SPC

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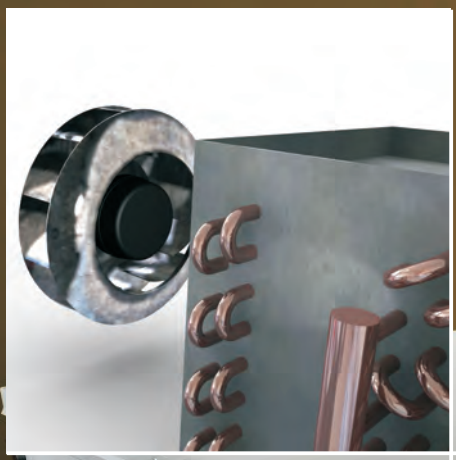
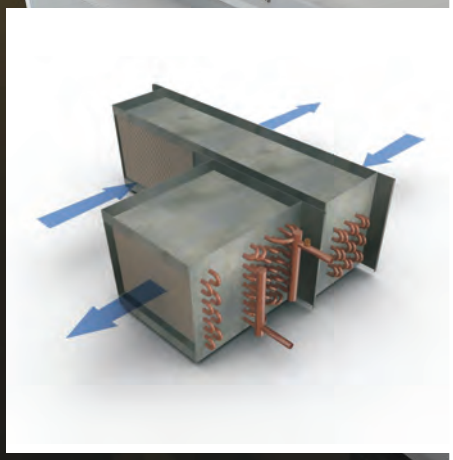
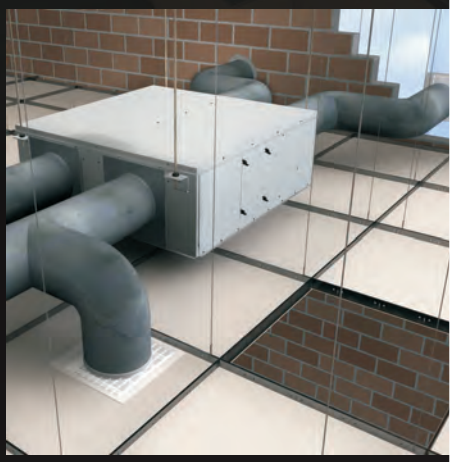
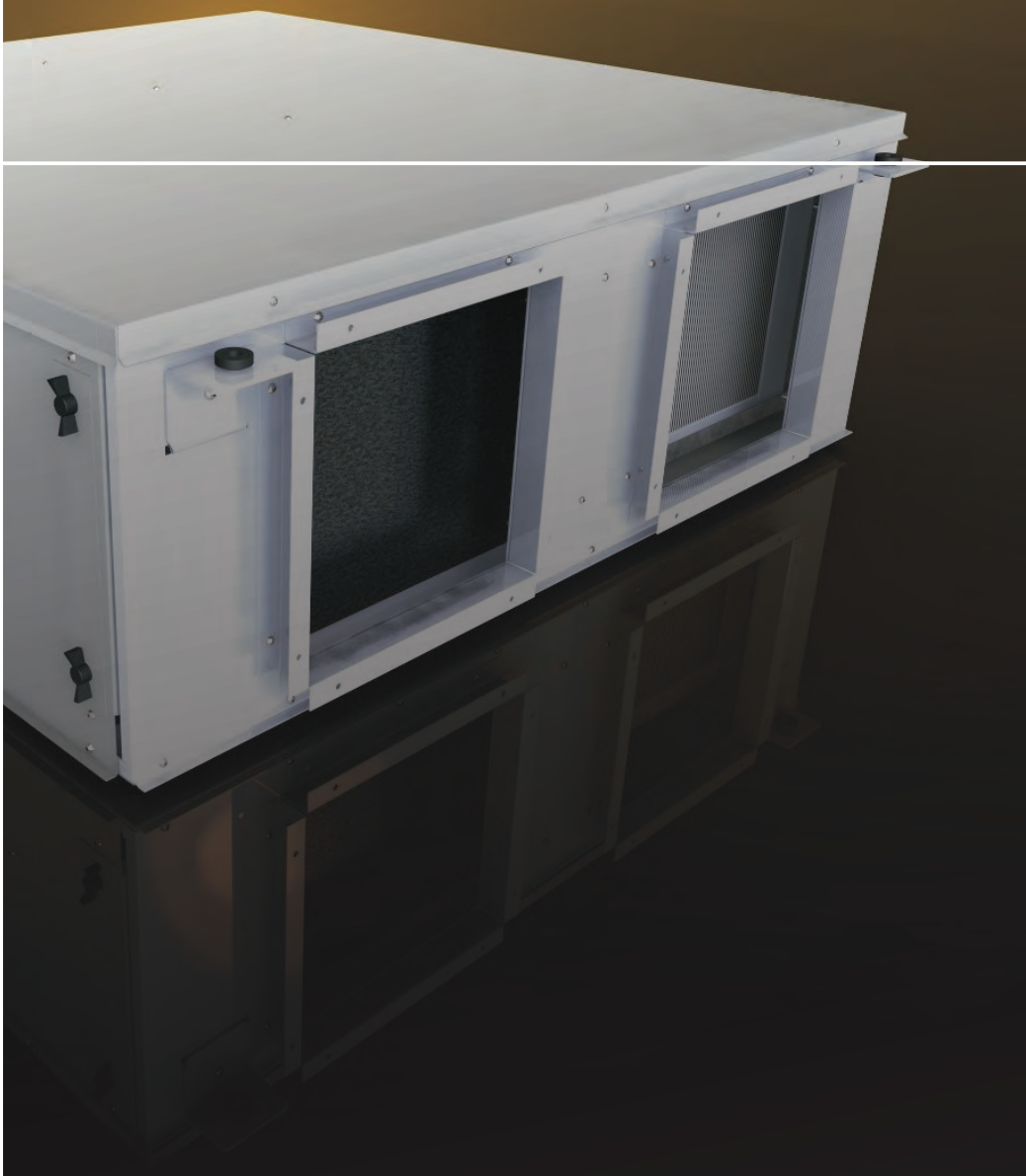








DERV / ERV

DEHUMIDIFICATION & ENERGY RECOVERY

VENTILATOR UNITS

INNOVATION WITH STYLE

DERV/ERV Dehumidification & Energy Recovery Ventilator

Introduction

DERV units represent a significant advance in ventilation technology for residential and light commercial premises. The purpose designed units are ideal for ventilating spaces subject to climates which are characterised by both high temperatures and high humidity levels.

The full range of units utilise energy efficient heat pipe technology to minimise the cost of ventilation while allowing designers and users to maintain the ventilation rates which are necessary for comfortable occupation.

DERV units take advantage of the cooling capacity of waste, extract air to absorb heat from high temperature ventilation air before treating this air to remove moisture in a cooling coil. This cooling coil incorporates another heat pipe to further precool the air and minimise the cooling load. Furthermore, the heat pipe reheats the overcooled air to reduce relative humidity and provide comfortable supply air ready for distribution directly to the occupied spaces.

If a supply of chilled water for the cooling coil is not available then ERV units can be used which incorporate only heat recovery heat pipes. These units use the cooling potential of the extract air to provide ventilation air to the space which has been precooled to a more acceptable level; though without the benefit of significant dehumidification. As an alternative, DERV units can be supplied with a direct expansion cooling coil which can be connected to a local outside unit or VRV system.

The range of units cover ventilation rates that would be required of individual residential properties; if greater rates of ventilation are required then the units are ideal for use in larger dwellings or establishments which would benefit from the installation of multiple units serving separate zones.

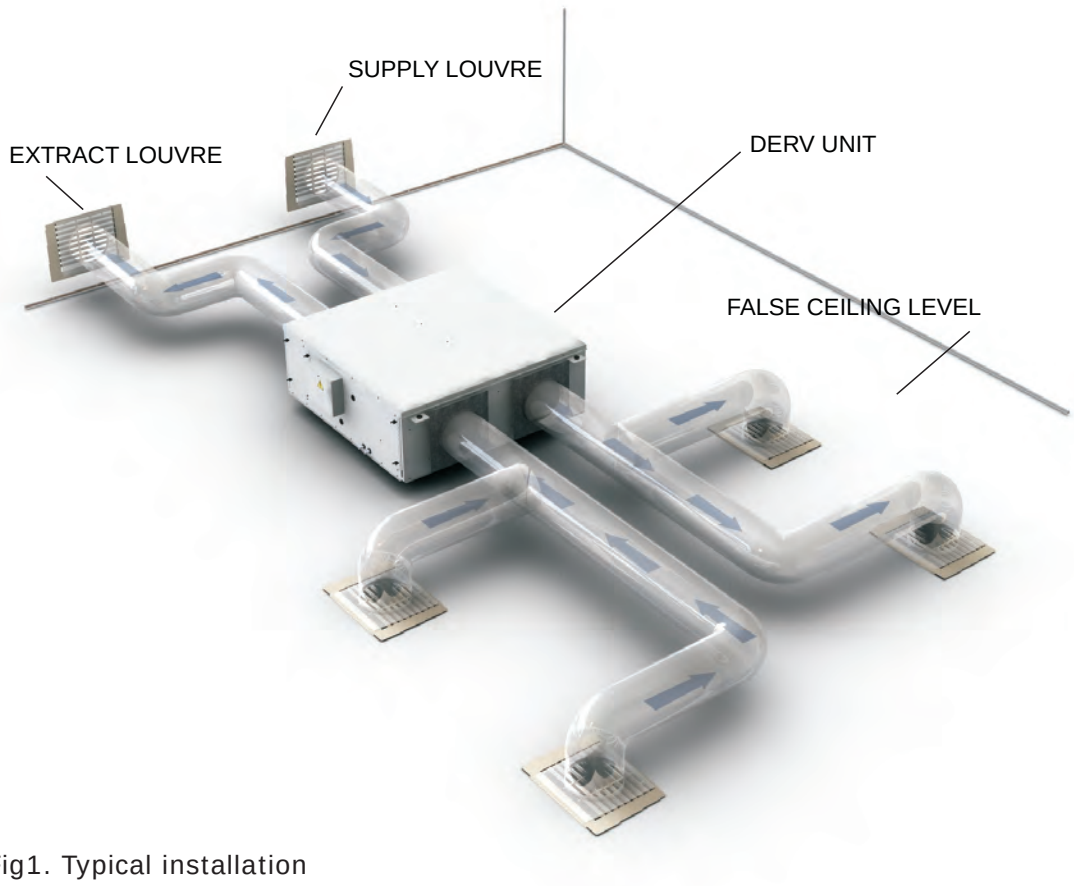


Fig1. Typical installation

DERV/ERV Dehumidification & Energy Recovery Ventilator

Features & Benefits

SPC DERV units provide all the benefits associated with large, central outside air conditioning units within a small, low profile unit specifically designed to fit within false ceilings.

While ventilation of individual dwellings has traditionally been poorly regulated, with untreated outside air being either introduced directly into the space or via terminal units, this approach can no longer sustain the levels of comfort required, particularly in the hot, humid climate of the Gulf.

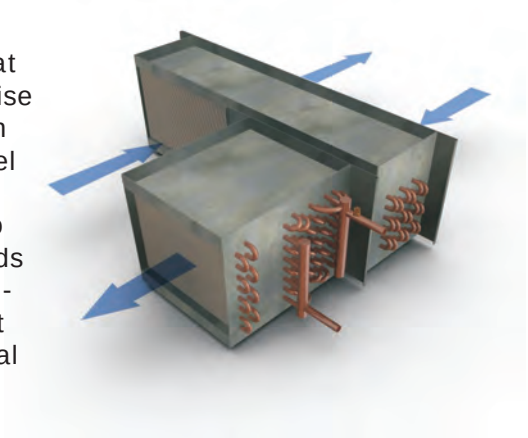
Accidental ventilation, or infiltration, brings with it both heat and humidity and requires the terminal air conditioning units to offset this additional load. Rarely, if ever, are these units designed to operate against the high moisture loads associated with humid outside air. While longer running of air conditioning units can result in acceptable space temperatures, the inevitable result of the ingress of moist outside air is a rise in space humidity beyond the threshold of comfort.

SPC DERV units work alongside the air conditioning system and effectively control the rate of ventilation at the prescribed level. They condition this outside air to a neutral state, allowing the fan coil or other terminal units to deal with the space gains for which they are designed.

In order to dehumidify the outside air the DERV units take advantage of the cooling capacity of extract air. Both supply and extract ducting passes through the DERV unit where a heat pipe heat exchanger is used to transfer heat from the hot outside air to the cool extract air to reduce the load on the downstream cooling/dehumidifying process.

After passing through the heat recovery section of the unit the outside air flows through the main cooling coil which in turn is equipped with a wrap-around heat pipe to facilitate the cooling /dehumidifying process using the most energy efficient technique available.

The wrap-around heat pipe has a two stage energy benefit. Firstly, the precool leg of the heat pipe further cools the outside air so as to minimise the load on the cooling coil. The cooling coil then cools and dehumidifies the air to a dewpoint level selected to maintain comfort conditions. The temperature associated with this dewpoint is too low to be supplied directly to the space and needs to be reheated. The downstream leg of the wrap-around heat pipe provides this reheating without any of the cost penalty associated with traditional electric reheat.



Not only do DERV units provide the designer with the necessary equipment to be able to provide properly conditioned spaces, they also allow the client to realise considerable energy savings compared to the use of corresponding conventional outside air units. Typical energy consumption would be 60% of that of a conventional system operating against the same set of conditions.

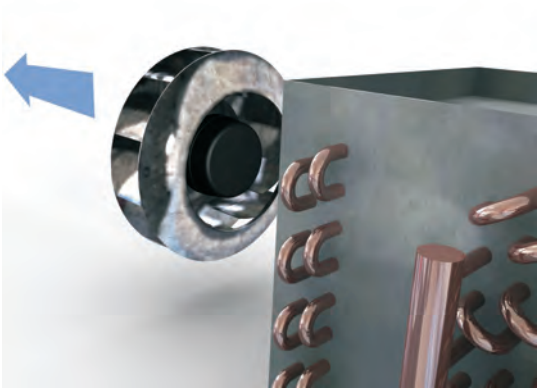
DERV/ERV Dehumidification & Energy Recovery Ventilator

Features & Benefits

DERV units are available in a range of three physical sizes as shown in the sizing data given below. The low height of the units means that they are ideal for mounting out of sight above false ceilings where they are easily suspended from the building structure. Access to the units for maintenance is a feature of the design and can be made from either the underside of the unit or via either of the two sides.

The units incorporate high efficiency AC backward curved blowers in both the supply and extract sections. These blowers allow the units to overcome significant external resistance while maintaining the design air flowrates. Units can therefore be connected up via the lengths of ductwork (circular or rectangular) necessary to connect the supply air from the intake louvre through to the space outlet diffusers and the extract air from the space extract grille through the extract louvre in the building fabric.

All units incorporate multi-speed transformer controlled fan motors allowing the installer to choose the combination of speed and external static pressure to give the required supply and extract air flows.



High efficiency heat pipes and cooling coils are fitted inside the units with the supply and extract sections sealed against each other to protect against cross-contamination.

The heat pipes are factory charged and sealed; the only site pipework being that between the cooling coil flow and return connections and the supply of chilled water. A drain trap and piping to waste will also need to be site fitted to remove the moisture from the unit as it is formed. In difficult situations this will be best achieved through use of a condensate pump.

The unit casing is from galvanised steel sheet finished in a powder coated epoxy polyester paint. This coating has been proven in 1000 hour salt spray tests and is guaranteed against corrosion. The casing is complete with reinforced mounting angles to allow simple installation using threaded rod.

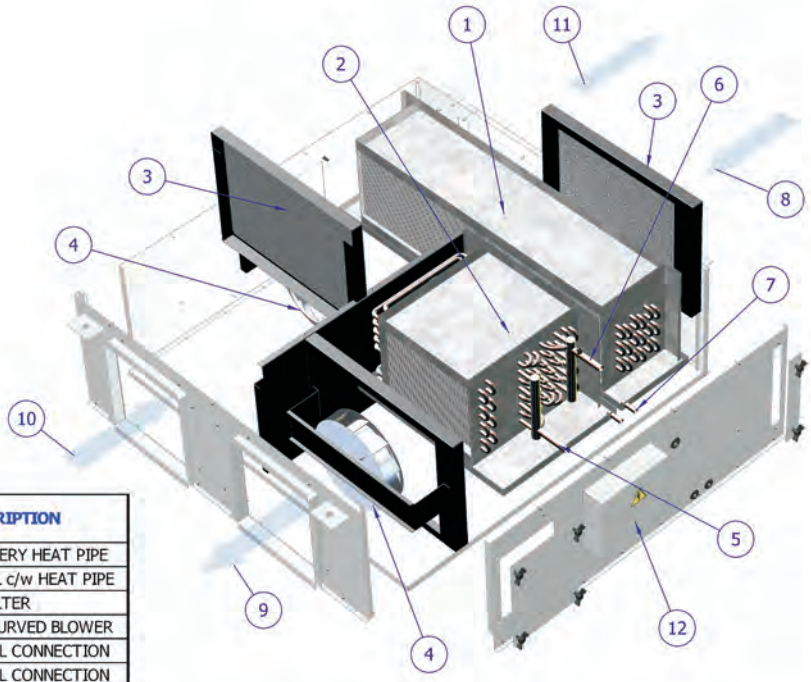
Wiring to the units should be made via suitable isolation, rated in line with the electrical data supplied. All units are designed to operate against a 230V, 50Hz supply and the running voltage can be chosen by the installer. Volt free contacts are available to allow the units to be switched on and off remotely using either manual switching or occupancy sensors and allow central control of units where required.

DERV units are designed to be installed in premises where central air conditioning and ventilation systems are not available. They are designed to be both visibly and audibly unobtrusive and their use will be consistent with the noise level that would be acceptable in a normal living environment. When installed above false ceilings and ducted on both inlet and outlet a resultant noise level no greater than NC35 would be experienced in a typically furnished living space. The unit casings incorporate insulation for both thermal and acoustic absorption, this minimises any break-out noise from the units. In particularly delicate noise environments there will be generous scope to install the units using acoustically lined ducting and even in-line attenuators should the external environment be exceptionally noisy.

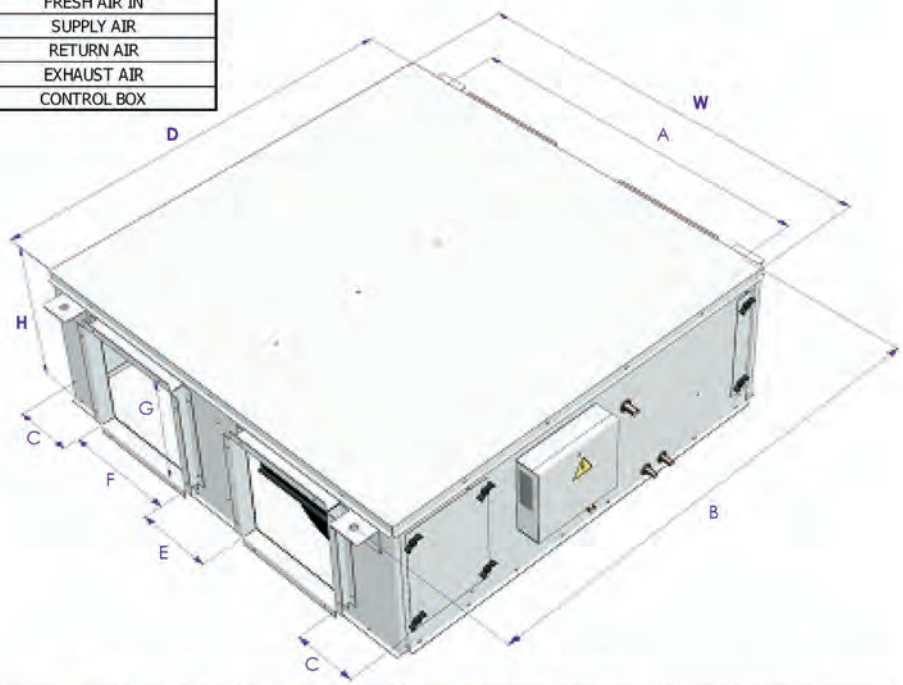
DERV/ERV Dehumidification & Energy Recovery Ventilator

Sizes

The DERV range is available in 3 sizes denoted by the nominal throughput of air (litre/s): 80, 150 and 250. Key dimensions for each unit are shown on the drawings attached along with the performance table below.



ITEM	DESCRIPTION
1	HEAT RECOVERY HEAT PIPE
2	COOLING COIL c/w HEAT PIPE
3	FILTER
4	BACKWARD CURVED BLOWER
5	COOLING COIL CONNECTION
6	COOLING COIL CONNECTION
7	DRAIN CONNECTION
8	FRESH AIR IN
9	SUPPLY AIR
10	RETURN AIR
11	EXHAUST AIR
12	CONTROL BOX



UNIT SIZE	EXTERNAL DIMENSIONS			FIXING CENTRES		APERTURE POSITIONS			
	HEIGHT	WIDTH	DEPTH	A	B	C	E	F	G
80	335	960	982	810	950	135	170	255	255
150	335	1110	982	910	950	163	323	255	255
250	386	1360	1080	1130	1030	201	248	350	250

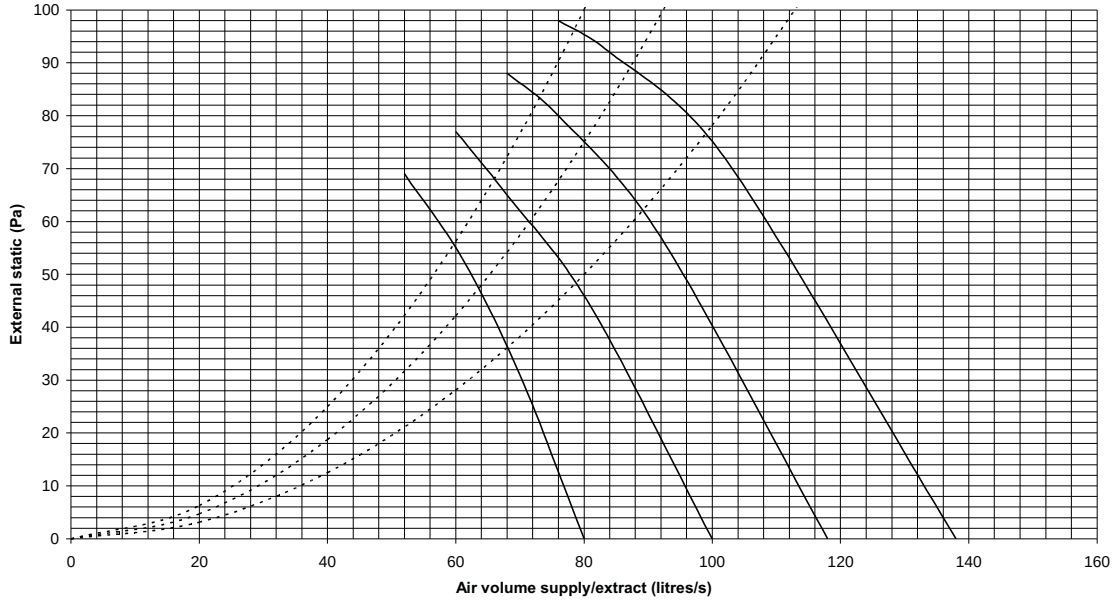
DERV/ERV Dehumidification & Energy Recovery Ventilator

Performance

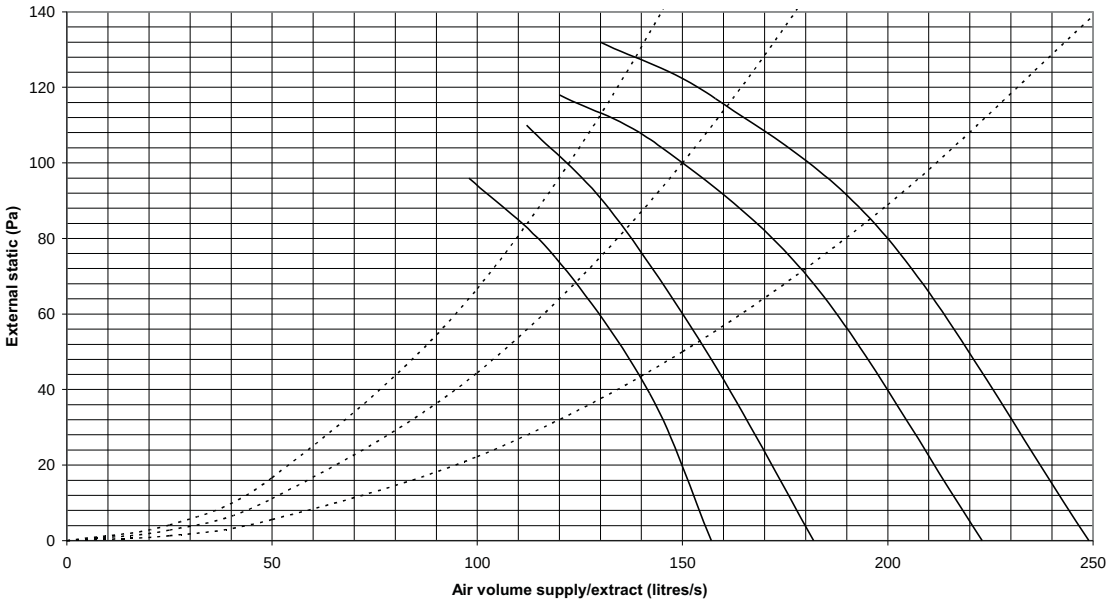
The actual air handling capacity of the units is determined by the external static pressure (due to ducting, inlet and outlet grilles etc.) and the voltage fed to the fan motors. Throughputs are given in the form of charts such that a value for the feed to the unit can be selected which, in conjunction with the external static pressure will provide the level of ventilation required.

The data regarding thermal performance is based upon the nominal air volumes for the unit. Please contact SPC for detailed performance data at other conditions.

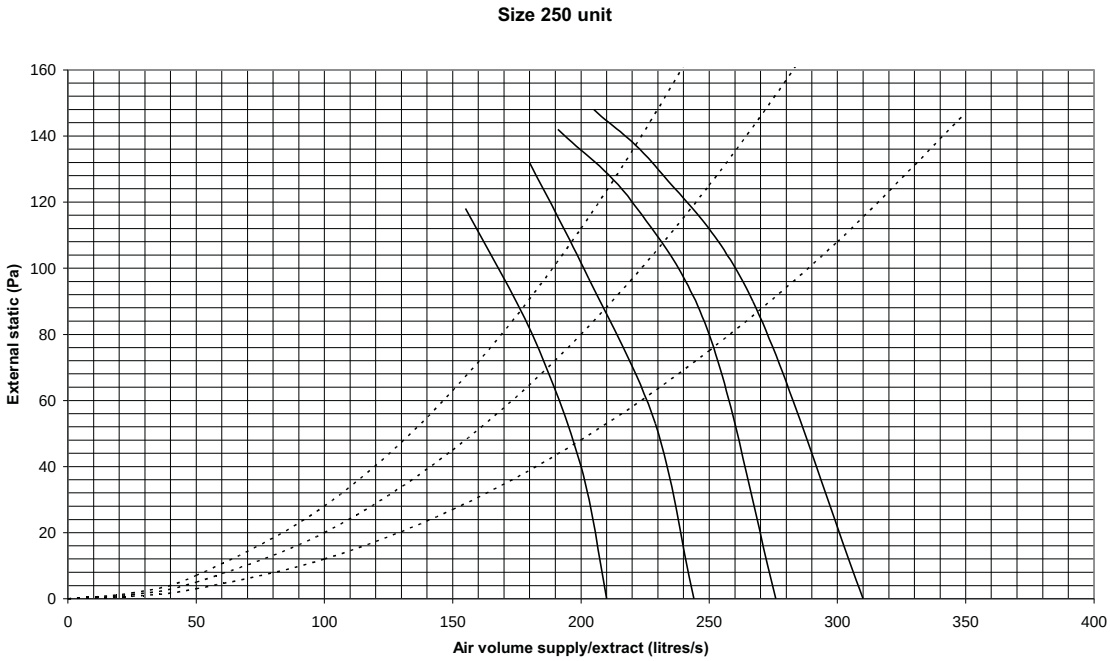
Size 80 unit



Size 150 unit



Performance



Unit size	80	150	250
Nominal supply volume (litres/s)	80	150	250
Nominal extract volume (litres/s)	80	150	250
Nominal supply external static (Pa)	75	100	80
Nominal extract external static (Pa)	75	100	80
Total net cooling (W)	5300	9940	16570
Sensible cooling (W)	2555	4790	7990
Supply air dry bulb (°C)	19.4	19.4	19.4
Supply air wet bulb (°C)	15.7	15.7	15.7
Heat recovery heat pipe cooling load saving (W)	1050	1970	3280
Wraparound heat pipe precool load saving (W)	546	1025	1710
Wraparound heat pipe reheat load saving (W)	546	1025	1710
Nominal current draw (A)	0.6	0.8	1.0
Nominal power draw (W)	138	193	240
Weight (kg)	50	70	90
Water flowrate (litres/s)	0.17	0.32	0.54
Water pressure drop (kPa)	13	9	22
Coil inlet connection size (mm)	15	22	22
Coil outlet connection size (mm)	15	22	22

The conditions upon which the above data is based are as follows:
Outside air @ 46/30°C
Extract air @ 25°C
CHW flow/return @ 7.2/12.8°C

DERV/ERV Dehumidification & Energy Recovery Ventilator

Specification

GENERAL
The unit shall be used to treat outside air in such a way as to provide tempered, dehumidified ventilation air to an occupied space. The unit will consist of a supply air section and an extract air section in a single integrated casing with a heat recovery heat pipe to precool the outside air. The unit will also incorporate a chilled water cooling coil to cool and dehumidify the air and wrap-around heat pipe to provide additional precooling and reheating of the supply air.

FANS/MOTORS
Direct drive, backward curved blowers, statically and dynamically balanced. The unit will incorporate individual supply and extract fans/motors sized to suit the air volume and pressure development required. The fans will be suitable for a 230V/1Ph/50Hz supply and capable of overcoming the resistance of the internal components of the unit along with the external resistance of the ducting etc.

HEAT RECOVERY HEAT PIPE
The heat pipe will be constructed from internally grooved copper tubes expanded into aluminium fins. The heat pipe section shall incorporate several individual heat pipes each factory charged and sealed. Supply and extract sections shall be separated by an airtight centre plate. The number of rows of tubes and the fin density shall be selected to suit the requirements of the application. Tubes will be arranged in a staggered pattern to maximize the performance.

WRAP-AROUND HEAT PIPE
This shall consist of a precool section upstream of the cooling coil and a reheat section downstream. The heat pipe will be constructed from inner grooved copper tubes expanded into aluminium fins. The section shall incorporate several individual heat pipes each factory charged and sealed. The number of rows of tubes and the fin density shall be selected to suit the requirements of the application. Tubes shall be arranged in a staggered pattern to maximize the performance.

CHILLED WATER COOLING COIL
This heat exchanger will consist of copper tubes expanded into aluminium fins. Tubes will be in a staggered pattern in order to maximize the performance and air and water will be arranged to be in counterflow with one another. Flow and return connections will terminate outside the unit casing and will be plain copper. As an alternative to the chilled water coil a DX evaporator coil can be incorporated to the same specification as above.

CASING
The unit casing will incorporate all of the elements of the ventilator unit along with an externally mounted electrical box.

The unit shall be suitable for mounting within a ceiling void and will be supported by threaded rod from the ceiling at a minimum of four points. Suitable mounting brackets will be supplied on the unit to accept the threaded rod hangers.

Unit casing shall be of a single skin, insulated internally both acoustically and thermally. The outer skin of the unit will be from galvanized sheet steel, minimum thickness 1.2mm suitable for internal mounting. The casing will be finished in a corrosion resistant powder coated epoxy polyester paint.

The supply and extract sections of the unit will be separated, internally using insulated partitions.

Specification (continued)

CASING (CONT.)
The unit will be complete with four rectangular spigots for horizontal mounting. These spigots will accept rectangular ducting and will be of a size determined to suit the volume of air being handled. Alternatively the units can be supplied with adaptors to accept circular ducting. The supply and extract airstreams shall be arranged such that they pass trough the unit in opposite directions.

The underside of the supply section shall be formed into a drip tray which shall extend below the heat recovery heat pipe, the wrap-around heat pipe and the cooling coil. The drain tray will be painted internally and insulated externally to prevent sweating. A drain trap should be fitted to the drainpipe provided and should be a minimum height of twice the suction pressure at the supply fan inlet.

The casing shall contain a sufficient number of removable panels so as the allow access to the fans, heat exchangers, drain tray and filters. Access shall be available from bottom and both sides of the unit.

FILTERS
A filter shall be supplied on the suction side of the fan on both the supply and extract section of the unit. The filter will be of grade EU3 on both the supply side and the extract side.

The filters shall be of the pleated panel type of sufficient depth to provide minimal resistance to the airflow through the unit. The casing shall be arranged such as to provide ready access to the filters for cleaning.

CONTROLS/WIRING
The power shall be brought to the unit via the electrical box located on the side of the unit. The supply must be suitably isolated and the electrical box will be designed to prevent internal access while the supply is connected.

The unit will be supplied with a remote switch for on/off control and speed change as standard. This remote switching will be wired back to the electrical box via suitably glanded knock-outs and will be a safe low voltage of 24V from an isolating transformer within the electrical box.

The unit will be supplied as standard with a minimum of two fan speeds for both the supply and extract fans. Supply and extract fans will switch speeds in response to a single switch and will not be controlled separately.

The control wiring will incorporate a minimum of two volt-free contacts. These contacts will be available for switching the unit on/off via remote contact from temperature, occupancy or carbon dioxide concentration sensors/controllers.

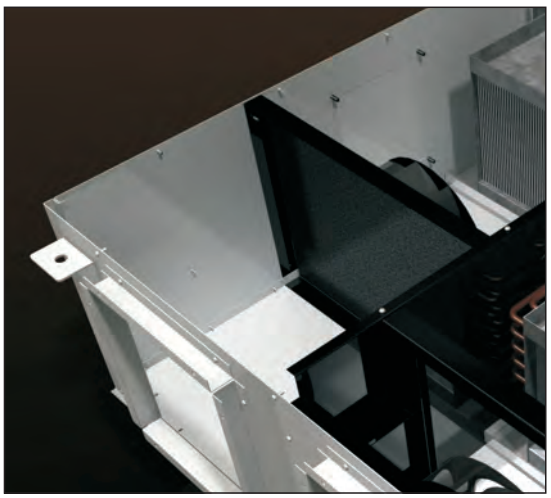
NOISE LEVELS
The units shall be designed to provide a resultant room sound pressure level equivalent to NC35. This is based upon a typical furnished room and typical ducted installation.

PERFORMANCE RATINGS
All DERV units are tested in line with ARI 1060 (Performance rating of air to air heat exchangers for energy recovery ventilation equipment) and ANSI/ASHRAE 84 (Method of testing air to air heat exchangers).

DERV/ERV Dehumidification & Energy Recovery Ventilator

PROJECTS & FEATURES

QASR AL SARAB RESORT & SPA, ABU DHABI

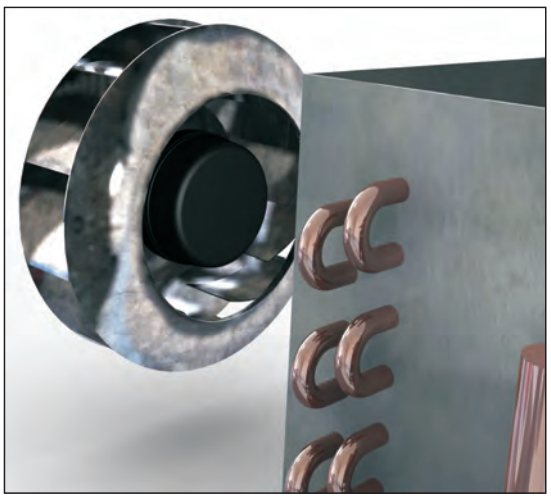


CLEANABLE REMOVABLE FILTER

VARIETY OF DUCTING CONNECTIONS AVAILABLE

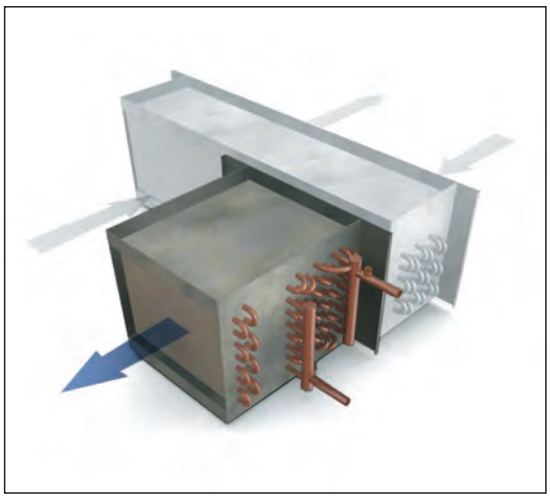
ENCLOSED ELECTRICAL BOX

EASY ACCESS FILTER POINT

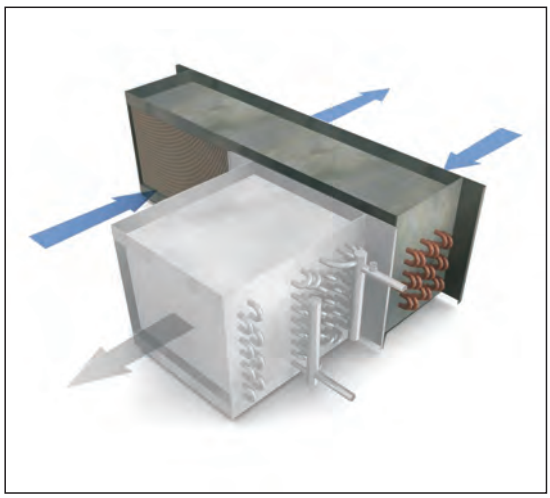


HIGH EFFICIENCY BACKWARD CURVED FANS

PROJECTS & FEATURES



DEHUMIDIFIER HEAT PIPE

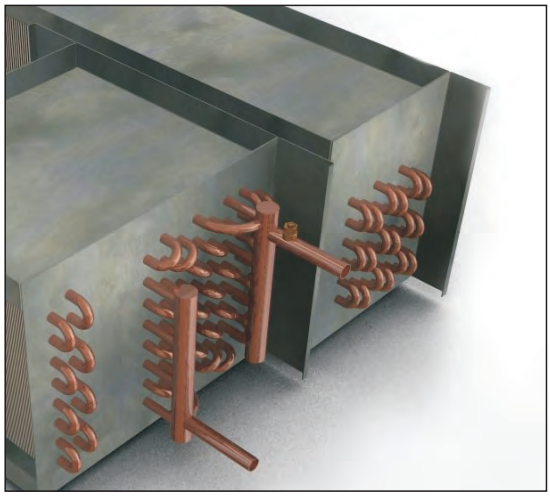


HEAT RECOVERY HEAT PIPE

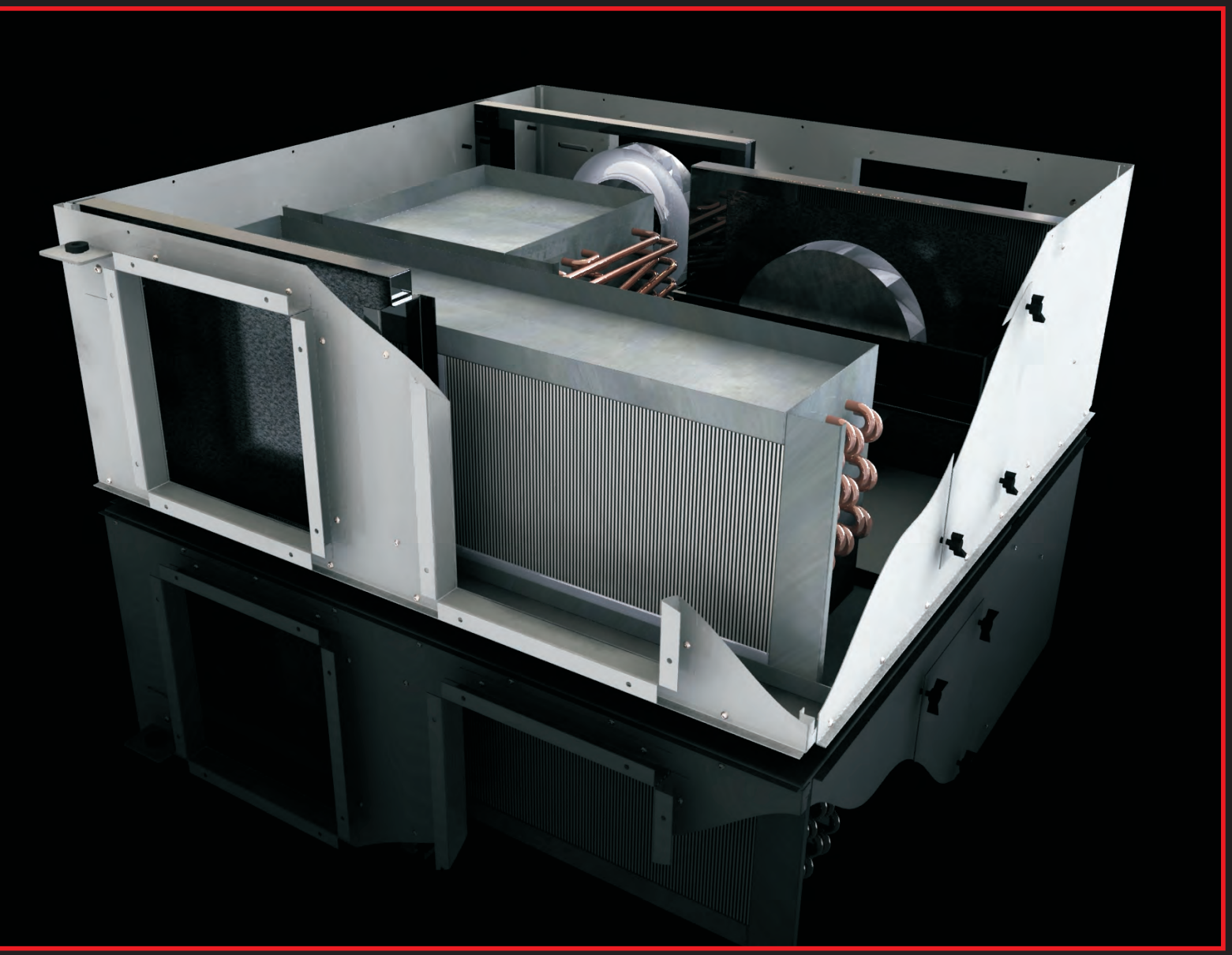
SECURE ROD HANGING SYSTEM

FULLY INSULATED CORROSION RESISTANT CASING

EASY ACCESS TO THE FAN



DRAINPANS UNDER ALL HEAT PIPES



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