BLOWTECH

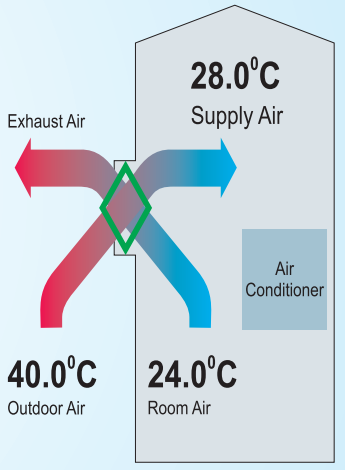
In-Ceiling Enthalpy Recovery Fresh Air Ventilators
DCE Series

Its counter-flow ventilation technology not only brings in **fresh air** but considerably reduces energy cost

Enthalpy Recovery

The term enthalpy refers to the total heat energy of air, consisting of sensible heat – an indication of how hot or cold the air is and measured by its dry bulb temperature, and latent heat – an indication of the moisture content of air and measured by its wet-bulb temperature or relative humidity. Introduction of fresh outdoor air (say at 36°C) into a conditioned space (say at 24°C) increases the cooling load on the air-conditioning system because the stale but cool exhausted room air takes with it the energy used to cool it. An enthalpy recovery ventilator recovers most of this cooling energy (or heating energy for a heating system in winters) by transferring it to the incoming fresh air.

Cooling during Summer



Why Ventilate?

For healthy living, it is essential that the indoor air be fresh and clean – contain lot of oxygen but devoid of pollutants such as smoke, dust, odour, CO_2 and bacteria. In modern refrigerant based air-conditioning systems, the indoor air is re-circulated and the conditioned space is increasingly made air-tight to save energy costs. This in absence of sufficient ventilation leads to higher levels of contaminants and poor indoor air quality (IAQ).

The basic purpose of ventilation is to introduce fresh clean outside air into a closed space and simultaneously exhaust the stale contaminated room air to outdoors. A well designed ventilation system maintains an acceptable level of IAQ. Poor IAQ is known to be responsible for higher rates of sickness, low morale and loss of productivity among building occupants.

ASHRAE* Recommended Ventilation Rates (cfm/person) :

Application	cfm	Application	cfm	Application	cfm	Application	cfm
Office Space	20	Hotel Rooms	15	Supermarkets	15	Libraries	17
Restaurant	20	Conference Rooms	10	Auditoriums	10	Health Clubs	25
Bars	30	Class Rooms	15	Laboratories	17	Computer Rooms	20

*American Society of Heating, Refrigerating & Air conditioning Engineers

DCE Series In-Ceiling Enthalpy Recovery Fresh Air Ventilator

The heart of Blowtech's DCE ERV is the counterflow enthalpy exchange core (EEC) which can reclaim upto 75% energy from the outgoing conditioned (but stale) air and transfer it to the incoming fresh air. The innovative design of the EEC permits not only sensible heat transfer but also allows moisture transfer through a specially designed paper medium. This reduces both the sensible and latent load on the room air-conditioning system by reducing both the temperature and humidity level of the incoming fresh air. The unique design of the ER paper medium features high moisture permeability, excellent air tightness and resistance to tearing and ageing.

Blowtech DCE ERV Advantage

- Fixed plate counter-flow enthalpy exchanger requires little maintenance
- Low height units ideal for installing in ceiling
- Both sensible and latent energy transfer upto 75% efficiency
- No cross contamination of air streams
- Fully ductable self contained unit
- Simultaneous supply of fresh outdoor air & exhaust of stale indoor air
- Variable air supply
- Designed for high available external statics
- Maintains healthy IAQ
- Reduces upfront air-conditioning equipment cost by reducing plant size
- Available in 7 sizes from 100 cfm to 1300 cfm
- Extremely compact – almost half the size of conventional units
- Acoustically lined fan compartment for super quiet operation
- Easy to service and maintain

Example of Fresh Air Load Reduction through Enthalpy Recovery:

This example illustrates the substantial reduction in air-conditioning equipment tonnage that can be achieved by installing the DCE enthalpy recovery fresh air ventilator as compared to a conventional ventilator. Let us look at the following summer day conditions:

	Outdoor Air		Room Air
Dry Bulb T (^{0}C)	35	→	27
Wet Bulb T (^{0}C)	27	→	19
Humidity Ratio (g/kg)	19.3	→	10.5
Specific Enthalpy (kJ/kg)	84.7	→	53.8

For a fresh air requirement of say 1000 cfm (sufficient for a space occupied by about 50 people), the cooling load on the air-conditioning system using a conventional ventilator can be estimated as under (specific gravity of air is assumed to be 1.2 kg/m^3):

= Specific Enthalpy Difference x Mass Flow Rate

= (84.7 - 53.8) x 1000/0.59x1.2 kJ/h

= 62850 kJ/h or 5.0 TR

By using the Blowtech's DCE 100 enthalpy recovery ventilator (capacity 1000 cfm) with an enthalpy recovery efficiency of 70%, the enthalpy of the incoming fresh air will be reduced from 84.7 kJ/kg to:

= 84.7 – (84.7-53.8) x 0.7 kJ/kg

= 63.1 kJ/kg

And the cooling load on the air-conditioning equipment would now be:

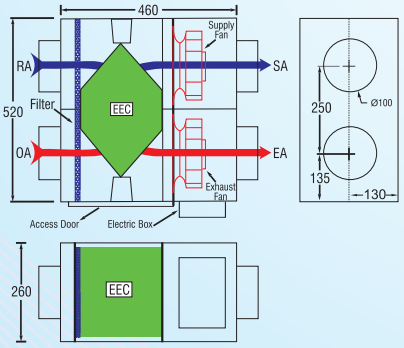
= (63.1 – 53.8) x 1000/0.59x1.2 kJ/h

= 18915 kJ/h or 1.5 TR

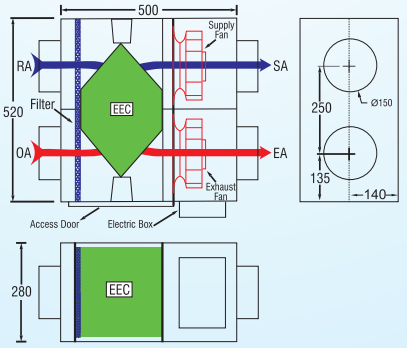
Thus AC plant capacity can be reduced by (5-1.5) = 3.5 Tr for an application requiring 1000 cfm of fresh air.

Dimensions and Flow Circuits

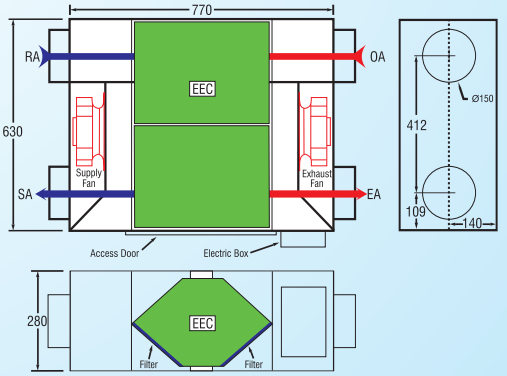
DCE-010



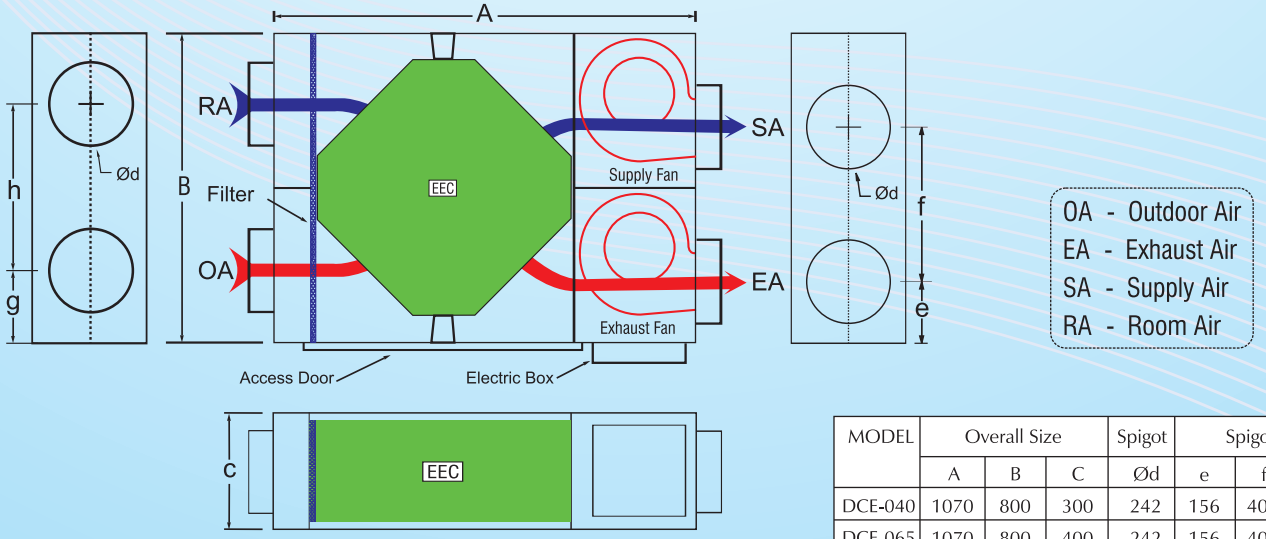
DCE-015



DCE-020



DCE-040, 065, 100, 130



OA - Outdoor Air
EA - Exhaust Air
SA - Supply Air
RA - Room Air

MODEL	Overall Size			Spigot	Spigot Location			
	A	B	C	Ød	e	f	g	h
DCE-040	1070	800	300	242	156	400	200	400
DCE-065	1070	800	400	242	156	400	200	400
DCE-100	1200	1000	450	350	230	500	250	500
DCE-130	1200	1000	600	400	230	500	250	500

(All Dimensions are in mm)

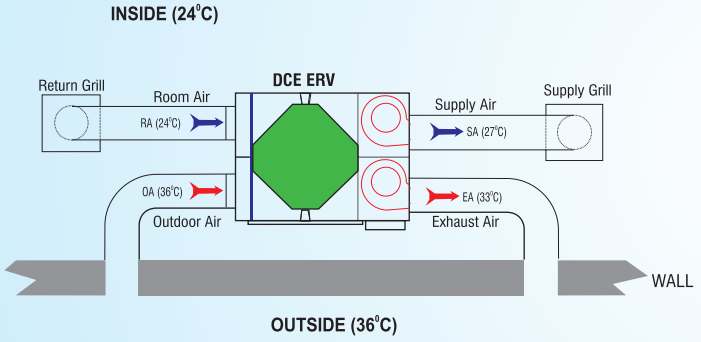
Specifications

MODEL	Air Volume		Approx Wt.	Input Power	Enthalpy Efficiency (%)	No. of Fan Speeds	Power Source
	cfm	Ext. Static (mm)	(Kg.)	(Watts)			
DCE-010	100	15	18.4	165	70	#	
DCE-015	150	10	19.8	170	70	#	
DCE-020	200	20	32	180	70	#	1 Ph
DCE-040	400	16	74	290	72	3	220-240V
DCE-065	650	15	85.5	350	72	3	50 Hz
DCE-100	1000	14	115	600	72	3	
DCE-130	1300	14	130	700	72	3	

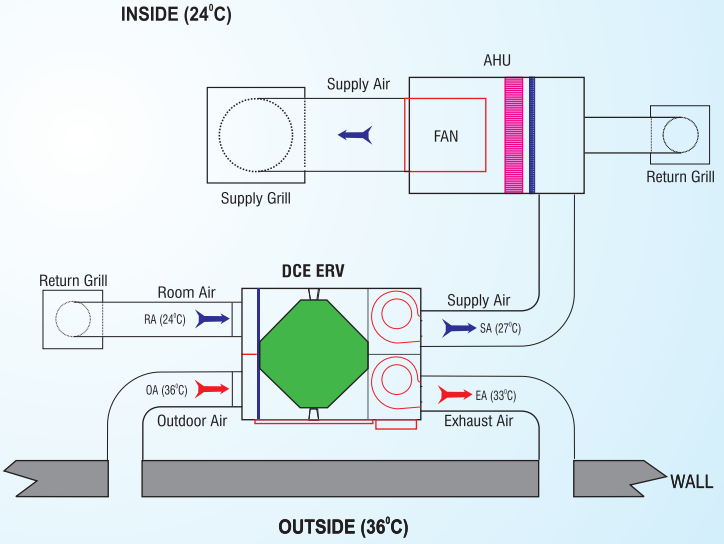
Models DCE-010, DCE-015 and DCE-020 are fitted with single speed backward curved fans with external rotor motors. Their speed can be varied continuously through an external wall mounted switch cum dimmer of 300VA rating. Models DCE-040,DCE-065,DCE-100 and DCE-130 are all fitted with a 3-speed motor and the operation can be controlled by a remote controller supplied with the unit.

Typical Installations

Standalone installation

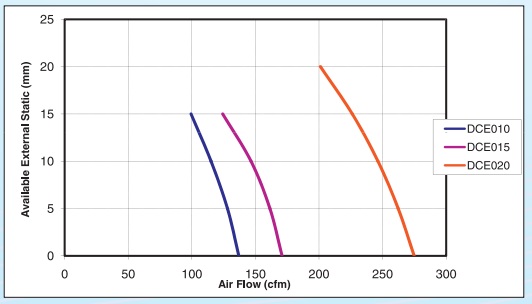


Blowtech DCE ERV coupled to an Air Handler (AHU)

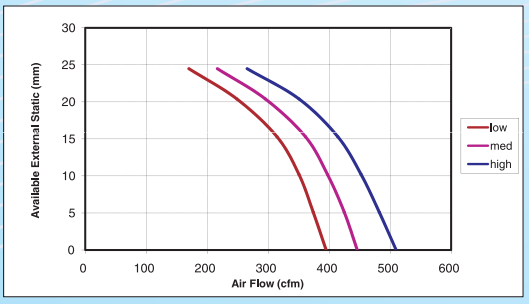


Air Performance Curves

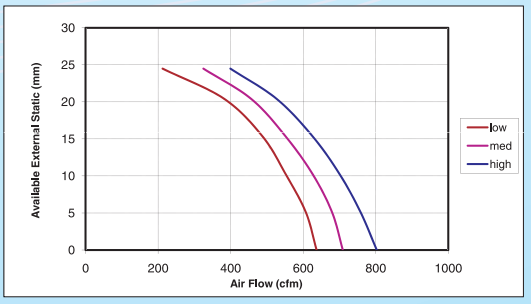
DCE 010 | DCE 015 | DCE 020



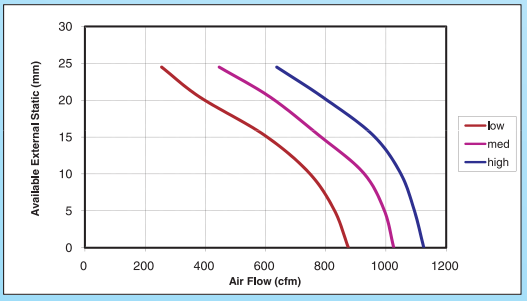
DCE 040



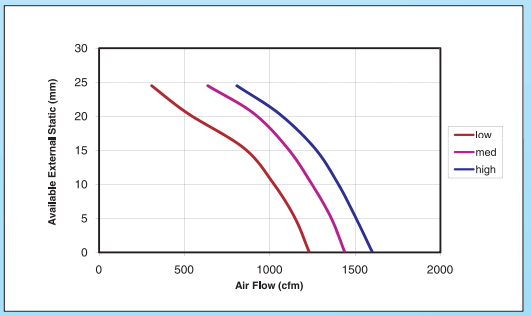
DCE 065



DCE 100



DCE 130



MEMBER

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