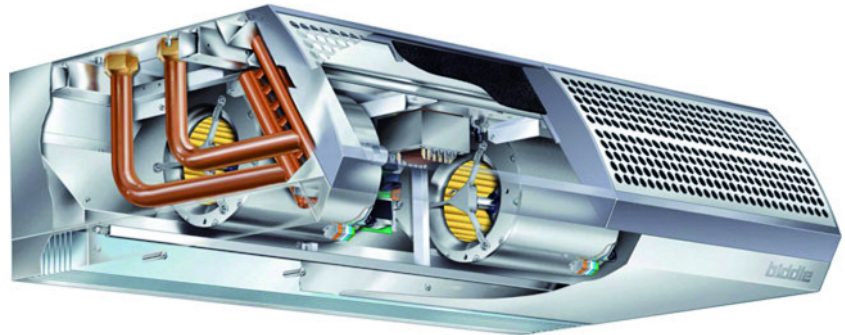


***invisidor***  
***CITY***  
COMMERCIAL AIR CURTAINS



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## Fresh Thinking in Climate Separation Technology

The latest development in a long line of leading technology air curtains, Invisidor CITY incorporates improved structural design and enhanced aesthetic appeal without compromising its award-winning performance. Most importantly, by utilising world class design and engineering, Biddle's Invisidor CITY now brings energy and cost saving benefits at a lower installed cost than ever before.

Without the barrier of a door, a shop becomes more inviting, which in turn leads to an increase in sales. However, opening doors to the elements allows warm air to be released, resulting in low comfort and poor energy efficiency. Invisidor air curtains prevent conditioned air escaping outside, whilst conditioning incoming air to a comfortable temperature. A complete range of models ensures effectiveness in creating a comfortable climate depending on different factors, including door size, the building and its location. Invisidor CITY is available in three performance models, including the latest CITY PowerPlus for higher entrance doors, and a CB variant for use with condensing boilers.

For over 15 years Biddle has invested heavily in research and development to create an energy efficient designer product of the highest quality. Biddle air curtains bring energy efficiency and thermal comfort. One big advantage of an Invisidor air curtain is that it offers real energy savings - research echoed by BSRIA's research.

Whether for a high street store, supermarket or a head office building, Biddle works closely with end-users, consultants, architects and installers at every stage of the design, to ensure the optimum solution is achieved.

The new Invisidor CITY means that businesses and their customers can experience thermal comfort throughout the year because of its unique patented rectifier and CFD analysis. Retailers can also benefit from Biddle's affordable prices, as well as being able to reap rewards from a long-term investment in a quality product.



## ***Biddle Patented Airflow Technology***

One of the main functions of an air curtain is to condition outdoor air as it enters the building. For this to be achieved the jet must cover the full width of the entrance, so that it cannot be bypassed by incoming air. However, ensuring the jet reaches the floor level is more difficult, with turbulence at the jet outlet being a critical factor.

Along with the TNO wind tunnel facility at Apeldoorn in the Netherlands, Biddle have successfully developed a patented rectifier, which minimises turbulence in the discharge airstream. With reduced turbulence, induction of the surrounding air is also reduced, which in turn, increases the jet throw by 30-40% of an equal volume/velocity unit. The pressure chamber behind the rectifier evenly distributes the air stream across the whole width of the unit. The result is a deeply penetrating, laminar airstream, reducing energy consumption whilst increasing comfort levels.

## ***Biddle Energy Efficiency***

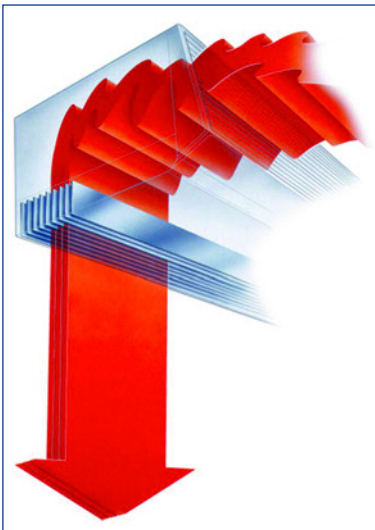
By using their patented rectifier in the Invisidor CITY range, Biddle have reduced the amount of air that escapes from the jet outlet. This saves a large amount of energy, in comparison to other air curtains.

Measurements have shown that with the Invisidor patented rectifier, up to 94% of the heat input to the air curtain can be transferred to the entrance area and subsequently contributes to overall room heating, an important factor when considering current building energy costs.

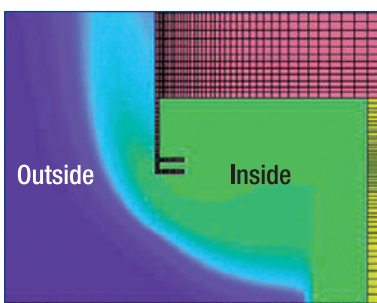
## ***Biddle Thermal Comfort***

Biddle Invisidor CITY was developed to deliver greater comfort than a conventional air curtain, to retail customers and employees in all weathers. Using Biddle's patented rectifier technology, the Invisidor CITY ensures that the air curtain supplies air at the correct velocity, volume and temperature to satisfy thermal comfort throughout the year.

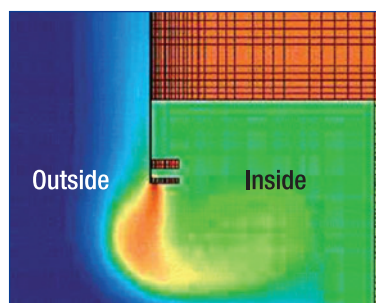
Laminar Airflow Rectifier  
Pressure Chamber



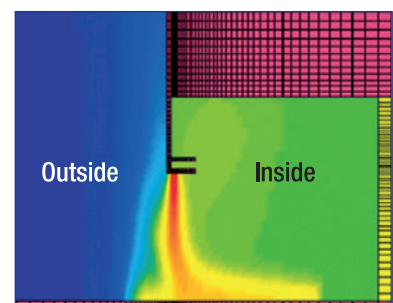
Entrance with no air curtain



Entrance with inefficient air curtain



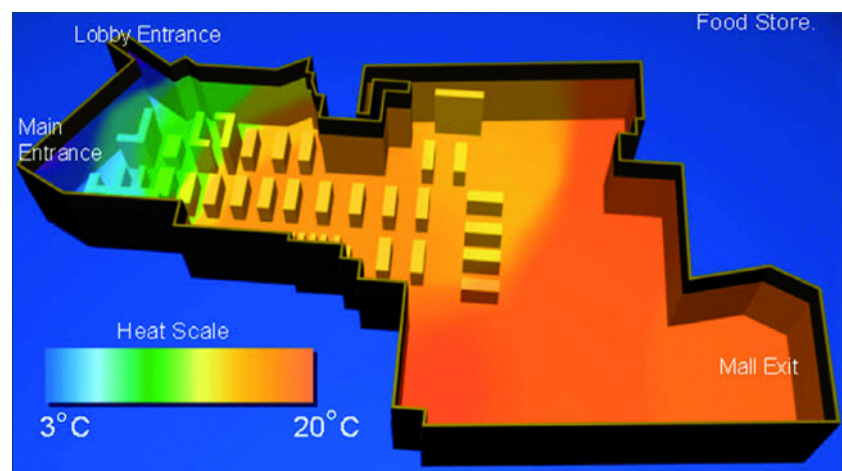
Entrance with Invisidor air curtain



## Computational Fluid Dynamics

An air curtain mounted in a high street store functions very differently from the same unit at a shopping centre or hypermarket entrance. By looking at how the air curtain reacted with different buildings rather than considering the unit alone, Biddle was able to design an effective and efficient product.

Biddle understands that various aspects of the air curtain design contribute to its effectiveness and efficiency in different ways. Along with Warwick University, Biddle developed a Computational Fluid Dynamics (CFD) model. By using this model, with information on particular building properties and weather conditions, simulation can be performed for almost any building. The Biddle CFD model has been used to aid product selection and also to compare different proposed air curtain solutions. It provides Biddle's customers with a unique understanding of the air curtain, as well as estimating energy savings and calculating the 'pay-back' time on investment.

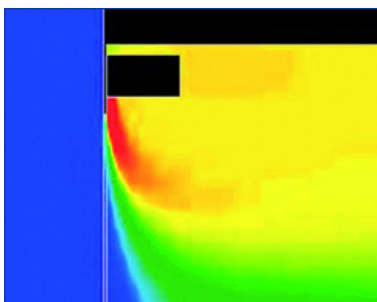


## The Affordable Invisidor Range

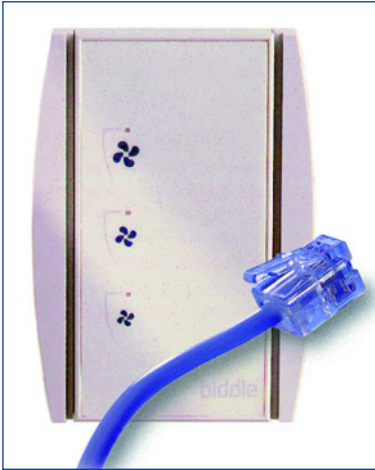
We have a comprehensive range of air curtains – there will be one ideally suited to your particular situation. There are three ceiling recessed options plus one free hanging exposed model, each model is shown in more detail on page 9.

- Invisidor CITY - Ideal for doorways up to 2.7m high and aimed primarily at the retail market where looks, performance, energy efficiency and budget are critical considerations
- Invisidor CITY Plus - A more powerful version of the CITY. For use up to 3.2m high
- Invisidor CITY PowerPlus - Designed for door heights up to 3.7m. This is the latest model in the range and is ideally suited for the large prestigious entrances to shopping malls, large retail units and commercial developments

Section view of doorway



## Control Options



With quick project turn-around times, any reduction in installation time is greatly beneficial. Biddle therefore supply a standard controls package which is simply connected between the unit and controller via a low voltage plug-in cable. Electronic touchpad controllers provide localised on/off, and three-speed control – as well as two heat settings on electric units. Each controller can control up to ten units, wired as master/slave.

In all cases the Invisidor has volt free contacts for input of remote switching devices, namely,

- Timers
- Thermostats
- Door switches
- BMS etc

Alternatively, and if the controller is not preferred, the Invisidor range can be configured for remote operation by a Building Management System (BMS). If you have particular requirements please contact the Biddle sales office for detailed advice.

## Flexible Suspension System

Fast and simple mounting brackets are supplied with each unit. They provide lateral adjustment so each unit can be accurately mounted in the desired position. For wall mounting purposes, brackets are available.

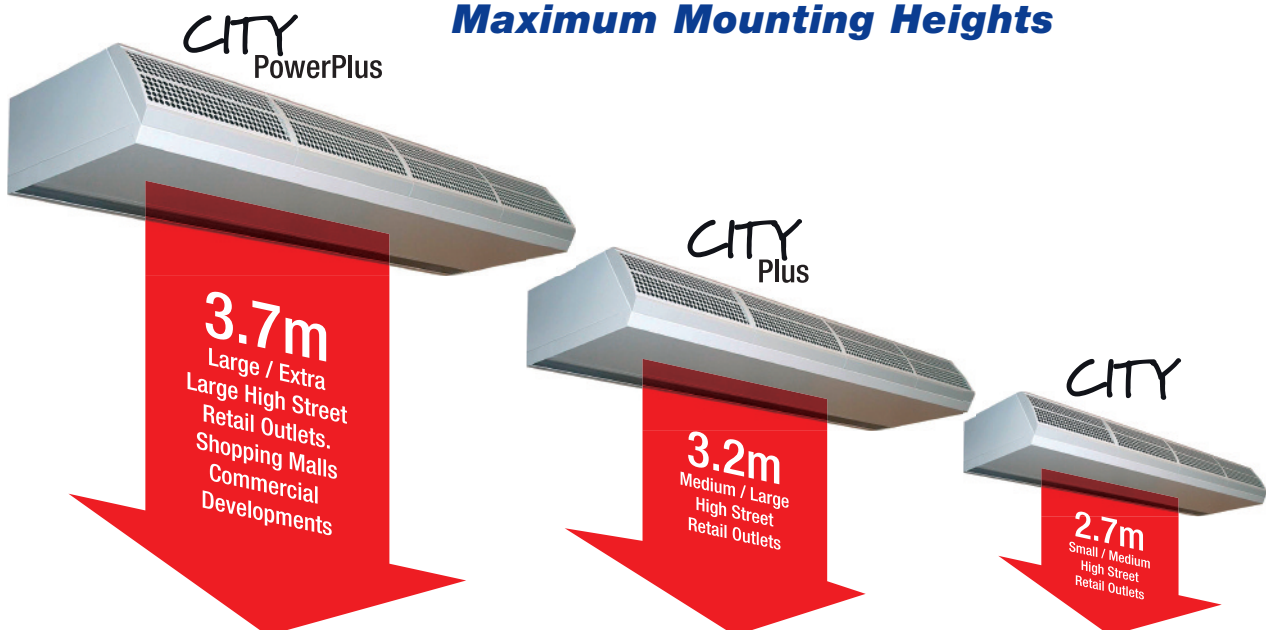
## Air Curtain Selection

### Product Selector

The 'at a glance' selector below will enable a simple selection of the most appropriate product for your entrance environment application.

Always consider building location, leakage characteristics, pressure differences and environmental factors - wind direction or speed.

### Maximum Mounting Heights



## Technical & Performance Data

### Invisidor CITY

- Aesthetically designed unit
- Mounting heights up to 2.7m
- Incorporates patented Invisidor technology
- Suitable for most high street applications

Invisidor City		Water Heating				Electrical Heating				
		CITY-100 W	CITY-150 W	CITY-200 W	CITY-250 W	CITY-100 E	CITY-150 E	CITY-200 E	CITY-250 E	
Maximum Installation Height	m	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	
Optimum Door Width	m	0.8	1.3	1.8	2.3	0.8	1.3	1.8	2.3	
Unit Width	m	1.0	1.5	2.0	2.5	1.0	1.5	2.0	2.5	
		A/B	A/B	A/B	A/B					
Heating Capacity ** (Max/Controlled)	@ Speed 1	kW	7.5 / 3.2	11.8 / 4.7	16.1 / 6.3	20.4 / 7.8	3.6	5.3	7.2	8.9
	2		9.2 / 4.1	14.5 / 6.2	19.8 / 8.3	25.2 / 10.3	3.6 / 7.2	5.3 / 10.6	7.2 / 14.3	8.9 / 17.8
	3		11.6 / 5.9	18.4 / 8.9	25.2 / 11.6	32.0 / 14.6	3.6 / 7.2	5.3 / 10.6	7.2 / 14.3	8.9 / 17.8
Air Volume	@ Speed 1	m³/s	0.171	0.257	0.343	0.429	0.171	0.257	0.343	0.429
	2		0.229	0.343	0.457	0.572	0.229	0.343	0.457	0.572
	3		0.323	0.485	0.648	0.808	0.323	0.485	0.648	0.808
Water Flow Rate (Max)	l/s	0.257	0.409	0.56	0.71	n/a	n/a	n/a	n/a	
Coil Hyd Pressure Drop (Max)	kPa	1.9	5.5	11.5	20.3	n/a	n/a	n/a	n/a	
Electrical Supply		230V / 1ph / 50Hz				400V / 3ph / 50Hz				
Max Power (Motor/Elec Heating)	kW	0.23	0.35	0.46	0.58	7.5	11.2	15.1	18.7	
Max Running Current	A	1.06	1.59	2.12	2.65	3 x 12.4	3 x 18.4	3 x 24.8	3 x 30.8	
Noise Level at 3m*	@Speed 2 dB(A)	37	39	40	41	37	39	40	41	
Weight (Dry)	Model F	kg	40	58	73	90	43	60	78	94
	Model R	kg	54	80	102	126	57	82	107	130
	Model R(0)	kg	49	73	93	114	52	74	97	118
	Model C	kg	52	75	96	118	55	77	101	122

\* Typically NR = dB(A) – 4

\*\* Heating Capacities A/B

A: Denotes the maximum heating capacity with 82/71°C flow & return water temperatures.

The unit discharges air at its maximum temperature.

B: Denotes the capacity when the optional 3 port valve is fitted, controlling the discharge air temperature to 35°C.

## Specification Codes

CITY - 100 - W - F

- F = Free-hanging model
- R = Ceiling recessed model
- R (0) = Bulkhead recessed model
- C = Cassette model
- W = Hot water heating
- E = Electric heating
- 100/150/200/250cm = Nominal Unit Length

## Technical & Performance Data

### Invisidor CITY Plus

- Choice of casing styles
- Mounting heights up to 3.2m
- Energy efficient
- Simple control
- Suited to medium size high street retail outlets

Invisidor City Plus		Water Heating				Electrical Heating				
		CITYPLUS 100 W	CITYPLUS 150 W	CITYPLUS 200 W	CITYPLUS 250 W	CITYPLUS 100 E	CITYPLUS 150 E	CITYPLUS 200 E	CITYPLUS 250 E	
Maximum Installation Height	m	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	
Optimum Door Width	m	0.8	1.3	1.8	2.3	0.8	1.3	1.8	2.3	
Unit Width	m	1.0	1.5	2.0	2.5	1.0	1.5	2.0	2.5	
		A/B	A/B	A/B	A/B					
Heating Capacity ** (Max/Controlled)	@ Speed 1	kW	9.6 / 4.5	15.2 / 6.7	20.7 / 9.0	26.3 / 11.3	5.4	8.0	10.7	13.3
	2		13.3 / 7.2	19.0 / 9.2	26.1 / 12.4	33.1 / 15.6	5.4 / 8.9	8.0 / 13.3	10.7 / 17.9	13.3 / 22.2
	3		14.3 / 8.2	22.7 / 12.3	31.2 / 16.2	39.6 / 20.5	5.4 / 8.9	8.0 / 13.3	10.7 / 17.9	13.3 / 22.2
Air Volume	@ Speed 1	m <sup>3</sup> /s	0.243	0.365	0.486	0.608	0.243	0.365	0.486	0.608
	2		0.400	0.510	0.679	0.849	0.400	0.510	0.679	0.849
	3		0.446	0.669	0.892	1.115	0.446	0.669	0.892	1.115
Water Flow Rate (Max)	l/s	0.32	0.505	0.692	0.88	n/a	n/a	n/a	n/a	
Coil Hyd Pressure Drop (Max)	kPa	2.9	8.2	17.1	30.2	n/a	n/a	n/a	n/a	
Electrical Supply		230V / 1ph / 50Hz				415V / 3ph / 50Hz				
Max Power (Motor/Elec Heating)	kW	0.37	0.56	0.75	0.94	9.4	14.0	18.8	23.4	
Max Running Current	A	1.64	2.46	3.28	4.10	3 x 15.7	3 x 23.4	3 x 31.4	3 x 39.1	
Noise Level at 3m*	@Speed 2	dB(A)	44	46	47	48	44	46	47	48
Weight (Dry)	Model F	kg	44	63	82	97	45	67	87	106
	Model R	kg	59	85	111	133	60	89	116	142
	Model R(0)	kg	54	77	101	121	55	81	106	129
	Model C	kg	56	80	105	125	57	84	110	134

\* Typically NR = dB(A) – 4

\*\* Heating Capacities A/B

A: Denotes the maximum heating capacity with 82/71°C flow & return water temperatures.

The unit discharges air at its maximum temperature.

B: Denotes the capacity when the optional 3 port valve is fitted, controlling the discharge air temperature to 35°C.

### Specification Codes

CITY Plus - 100 - W - F

- F = Free-hanging model
- R = Ceiling recessed model
- R (0) = Bulkhead recessed model
- C = Cassette model
- W = Hot water heating
- E = Electric heating
- 100/150/200/250cm = Nominal Unit Length

## Technical & Performance Data

### Invisidor CITY PowerPlus

- High performance unit
- Mounting heights up to 3.7m
- Suitable for malls and large retail outlets
- Incorporates patented Invisidor technology

Invisidor City Plus		Water Heating				Electrical Heating				
		CITY POWERPLUS 100 W	CITY POWERPLUS 150 W	CITY POWERPLUS 200 W	CITY POWERPLUS 250 W	CITY POWERPLUS 100 E	CITY POWERPLUS 150 E	CITY POWERPLUS 200 E	CITY POWERPLUS 250 E	
Maximum Installation Height	m	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	
Optimum Door Width	m	0.8	1.3	1.8	2.3	0.8	1.3	1.8	2.3	
Unit Width	m	1.0	1.5	2.0	2.5	1.0	1.5	2.0	2.5	
		A/B	A/B	A/B	A/B					
Heating Capacity ** (Max/ Controlled)	@ Speed 1	kW	17.3 / 8.1	26.0 / 12.0	35.5 / 16.1	45.1 / 20.1	10.7	15.9	21.5	26.7
	2		20.5 / 10.4	30.8 / 15.6	42.2 / 20.8	53.7 / 25.9	10.7 / 21.5	15.9 / 31.8	21.5 / 43.0	26.7 / 53.4
	3		26.6 / 15.6	40.0 / 23.5	54.9 / 31.3	69.9 / 39.1	10.7 / 21.5	15.9 / 31.8	21.5 / 43.0	26.7 / 53.4
Air Volume	@ Speed 1	m <sup>3</sup> /s	0.442	0.663	0.884	1.105	0.442	0.663	0.884	1.105
	2		0.571	0.856	1.142	1.428	0.571	0.856	1.142	1.428
	3		0.862	1.292	1.723	2.153	0.862	1.292	1.723	2.153
Water Flow Rate (Max)	l/s	0.59	0.89	1.22	1.55	n/a	n/a	n/a	n/a	
Coil Hyd Pressure Drop (Max)	kPa	18.8	10.5	22.1	39.3	n/a	n/a	n/a	n/a	
Electrical Supply		230V / 1ph / 50Hz				415V / 3ph / 50Hz				
Max Power (Motor/Elec Heating)	kW	0.75	1.13	1.50	1.88	22.6	33.6	45.2	56.2	
Max Running Current	A	3.3	4.9	6.6	8.3	3 x 35.0	3 x 52.0	3 x 70.0	3 x 87.0	
Noise Level at 3m*	@Speed 2	dB(A)	43	45	46	47	43	45	46	47
Weight (Dry)	Model F	kg	63	94	119	151	69	104	137	170
	Model R	kg	81	139	153	194	87	149	171	213
	Model R(0)	kg	73	110	138	175	79	120	156	194
	Model C	kg	79	116	149	188	85	126	167	207

\* Typically NR = dB(A) – 4

\*\* Heating Capacities A/B

A: Denotes the maximum heating capacity with 82/71°C flow & return water temperatures.

The unit discharges air at its maximum temperature.

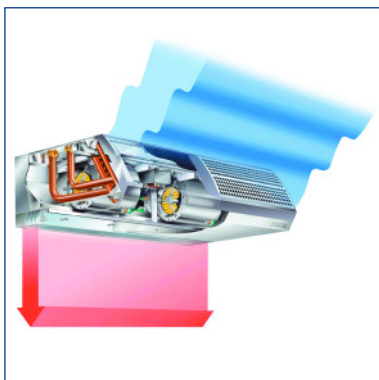
B: Denotes the capacity when the optional 3 port valve is fitted, controlling the discharge air temperature to 35°C.

## Specification Codes

CITY PowerPlus - 100 - W - F

- F = Free-hanging model
- R = Ceiling recessed model
- R (0) = Bulkhead recessed model
- C = Cassette model
- W = Hot water heating
- E = Electric heating
- 100/150/200/250cm = Nominal Unit Length

## Condensing Boiler Range



- For use with lower water temperatures
- Energy efficient
- Incorporates patented Invisidor technology
- Choice of casing styles
- Choose from 1500mm, 2000mm or 2500mm long units

### Invisidor CITY CB

Invisidor City CB Model Reference	CITY CB 150 W*	CITY CB 200 W*	CITY CB 250 W*
Maximum Installation Height (m)	2.7	2.7	2.7
Optimum Door Width (m)	1.3	1.8	2.3
Unit Width (m)	1.5	2.0	2.5
Heating Capacity/Off Coil Temperature (kW/°C)			
Speed 1	5.04 / 37	7.25 / 39	9.48 / 39
Speed 2	6.08 / 36	8.78 / 37	11.5 / 38
Speed 3	7.54 / 34	11.0 / 35	14.4 / 36
Air Volume (m3/s)			
Speed 1	0.257	0.343	0.429
Speed 2	0.343	0.457	0.572
Speed 3	0.485	0.648	0.808

### Invisidor CITY Plus CB

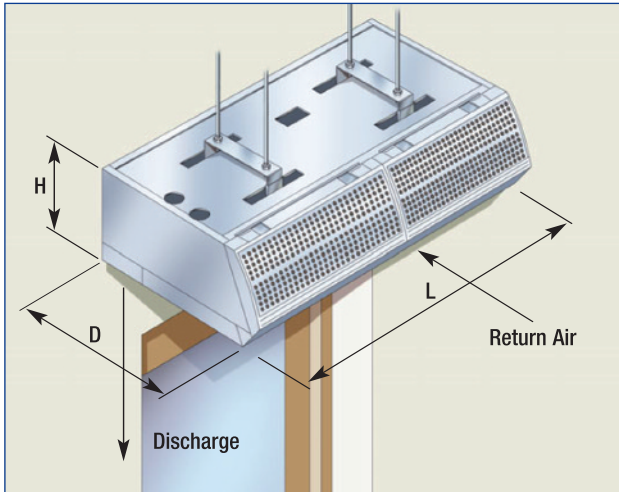
Invisidor City Plus CB Model Reference	CITY Plus CB 150 W*	CITY Plus CB 200 W*	CITY Plus CB 250 W*
Maximum Installation Height (m)	3.2	3.2	3.2
Optimum Door Width (m)	1.3	1.8	2.3
Unit Width (m)	1.5	2.0	2.5
Heating Capacity / Off Coil Temperature (kW / °C)			
Speed 1	6.33 / 35	9.14 / 37	12.0 / 37
Speed 2	7.78 / 34	11.3 / 35	14.9 / 36
Speed 3	9.14 / 33	13.3 / 34	17.6 / 34
Air Volume (m3/s)			
Speed 1	0.365	0.486	0.608
Speed 2	0.510	0.679	0.849
Speed 3	0.669	0.892	1.115

\* Denotes casing style to be added to complete product reference.

Performance based on LPHW

- Flow 60°C
- Return 40°C
- Entering Air Temperature 21°C

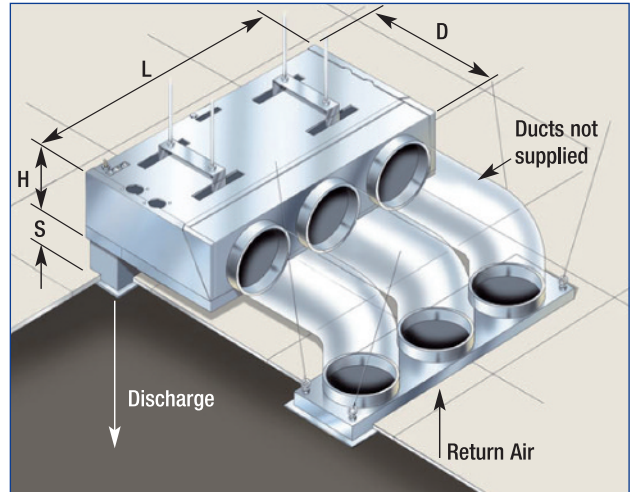
## Dimensional Drawings



**Free-hanging Model (F)**

Dim	CITY/CITY Plus	CITY PowerPlus
L	1000-1500-2000-2500	1000-1500-2000-2500
H	270*	370*
D	590	774

\*Add 27mm for hanging brackets

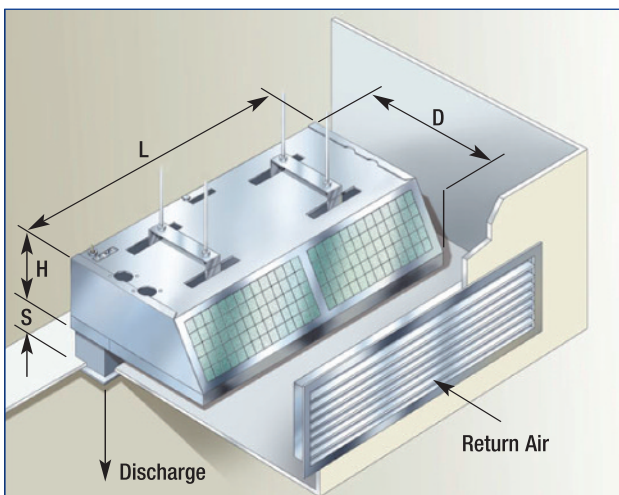


**Ceiling Recessed Model (R)**

Dim	CITY/CITY Plus	CITY PowerPlus
L	1000-1500-2000-2500	1000-1500-2000-2500
H	270*	370*
D	590	774
S	80 - 125	80 - 125
Spigot Dia	160	250

\*Add 27mm for hanging brackets

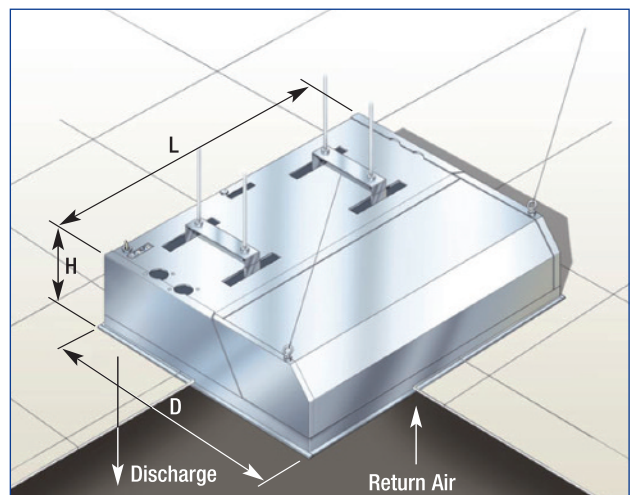
unit length (L)	Number of Spigots per unit	
	CITY/CITY Plus	CITY/PowerPlus
1000	5	3
1500	7	5
2000	10	6
2500	12	8



**Ceiling Recessed Model (R)**

Dim	CITY/CITY Plus	CITY PowerPlus
L	1000-1500-2000-2500	1000-1500-2000-2500
H	270*	370*
D	590	774
S	80 - 125	80 - 125

\*Add 27mm for hanging brackets



**Cassette Model (C)**

Dim	CITY/CITY Plus	CITY PowerPlus
L	1000-1500-2000-2500	1000-1500-2000-2500
H	270*	370*
D	821	1105

\*Add 27mm for hanging brackets

## **Specifications**

### **Casing**

Casings are manufactured from zinc coated steel, extra strengthened to minimise vibration. All models have inspection/access panels on the underside of the unit. Unit casings are finished in White (RAL 9010). The free hanging model is supplied with sectional inlet grilles that have a grey/white finish. Other RAL colours are available on request.

### **Grilles**

All units are supplied with a patented rectifier grille for the discharge air. Inlet grilles have filters fitted directly behind the grille blades for ease of maintenance. All rectifiers and grilles have an Aluminium finish.

### **Motor / Fan Assembly**

Two or more, dual inlet, vibration-free centrifugal fans, each driven by a suspended rotor motor. The fan casing and impeller are made from zinc coated steel. The motor is manufactured according to EN 60-335-1, protection class IP44 (CITY) or IP54 (CITYPlus and PowerPlus), and insulation class F. All motors are fitted with thermal overload protection.

### **LPHW Heating Coil**

The heating coil comprises Copper tubes with Aluminium fins. The water connections are G1" female thread. Test pressure is 30bars and the operating pressure is 16bars max. at 120°C.

### **Electric Heating Coil**

The electric heating coil has Aluminium fins and is controlled by the electronic control board. The elements are fitted with high temperature cut-out thermostats to prevent overheating. In addition when the unit is switched off, the fans will continue to rotate until the elements have cooled sufficiently.

### **Control and Operation**

The touchpad controller has three buttons for controlling the fan speed, as well as manual control for on/off. Electrically heated units have two additional buttons for 1st and 2nd stage heating control. The controller is connected to the air curtain with a low voltage cable, which has RJ11 plugs fitted. This type of cable is also used to inter-connect multiple units. Enable inputs from a room thermostat, BMS or door switch can be connected directly to the potential free contacts on top of each unit. For specific requirements please contact the Biddle sales office.

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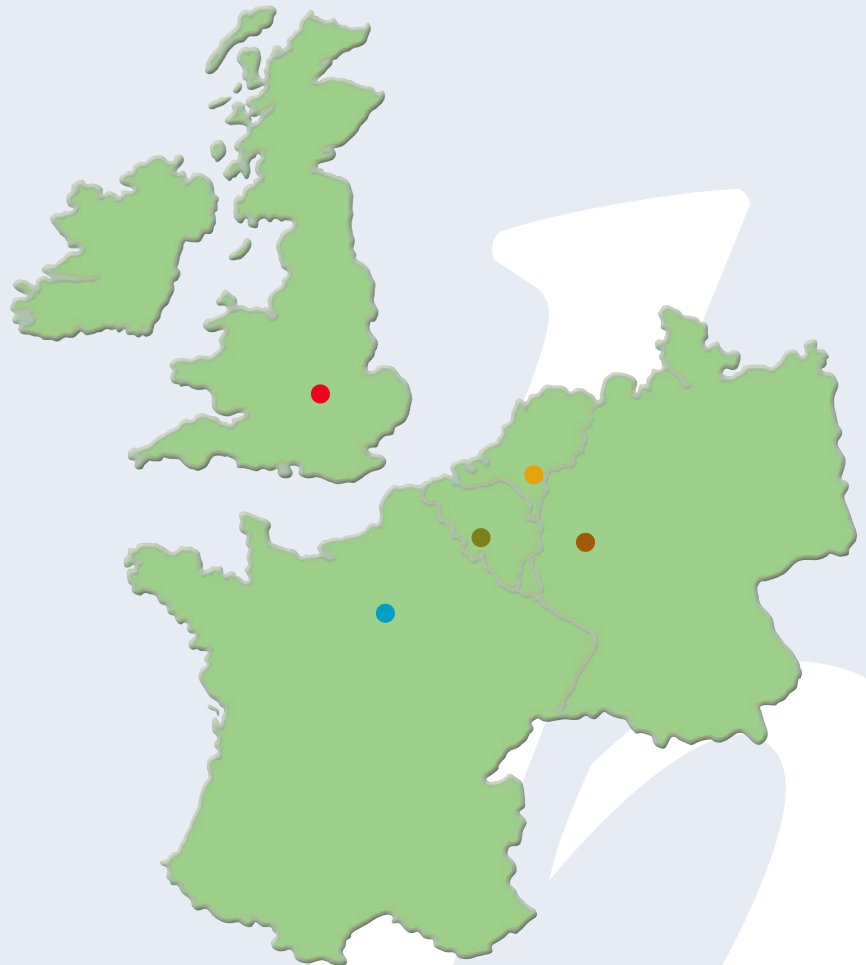
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**biddle**  
CLIMATE SOLUTIONS



The information given in this brochure is, to the best of our knowledge, correct at the time of going to print. However, Biddle Air Systems are constantly looking at ways of improving their products and services and therefore reserve the right to change without prior notice any of the data contained in this publication.  
2.10