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HEATING SOLUTIONS

regavent

WHOLE HOUSE VENTILATION WITH HEAT RECOVERY

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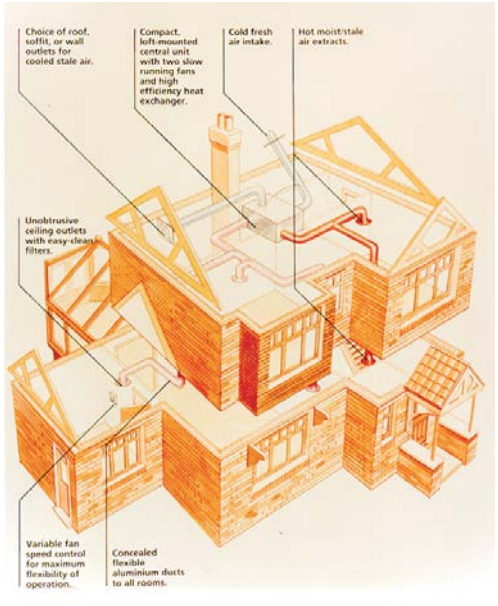
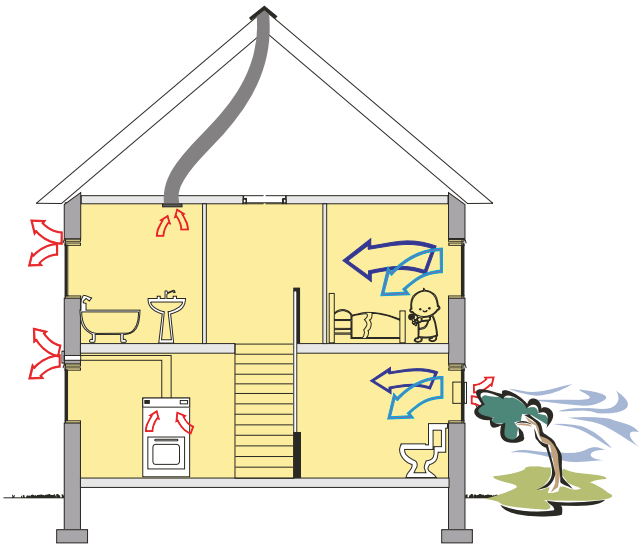
REGAVENT WHOLE HOUSE VENTILATION WITH HEAT RECOVERY

Ventilation is essential in modern well-insulated homes, not only to prevent the very visible problems associated with the moisture generation, but also to provide a better indoor environment by removing pollutants and providing fresh air. Mechanical Ventilation with Heat Recovery (MVHR) provides the most effective method of achieving energy efficient ventilation.

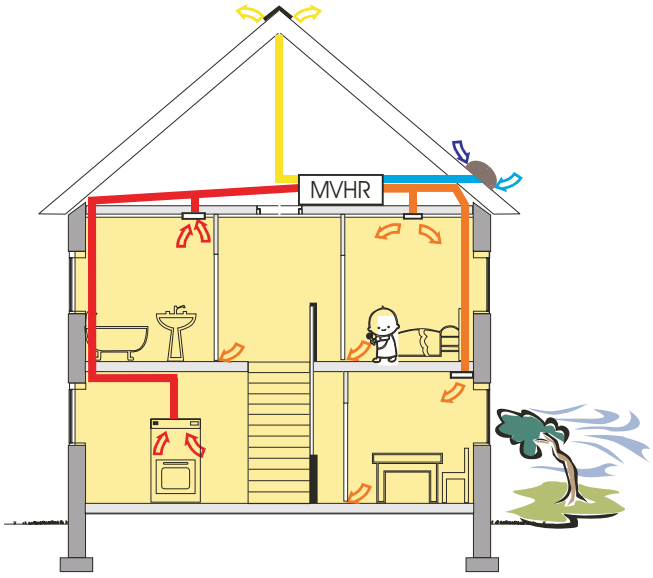


The key to efficient living space ventilation is controlled and balanced airflow. Traditional ventilation methods in the home rely on some form of extract to remove the moist air and pollutants, generally an extract fan or passive ventilation duct installed in the 'wet' rooms, where the water vapour is generated. The extracted stale air must be replaced by fresh air from outside and this is normally achieved by natural leakage through openings in the building structure and in modern buildings the installation of trickle ventilators. The provision of these replacement air openings means that the ventilation rates cannot be controlled with wind pressure and direction varying the airflow, as a result the air change frequency may be as high as four times an hour under turbulent conditions. Far higher than the one air change per hour generally accepted as the optimum level to maintain a fresh atmosphere in the home. This over ventilation achieves no gain in resident comfort but certainly wastes energy and causes potential occupant discomfort due to draughts.



Typical extract ventilation subject to wind pressure

Mechanical Ventilation with Heat Recovery provides a controlled way of overcoming this problem. The system utilizes a central air unit, housing two fans and a heat exchanger, that is connected by ducts to all the rooms of the home. One fan extracts the stale, moist air from the 'wet' rooms and the second provides an equal volume of replacement fresh air. This means that balanced ventilation is provided by the MVHR system and that there is no need for air leakage through the building structure.



Sealed house with MVHR ventilation

House leakage

In fact, to achieve efficient operation of the system it is essential to build to a very high sealing standard, minimizing the structural leakage that results in uncontrolled air changes. This means, not only, tightly fitting window and doors but also paying close attention to other potential leakage points such as the loft hatch, service pipes and overflows, all must be sealed against air entry. A natural ventilation rate of 0.2 air changes an hour due to structural leakage should be achieved, the MVHR unit will then provide forced ventilation of 0.5 air changes per hour with a potential for a 50% boost, up to 0.75 ach, under high pollution conditions. In this way the total target ventilation rate of one air change per hour will be achieved.

Thus, it can be seen that a combination of balanced ventilation and a tightly sealed dwelling will provide the most effective route to energy efficient ventilation.

The provision of a heat exchanger in the central air unit enhances this efficiency but the main gains come from control of the air change rates. Depending on the air flow rate a typical heat exchanger can recover up to 90% of the potentially wasted heat from the extracted stale air and this provides a useful contribution to the operational cost of the system.

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The Regulations

Document F & Scottish Regulation K

The present Building Regulation Document F, and Scottish Regulation K are concerned solely with 'the provision of adequate means of ventilation for people in the dwelling' and make little reference to air tightness of dwellings or heat recovery but concentrate on the provision of mechanical and non-mechanical means of ventilation in individual rooms. MVHR conforms to the regulation under the Alternative Approaches clause which states:

Building Regulation Document F

Alternative Approaches

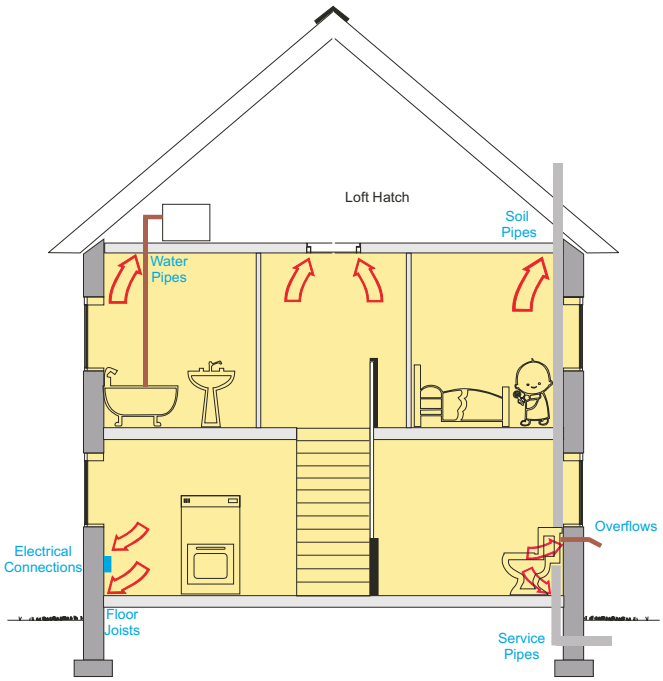
1.9 d. As an alternative to paragraphs 1.2 to 1.7 the requirement will be satisfied following the relevant recommendations of:

d. ***BRE Digest 398 Continuous mechanical ventilation in dwellings****: design, installation and operation. For the design of either*

- continuous balanced (supply and extract) mechanical ventilation to be provided throughout the dwelling;

or

- continuous mechanical extract ventilation to be provided in kitchens, utility rooms, bathrooms and other sanitary accommodation.



Special attention must be paid to potential leakage points

Digest 398 reinforces the need for a dwelling as air tight as possible for balanced mechanical ventilation, and confirms the requirement for trickle ventilators to supply replacement air for mechanical extract only systems.

Balanced MVHR systems conform to the Building Regulations without any other form of ventilation whether by extract fans, ventilation ducts or trickle vents.

Operating cost

Comparison parameters

The capital cost of a MVHR ventilation system varies in proportion to the floor area on the dwelling both in material and installation costs. Besides the obvious effect of the size of the dwelling and the number of rooms, various other factors affect the installation cost, is it an existing or new home? a bungalow or house? does the construction allow for easy concealment of the ducts? All factors that affect both the material and installation costs As examples the basic costs of materials for an installation in a two bedroom flat will be as low as £600 with the installation being carried out by two operatives in a single day. For a new four our five bedroom house that material costs would be in the region of £1300 to £1500, with installation taking the equivalent of two to three labour days during the construction of the dwelling

Cost Recovery

Whilst one cannot quantify the householder benefits of a correctly controlled, fresh, pollutant free home environment we can cost the benefits associated with the energy savings of heat recovery ventilation.

The following calculation shows a comparison of the air infiltration heating costs associated with two equal houses one with conventional construction and fan ventilation and one that is tightly sealed with MVHR installed.

Air Change Rates – Tests carried out by the BRE and other bodies has shown the natural air infiltration rates vary widely in the UK. Even nominally identical dwellings will have differing degrees of air tightness due to location and wind pressure effects. The CIBSE averages across the UK show that typical natural air leakage levels are;

City	1.0 ach
Suburban	2.0 ach
Country	3.0 ach

Heating Requirements – The heating season in the UK is the 7 months from October to April and from CIBSE the average temperature for calculation purposes is 7°C(South East) during this period. Indoor average temperature is assumed to be 21°C.

Heating Load – Heat required to raise 1 cubic metre of air 1°C = .34 watts

Peak Electricity	£0.0798 per kWh
Off Peak Electricity	£0.0280 per kWh
Gas	£0.0141 per kWh

The dwellings

House A

Volume	270 m^3
Natural Air Change Rate	2 ach

Mechanical Extract – Kitchen 60l/s (215m^3/h) 20W

Mechanical Extract – Bathroom 15l/s (54m^3/h) 15W

Both fans operate for an average of 1 hour per day

House B

Volume	270 m^3
Natural Air Change Rate	0.3ach
Mechanical Extract MVHR	23 hrs per day 135 m^3/h (0.5 ach) 90W
Mechanical Extract MVHR	1 hr per day 202 m^3/h (0.75 ach, 50% boost)

Building A Energy Cost of Ventilation

House A calculations

Heat loss due to infiltration 2ach of 270 m^3 @ 14°C temperature rise

= 540 x 14 x .34

= 2.57 Kw per hour

= 13,132 kWh per year

Heat loss due to fan ventilation of 270 m^3 @ 14°C temperature rise

= 270 x 14 x .34

= 1.29 Kw per hour

= 275 kWh per year

Total gas heating load for air changes (13,132kW + 275kW) x £0.0141 = £189.04

Fan operating costs 0.038kw 1 hour per day @ £0.08 per kWh = .038 x .08 x 365 = £1.11

TOTAL VENTILATION ENERGY COST BUILDING A £190.15

Building B Energy Cost of Ventilation

House B calculations

Heat loss due to infiltration 0.3ach of 270 m^3 @ 14°C temperature rise

= 81 x 14 x .34

= 0.386 Kw per hour

= 1,972 kWh per year

Heat loss due to HRV ventilation of 135m^3 @ 14°C temperature rise

= 135 x 14 x .34

= 0.643 Kw per hour

= 3,149 kWh per year

(23 hours per day)

Heat loss due to HRV ventilation of 202m^3 @ 14°C temperature rise

= 202 x 14 x .34

= 0.961 Kw per hour

= 205.46 kWh per year

(1 hour per day)

HRV air changes heating load less 68% average recovery (3,149kWh + 205kWh) x .32 = 1,073 kWh

A further reduction comes from the energy used by the supply air fan which is transferred to the incoming fresh air

= (((90 x 23)+(135 x 1))/2)/1000 = 1.102 kWh per day

= 234 kWh per year

Total gas heating load for air changes

(1972 + 1073kW - 234kW) x £0.0141 = £39.64

HRV operating costs

Normal winter operation ((90 x 23)/1000) x 365 x 7/12

= 441 kWh

Boost winter operation ((135 x 1)/1000) x 365 x 7/12

= 29 kWh

Normal summer operation ((45 x 23)/1000) x 365 x 5/12

= 157 kWh

Boost winter operation ((67 x 1)/1000) x 365 x 5/12 = 10 kWh

Total HRV electrical load = 637 kWh

HRV operating costs (637 x 17/24 x .0798) + (637 x 7/24 x .028) = £41.21

TOTAL ENERGY COST BUILDING B £80.85

COST SAVING WITH HEAT RECOVERY VENTILATION £109.30 PER YEAR

THE BENEFITS OF THE SYSTEM

Meets the requirements of the Building Regulations Part F.

Moist air extracted at source and condensation problems therefore virtually eliminated.

A high level of extracted heat retained - up to 90%.

Retained heat used to increase temperature of incoming fresh air.

Fresh air can be taken from inside a well ventilated loft space or from outside the house.

Variable air speed control from 40% to maximum.

Quiet and efficient in operation.

Ventilation and extraction is through unobtrusive ceiling vents.

Bendable aluminium ducting and metal connectors supplied. Ducting Fire Resistant 15 minutes to BS476 Part 8.

Draught free ventilation - the fans create a gentle continuous air flow under slight negative pressure.

Windows can be shut and locked for security, and noise entry from outside reduced.

Optional summer bypass allows the system to be used throughout the year.

250C unit with integral cooker hood

HOW THE REGAVENT HRV SYSTEM WORKS

Increasing costs together with environmental considerations have lead to an ever increasing need for energy conservation. To meet this requirement house construction methods have been changed to achieve a high level of air tightness. Air tight houses have tightly fitting windows and doors, in addition all cracks or holes for service pipes in the exterior shell are sealed. As a result reduced air leakage gives lower fuel bills and enhanced comfort by the elimination of cold draughts. Unfortunately, these benefits can be offset by increases in humidity levels and a build up of indoor pollutants due to lack of fresh air in the building. The most effective answer to indoor pollution is ventilation which may be achieved by mechanical or non mechanical means. Non mechanical means such as opening windows or using window vents and wall grilles is completely uncontrolled and will vary depending on wind direction and force, often resulting in low levels of ventilation on cold still winter days when condensation problems are often at their worst. Simple mechanical ventilation systems whether by extract fans in bathrooms, WC's and kitchens or by loft mounted inlet fans that pressurise the dwelling and force air to escape through cracks and gaps around doors and windows, give greater control over ventilation rates, but they are still dependant on leakage to replace the extracted air and result in high heating costs due to the extraction of heated air and the need for the replacement air to be warmed to indoor temperature. Whole house ventilation systems control the ventilation rate throughout the dwelling by using an inlet fan to bring fresh air into the dry areas of the house, e.g. living rooms, bedrooms etc. and an extract fan to remove a similar volume of moist stale air from the wet areas of the dwelling, e.g. kitchens, bathrooms etc. Thus the ventilation system is balanced and is not dependant on replacement from uncontrolled leakage for its operation. In addition the air to air heat exchanger recovers an average 70% of the heat from the extracted air giving a further reduction in heating costs. Heat Recovery Ventilation saves energy and reduces heating bills by controlling and balancing the air changes in the home whilst recovering heat from the extracted stale air. At the same time it ensures a fresh healthy household environment free from indoor pollution.

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THE COMPONENTS OF THE REGAVENT HRV SYSTEM

Air Handling Units

The central air unit is the heart of any whole house heat recovery ventilation system, it houses two fans, one extract and one supply, and a heat exchanger.

Regavent 650 with mounting cradle

The extract fan removes stale moist air from the home and the supply fan brings fresh air in to replace the extracted moist air.

Designed for loft or wall installation the RegaVent central air units are designed for continuous ventilation of domestic dwellings and small commercial premises. The unit casings are manufactured from strong, corrosion resistant galvanised steel, this houses a long life plastic heat exchanger, thus the only wearing parts are the fan motors.

Selected for durability and performance the fan motors are of external rotor design. With sealed for life ball bearings they are quiet running and completely maintenance free in operation. Experience has shown that under normal 24 hour operating conditions the expected motor life should exceed 10 years.

The heat exchanger is of counter flow design, a layout calculated to give the highest level of efficiency. An average 70% of the heat is extracted from the stale air and transferred to the incoming fresh air. The heat exchanger requires no maintenance under normal operating conditions but may be removed for cleaning if an exceptional build up of grease or dust makes this necessary. Alternatively replacement units are available at low cost.

The cental air units incorporate filters for dust removal on both extract and fresh air supply. The washable filters protect the heat exchanger from the build up of dust and from grease and other particles in the stale air. Frequency of cleaning of the filters is dependant on the level of contamination but typically would be an annual operation.

DC Motors

Both 325 and 650 units are available with the option of 48 volt DC motors offering reduced energy consumption. Although the initial cost of the DC motors is higher than AC, the energy savings can recover the initial outlay within six to eight years. DC motors convert two thirds of the power used into useful work compared to only a half for AC motors. Reduced electrical losses mean lower temperatures and less thermal stress giving longer motor life and continued electrical savings many years into the future. Central air units with DC motors are supplied ready fitted and wired with the correct electronic power supply.

Noise

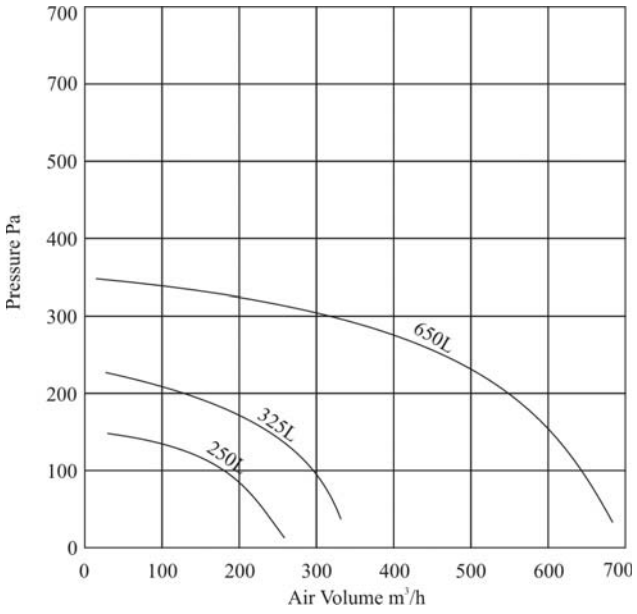
Any ventilation system must be unobtrusive in operation and low noise is thus of great importance, to this end RegaVent central units are supplied complete with an acoustic/thermal insulation jacket. Manufactured from high density close cell neoprene foam the jacket not only prevents noise breakout from the unit but also reduces heat loss to maintain thermal efficiency. To further ensure quiet operation each unit comes with a mounting cradle incorporating rubber mounts, preventing noise transmission to the structure.

When the cool incoming air and the warm stale air pass across the heat exchanger the moisture in the stale air condenses. All RegaVent Cental Air Units are supplied with a drain connection and small diameter hose to allow this condense to be drained away from the unit.

The 250W central air unit is designed with all duct connections located at one end of the casing making it suitable for wall mounting. This makes the unit ideal for use in flats or other situations where no loft space is available. It may be mounted in a cupboard or can be supplied with an integral cooker hood for mounting above a hob unit. The dimensions of the 250 are identical to a standard kitchen cupboard allowing the casing to be concealed using a kitchen unit door, thus blending with the overall kitchen style.

Air Handling Units

Performance Curves



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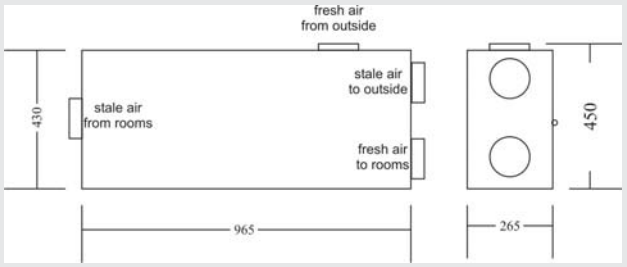
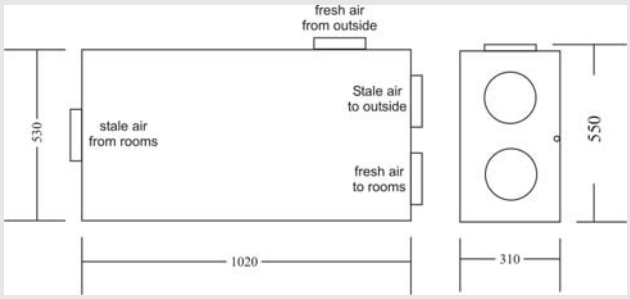
Dimensions

Regavent AHU325 (Duct Connections 125mm)



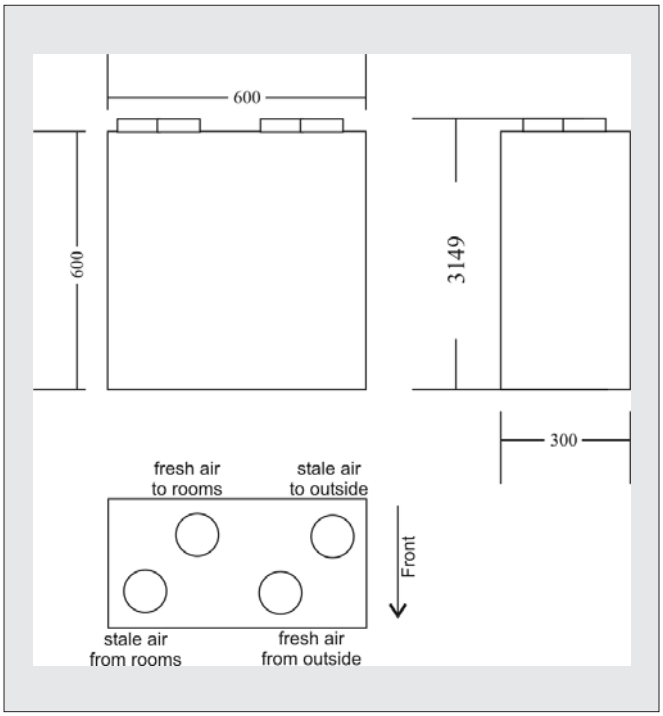
Regavent AHU650 (Duct Connections 160mm)



Regavent AHU250

Ideal for wall mounting, the AHU250 has an extraction rate of 250m^3/h providing the correct air change rate for dwellings with floor area up to 145 M^2. Suitable for use in flats where no loft space is available, the addition of the integral cooker hood allows an unobtrusive and energy efficient kitchen installation.

Regavent AHU250 (Duct Connections 100mm)



Regavent AHU650

The exceptional air movement of the 650L unit makes it the only choice for use in very large homes or commercial premises, up to 400m^2 floor area. Designed primarily for loft mounting the AHU may also be installed in other locations inside the habitable area. Quietness has been the paramount consideration in the design of the 650L and all aspects of the relationship to the dwelling have been considered. The unit uses two slow running double inlet blowers each consuming 200 watts at maximum output but only generating a very low sound power level of 58dBA. This is further reduced by an acoustic treatment to all external surfaces and the provision of a purpose designed support cradle using anti-vibration mounts to prevent any noise transmission through the building structure.

Integral electronic control allows speed selection of the high efficiency motors. Up to four preset speeds are available giving air volumes from 250m^3/h to 680m^3/h. This wide range allows the air movement to be selected to suit the occupancy of the dwelling with the potential for trickle ventilation when the home is unoccupied to a high level of boost for periods of exceptionally high occupancy.

Regavent AHU325

Designed primarily for loft installation the 325 air units is suitable for 3 to 5 bedroom homes. With a ventilation rate of 325m^3/h the 325 will provide ventilation for a floor area of 200 M^2.

Specification

Unit Reference	325	325D	650	650D
Air Volume m^3/h (at free discharge)	325	325	680	680
Duct Connection mm	125	125	160	160
Power Consumption W	140	76	184	94
Power Supply V	230AC ~ 50 Hz	48DC	230AC ~ 50 Hz	48DC

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DUCT SYSTEMS

Supply air ducts distribute the warmed fresh air from the central air unit to the dry areas of the house, living rooms, dining rooms and bedrooms. These ducts are normally 63mm or 100mm diameter and will be insulated in the loft where heat could be lost. Insulation is not necessary if the ducts are in the living areas, i.e. running through first floor cupboards or between floor joists as any heat lost from the duct will be gained in the dwelling.

It should be borne in mind that the incoming air, although pre-warmed will be cooler than room temperature and could result in cold draughts. To avoid this the RegaVent air grilles are installed at ceiling level and are designed to mix the new fresh air with the room air to balance temperatures.

Each air duct system incorporates a sound absorber to reduce noise entry from outside and also help prevent sound from the supply air fan being carried to especially sensitive areas such as bedrooms.

Exhaust ducts remove the stale moist air form the "wet" areas typically kitchens, bathrooms and utility rooms. These ducts should be insulated in the loft space but can be un-insulated in the dwelling. Exhaust ducts may incorporate sound absorbers although this is less important than for the supply.

External ducts connect the central air unit to outside. Their termination may be roof or wall mounted. In the case of the supply air inlet this must not be sited close to flue outlets, soil vent outlets, garages or in any other position which could result in fumes entering the home or in contamination that could lower the incoming fresh air quality.

FILTERS

The central air unit incorporates coarse filters to remove dust and insects that could block the heat exchanger core. Each room grille and the cooker hood contain individual filters to further improve fresh air cleanliness and protect the heat exchanger on the exhaust air side. Three different densities of filter are available. The finest will remove pollen size particles to help relieve the symptoms of hay fever and asthma. These filters also help to balance the air flow to individual rooms and it will be found that inlet grilles may house several filters of different densities. Always ensure that the same filter sets are returned to each grille to prevent the balance of the system from being disturbed.

CONTROLS

All RegaVent HRV systems include a conveniently located fully variable speed control or a low/high speed switch to enable the air flow rates to be adjusted to suit the level of occupancy of the dwelling and the individual requirements of the home owner. In addition humidistats may be installed to automatically increase air movement when demanded by rising moisture levels caused by bathing or cooking. Humidistat ceiling grilles are available allowing the sensor to be installed close to the moisture source. A summer/winter switch may also be provided to allow use of the extract fan only during the summer when fresh air is provided by open windows thus allowing continued powered extract from the moisture producing areas. Finally, a reset timer may be linked to an existing room light to increase air movement when the light is switched on and for a predetermined time after the light is switched off.

OPERATING YOUR REGAVENT HRV SYSTEM.

To obtain maximum benefit from your RegaVent system it should operate continuously throughout the heating season on a 24 hour basis, this will ensure a fresh household environment and prevent the harmful affects of condensation. During summer months where windows are opened it is not necessary to use the system, although if a summer/winter switch is provided it may be preferable to keep the extract fan in operation to provide rapid removal of stale, moist air. The system may be operated throughout the year if, for reasons of outside noise or security, open windows are not desirable.

HOW MUCH AIR ?

Your RegaVent HRV system is designed to give a complete air change every two or three hours throughout the dwelling at its normal operating speed, at maximum speed this is increased by 50% to help clear moisture and odours more quickly during periods of heavy contamination. This air change rate is the optimum to keep the air in the home fresh whilst conserving energy. The air exchange rate is based on house volume and makes no allowance for occupancy, whereas the indoor air quality is very much affected by the number of people occupying the space at any one time. A recommended requirement for each occupant is 25 cubic metres of fresh air per hour, thus it can be seen that 2 people would require 50 cubic metres of air per hour and 6 people 150 cubic metres, this is regardless of the volume of the space that they are using.

Variable speed control provides control of the system to give varied rates of air change to match the requirements of occupancy and pollutant generation. This is at user control but it should be remembered that too little ventilation will adversely affect air quality. After a short period of use the optimum levels to suit individual needs will be found.

SYSTEM DESIGN

RegaVent heat recovery ventilation is designed to control the ventilation rates within the home. To operate efficiently with maximum economy it must be installed in relatively airtight dwellings. Any uncontrolled ventilation will reduce the cost savings offered by its installation and result in undue air movement and reduced comfort. Most new homes, especially those of timber frame construction, will meet the standards of airtightness required for efficient heat recovery ventilation. In fact their well sealed construction makes it use almost essential. For older homes care must be taken to reduce air

leakage to minimum. This will entail not only draught proofing windows and doors but also sealing around frames to fill all cracks and ensuring that gaps around overflow pipes and other services that break through the building structure are correctly sealed. In addition disused chimneys should be blocked or fitted with flue dampers to prevent the massive air leakage that can occur through this route.

AIR CHANGES

Research has shown that air change rates of a half to one air change per hour throughout the dwelling are sufficient to prevent the damaging effects of excessive moisture levels and prevent the build up of harmful indoor pollutants. In sealing the structure the aim should be to reduce air leakage to approximately 0.2 air changes per hour, this may be checked by pressure testing. The HRV system should then be sized to produce an air change rate of 0.3 to 0.5 air changes per hour with an additional allowance to increase the ventilation rate by a further 50 percent as a boost facility to enable increased ventilation during periods of high moisture or pollutant production. The total air change rate in the dwelling will be 0.5 to 0.7 air changes per hour under normal operation and up to 0.95 air changes with the HRV system working at maximum volume.

SIZING THE CENTRAL AIR UNIT

To achieve the air change rates detailed above the volumes of the habitable areas of the house including halls and landings should be calculated and totaled to give a whole house volume figure which should then be multiplied by 0.75 to give the required normal volume for 0.5 air changes per hour plus the allowance for 50% boost.

From the fan performance graphs the central air unit should be selected to produce the required air flow against a pressure of 50 Pa. This gives an initial allowance for the resistance that will be encountered in the air distribution ducts, the exact figure will be calculated once the detail system layout is finalised.

POSITIONING THE CENTRAL UNIT

Generally HRV systems are quiet in operation, but to isolate noise from the living area of the dwelling it is preferable to install a loft mounted central air unit as any possible noise breakout is then isolated from the occupants. In flats or other types of dwelling where no roof space is available a cooker hood unit should be used in preference to a cupboard installation as fan noise is more acceptable in the kitchen than in other living or sleeping rooms.

When siting the loft mounted unit the following points should be borne in mind:

a/ Site the unit where any noise nuisance will be reduced, i.e. away from the loft hatch and over a bathroom or landing rather than a bedroom.

b/ Periodic maintenance will be required thus the unit must be accessible having sufficient room above to remove the top for access to the fans and heat exchanger and at the sides for access to the electrical connections.

c/ The unit should be located in the loft to minimise the length of duct runs especially the connections to outside the house as these always carry the maximum air volume and have the greatest flow resistance.

d/ A condensate drain tube will need to be routed from the unit to a suitable drainage point such as a sink waste, above the trap, or through the soffit to a rainwater drain. This tube must always be below the level of the base of the central unit to prevent the build up of water in the unit casing.

GRILLE POSITIONS

EXTRACT grilles are installed in the “wet” rooms of the home, bathrooms, shower rooms and kitchens etc. and they should be positioned in each room as close to the main source of moisture as possible to ensure that the water vapour that causes condensation is removed as soon as possible. To this end grilles should be sited directly over baths and showers and in the kitchen a cooker hood should be installed if possible. The heat generated by the cooker provides a good source of energy to be recovered by the system and wherever possible the hood should be ducted to the central air unit rather than exhausted directly to outside.Any hood or canopy may be used in conjunction with the RegaVent system but no fan is required, just a filter and light. To ensure maximum extract from the hood a zone valve is installed in the bathroom extract run, this closes when the cooker hood light is operated to direct 80% of the extract performance to the hood. A high extract rate is achieved with low noise levels due to the remote operation of the fan.


ceiling grille

It is possible to connect a tumble drier into the system but in this case two points should be considered. Firstly, protection of the heat exchanger in the central unit from blockage by installing a filter unit in the duct to remove cloth fibres and secondly to ensure that there is no back pressure on the tumble drier that could cause potentially damaging overheating.

If a conventionally flued heating appliance is situated in a room requiring extract, supply air must also be ducted to the room to ensure a balance of air flow that will not interfere with the combustion process of the appliance.

INLET grilles supply fresh air to the “dry” rooms i.e. bedrooms, lounge, dining room etc. These grilles should be installed as far as possible from any door in the room to ensure that the air permeates the whole room before exiting en route to an extract point in a “wet” room. It should also be borne in mind that despite the high a rate of heat recovery the incoming air will always be colder than the extract air, therefore giving the impression that it is cool when compared to room temperature. The grille design helps to reduce the effect of this cooler air by diffusing it at high level to mix with the hotter room air, the grille is also non-directional to prevent cold draughts. Despite these measures it is still preferable to site the grilles away from potential problem points such as directly above beds. Usually a point close to a window is ideal. No air is supplied into halls or stairways as these are used as transfer areas allowing fresh air to flow from the “dry” rooms to replace the stale air being extracted from the “wet” rooms. This directional circulation helps prevent the spread of odours and moisture.

GRILLE OPTIONS

The light grille incorporates a 50 watt low voltage lamp to give a feature light in any part of the home. Being of SELV design the unit can be safely installed

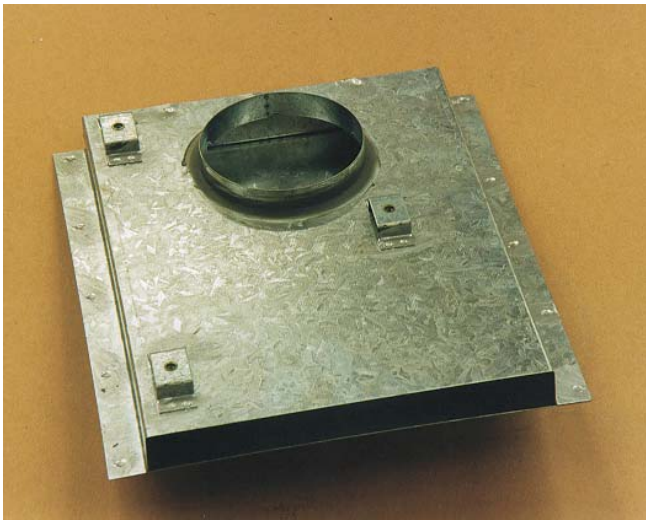
directly above a bath or shower to give extra light and air extract right where its needed. The low voltage lamp is supplied complete with a 230v/12v AC transformer.

DUCTING TYPES

There are four types of flexible ducting available for use in RegaVent systems these are flexible aluminium, rigid steel, low profile steel and rectangular plastic. Generally, aluminium flexible is used for most applications as it combines fire and corrosion resistance with ease of use. The slightly higher air flow resistance of this duct is offset by the ability to form gentle bends that create less turbulence. Aluminium flexibles are light and easily formed to bends and offsets. Rigid spiral steel ducts have the advantage of great strength and are used where damage may be a problem such as in exposed situations or where sited in a loft space which is used for storage. Due to the need for purpose made bends the system cost is higher and installation time extended. In domestic use steel ducts may be used for vertical duct runs in cupboards or wardrobes where the additional cost is offset by the saving made from not boxing in.

Low profile galvanised steel ducts are usually only used in flats, where the low, 25mm, profile allows for ceiling mounting and subsequent easy concealment with battens and plaster board.

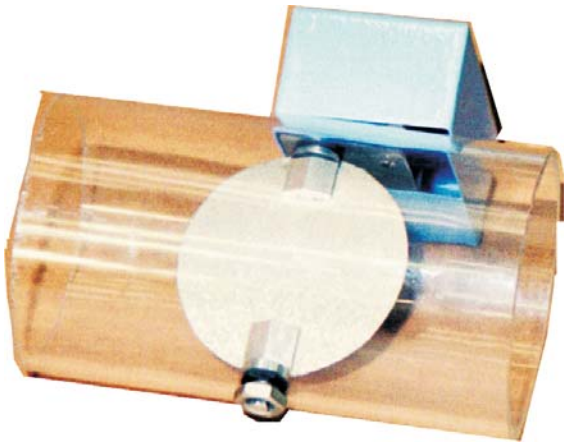
The plastic rectangular duct is commonly used in houses to provide concealed drops between floors, here its low profile allows installation within stud wall cavities. A full range of plastic fittings allows the transition between the circular and rigid duct.



ZONE VALVES

Zone valves are a low cost motorised damper allowing more flexibility in the design of the system. They may be used to increase the flow of air in certain rooms or areas on demand when required, as in the case of the passive cooker hood system. Or they can help recover from warn areas of the home, as an example, conservatory air temperatures increase dramatically in the spring or autumn sun, with an extract duct, a zone valve and thermostat, the HRV system can obtain another useful source of heat as the temperature rises.

The zone valve utilizes an almost silent thermal motor which uses only 4 watts of power in operation.



ROOM SUPPLY AND EXTRACT DUCTS

Having now decided on the position of the grilles and central air unit the duct runs may be planned bearing in mind the following:

a/ Do not undersize the ducts, high air velocities increase pressure loss and generate noise. The following maximum flow rates are suggested:

63mm	40 cubic metres per hour
100mm	100 cubic metres per hour
125mm	250 cubic metres per hour.

b/ Endeavor to run ducts around the perimeter of the loft space to allow future use of the loft floor.

c/ When planning the duct runs avoid tight bends to reduce pressure loss.

d/ All ducts in unheated areas should be insulated to prevent heat loss.

e/ Always fit a fire damper in the extract duct from the cooker hood.

f/ As a minimum a sound absorbing section should be installed in the supply to rooms duct run, as close as possible to the central air unit. This will reduce noise levels in sensitive areas such as bedrooms where noise entry from outside or even very slight fan noise can be a nuisance. A sound attenuator may also be fitted in the extract run, this is dependant on the preference of the user or site conditions.

g/ Factory insulated acoustic duct is available, this provides both thermal and acoustic insulation. When used in the loft space it ensures an energy efficient system that is very quiet in opteration.

FRESH AIR FROM OUTSIDE AND STALE EXHAUST DUCTS

Connections to outside are necessary to exhaust the stale air and bring in fresh air, the AHU incorporates a filter to remove dust and particles from the incoming air. Both supply and extract termination's can be made via wall grilles, roof terminals, ridge tiles or soffit grilles but in any case must be sufficiently separated to prevent exhaust air from being drawn in the fresh air

supply. If using outlets supplied with the roofing system ensure that they have a free area equivalent to the duct size of the unit, in some cases this will mean the use of two or even three outlets with the use of tee pieces to produce a manifold.
When siting the supply air inlet ensure that it is not positioned close to any flue or foul air outlet that could result in pollution of the incoming air.

SYSTEM RESISTANCE

With the positioning of all room grilles and the exhaust and intake connections the duct layout is complete and the system resistance may be calculated to ensure that it does not reduce the output of the selected central air unit below the required air volume. The maximum resistance is that of the longest duct run, if two duct runs are similar both should be calculated to find the greatest. Duct resistance is a factor of size and air volume and may be found from the product fact sheets, in addition an allowance must be made to compensate for the extra resistance of each bend in the run.

The bend allowances are dependant on bend radii as follows:-
1 x Tube diameter = 2.6 Pa
2 x Tube diameter = 2.3 Pa
4 x Tube diameter = 2.0 Pa
An additional allowance must be made for the room inlet grille and the exhaust or supply air terminal, depending on which duct run is under consideration. This will depend on the type of unit and the air velocity but as a guide figure 15 Pa should be used and this should be added to the calculated system resistance to give the total pressure loss.

If the system resistance reduces the unit output below the required level a larger central unit should be selected or the duct sizes may be increased to reduce pressure losses.

ELECTRICAL

A mains isolator switch must be installed adjacent to the central air unit to allow its isolation for maintenance.
All systems should include a variable speed control to allow adjustment of the air volume to meet varying demand conditions. In addition further control can be achieved by the addition of humidistats, time delay units or summer/winter switches. Both of the former are designed to increase air flow, over-riding the speed control, to meet the demands of greater moisture production. The humidistat is generally installed in shower and bathrooms to sense increased moisture level in the air, when this is detected it turns the central air unit to maximum volume until the level returns to normal. To minimise response time the humidity sensor should be wall mounted at high level as close as possible, compatible with electrical safety, to the source of moisture i.e. above the bath or shower. The time delay unit is used in conjunction with a room light or door switch in order that use of the room signals the central air unit to operate at maximum volume and to continue to do so for a timed period after the room is vacated. The over run timer is variable at the choice of the user and may be adjusted in the range of 1 minute to 40 minutes. The summer/winter switch isolates the supply air fan allowing the use of only the extract side of the system during warmer weather when open windows can provide the replacement fresh air.

AIR CONDITIONING OPTION

To provide summer cooling a loft mounted air conditioning option is available for the RegaVent HRV system. This unit provides 500 m^3/h of air per hour and at this flow rate will achieve a temperature reduction of 8°C with an outside air temperature of 25°C. This will provide cooling for an area of up to 30 square meters. With this relatively small volume the unit provides an economic method of summer cooling but cannot operate throughout the home. Thus, the duct system needs to be zoned to allow the cool air to be routed to selected parts of the dwelling, perhaps the living rooms during the day and the bedrooms at night.
To convey the larger air volumes required for cooling the supply air duct sizes will need to be increased, generally to 160mm in the loft area. Should the AC option be required please indicate this to our design team who will be pleased to quote the alternative design possibilities.

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