, the Variflow can save up to 50% on energy, whilst using the unit in orthopaedic mode. Further savings can be gained when using the unit in conventional and ophthalmic operational settings.

Control Panel

The UCV is powered from a separate panel containing all; breaker, terminals, contactors, transformers and relays etc. On the face of the panel are housed all warning/indication lights. Controls include integral speed controllers to control the speed of each individual fan, operational modes and setback mode indicators along with individual fan fail warning lights. The unit is surface mounted and weights approx 120 kg.



Variflow Wall Control Panel

The Variflow Theatre Control Panel

The Variflow theatre control panel, will be suitable for being flush mounted into a opening within the Surgeons Panel (by others) or in a surface mounted box. This is manufactured from stainless steel or laminate and displays the standard user controls; indicating operational settings, General, Ophthalmic, Orthopaedic, System Healthy, Standby, Low Airflow and Airflow Fail Warning Lights along with Filter Condition.

Lighting

Internal lighting is provided with the use of four integral teardrop light fittings 570mm long single 55w tubes to provide a minimum level of 1000 lux within the clean zone, when minimum eight perimeter general lights are incorporated in the remainder of the theatre ceiling. The lights are wired to a common junction box, which allows them to be connected to the general lighting circuit.

Unit

The unit is constructed from welded mild steel sheets to form four identical quarters, which fit around the operating light stem. The four sections are bolted together and a steel mounted frame is fixed to the outside. This frame can be hung from drop rods or bolted to the slab or primary steelwork. (Primary steelwork is provided by others and method of fixing is subject to a structural engineers report). The unit is finished in a white polyester powder coated paint.

Dimensions

The overall dimensions of the unit are approx 4.0m x 4.0m x 0.6m deep and the unit, with the majority of the body recessed into the ceiling void.

Partial Walls

Partial walls extend down from the underside of the canopy to create a 2.87m x 2.87m clean zone. The partial wall is manufactured from 10mm acrylic.

Diffuser

The diffuser height can be positioned between 2.45m and 2.9m and the mounting frame between 3.0m and 3.45m; subject to site conditions and the choice of the operating light. Perforated sheet panels provide four air diffusers, suspended direct below the terminal filters; hinged to allow easy access to the HEPA filters.



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Application

To purge the number of any contaminants and particles generated within the clean zone during operation.

Operational Data

Operational Setting	Downflow Velocity	Entrainment Level	Noise Level	Electrical Consumption	Air Changes Per Hour
Setback	0.17m/sec	n/a	n/a	n/a	210
Conventional	0.24m/sec	< 1.0%	48dBa	1.6 amps	300
Ophthalmic	0.32m/sec	< 1.0%	51dBa	2.5 amps	395
Orthopaedic	0.38m/sec	< 1.0%	55dBa	3.6 amps	480

Entrainment levels are based on an upstream challenge concentration of particles, at the 0.3µ size, in excess of 368k

Entrainments levels recorded 280mm from the Clean Zone Perimeter, one metre from floor level and at 8 equidistant points around the clean zone.

Noise Levels recorded one metre from floor level in the centre of the Clean Zone

Technical Data

Standards Compliant with HTM- 03 – 01

Supply air volume 3.0 m³/sec

Return air volume 2.0 to 2.25 m³/sec

Fresh Air Volume 0.75 to 1.0 m³/sec

UCV Heat Gains max 4KW

Electrical Requirements 415v/3ph/16amp

Noise Level Not to exceed 55 Dba, subject to background noise

Manufacturing Data

Main Body Size 4.0m x 4.0m x 0.6m deep overall external dimension

Weight approx 1480 kg includes hanging frame

Clean Zone Size 2.87 m x 2.87 m

Glazed Canopy Height 2.0m FFL

Mounting Height 2.40 mtrs to 2.85 mtrs, these heights will accommodate the majority of Operating Lights

Performance Data

Discharge Air Velocity

Measured at 2mtr FFL to give an average of 0.38m/s within the clean zone in accordance with HTM 03-01

Measured at 1mtr FFL to give not less than 0.2m/s of any one reading taken in the inner zone of 1.8m x 1.8m (36 readings in total)

In order to ensure that the velocities can be achieved, its important that the fresh air serving the Variflow is :

Of an air volume between 0.75 to 1.0m³/sec

Of a temperature between 19°C to 23°C

Optimum performance will be achieved when the supply air is maintained at 1°C below the room air temperature.

With the velocities and temperatures set out as above, the performance of the UCV system will not be compromised by air being drawn into the clean zone, alleviating any possibility of microbiological contamination to exposed instruments and trolleys.

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