



FORCEFLOW

900 Series
Fan Convectors

Biddle



FORCEFLOW 900 SERIES

WHY USE A FAN CONVECTOR?

Fan Convectors have three big advantages over similar heating solutions: they require little maintenance, they occupy much less wall space than radiators of equivalent output and they distribute heat throughout a room very quickly. For these reasons, Fan Convectors are universally acknowledged to be one of the simplest and most cost-effective ways to heat rooms of all types and sizes. This makes them the solution of choice for schools, libraries, churches, hospitals, leisure centres, retail outlets and commercial buildings.

WHY CHOOSE FORCEFLOW?



A product of over 50 years' experience, Biddle's industry-leading Forceflow Fan Convectors are renowned for their quality, reliability and efficiency. The Forceflow 900 series includes four variants, which are available in many different styles as standard, and even more on request. So, whatever the application we can provide a solution that meets the most exacting requirements and conforms with all relevant building regulations.

FORCEFLOW 900 SERIES

The Forceflow 900 Series includes:

- H2 Select
- Low Surface Temperature (LST)
- Condensing Boiler (CB)
- Sectional

FORCEFLOW H2 SELECT

The latest in a long line of market-leading designs, the H2 Select is available in 21 styles as standard and other styles and configurations on request. Easy to install and simple to maintain, Forceflow Fan Convectors can be mounted almost anywhere on the wall or ceiling, either as an exposed/cased or concealed/recessed unit.

BENEFITS:

- Non-handed casing allows the handing of the unit to be changed on site
- Detachable top panel creates more space for the fitting of valves
- Removable fan/motor assembly provides easy access to the back pipe connections
- Increased internal space speeds up installation
- Horizontal coil header allows angled valves to be fitted
- EU3 grade disposable panel filter simplifies maintenance
- Quick heat up
- Good heat distribution
- Simple to install
- Various control options
- Variety of casing options

HOW IT WORKS

The H2 Select fan convector range needs little user interaction. In 'Winter' mode, when the low temperature cut-out thermostat (T4) senses hot water in the coil the unit will operate. Then, by measuring the room temperature (T1 & T2 thermostats) the unit automatically cycles between low/medium speed and on/off, depending upon the actual versus desired room condition. When the boiler is switched off the T4 thermostat will also turn off the fan convector. In 'Summer' mode, the unit continually re-circulates ambient air.

PROVEN PERFORMANCE

Each model is available as standard as shown right. Heating duties are given for LTHW with 82°C flow and 71°C return, and 20°C entering air temperature. External static pressure is 0Pa. Noise levels are for guidance only. Biddle can advise on performance under different conditions. When the fans are turned off the natural convective heat emission is approximately 15% of the emission shown at medium fan speed. Alternative air volumes and heating duties are available.

STYLES:

The Forceflow H2 Select is available in 21 styles as standard see page 13 for details. More styles and configurations are available on request.

CONTROLS & ACCESSORIES

Please see page 16 for a comprehensive list of standard and optional accessories.



FS2 style with optional pencil and finger proof grille



FS21 style with standard grille

PERFORMANCE TABLE

Model	Fan speed	Air volume (l/s)	Heating duty (kW)	Noise level (NR)	Leaving air temp (°C)	Full load current (Amps)	Coil water pressure drop (kPa)	Water flow rate (kg/s)
915-H2	High	118	4.65	40	53	0.33	0.83	0.10
	Medium	87	3.80	35	56	0.28	0.61	0.08
	Low	59	3.02	27	62	0.21	0.41	0.07
930-H2	High	190	7.81	41	54	0.49	2.64	0.17
	Medium	176	7.32	35	54	0.48	2.10	0.16
	Low	104	5.75	25	66	0.43	1.29	0.12
935-H2	High	254	10.50	43	54	0.45	4.75	0.23
	Medium	202	9.10	35	57	0.42	3.55	0.20
	Low	136	7.08	24	63	0.38	2.49	0.15
940-H2	High	318	14.48	42	58	0.50	10.1	0.31
	Medium	249	12.50	35	62	0.43	8.25	0.27
	Low	164	9.62	30	69	0.39	4.24	0.21
975-H2	High	465	19.92	46	55	1.70	4.69	0.43
	Medium	408	17.90	37	56	0.91	2.64	0.39
	Low	250	13.15	29	64	0.74	1.70	0.28

MINIMUM WATER FLOW RATE

Model	Minimum water flow rate (kg/s)
915-H2	0.025
930-H2	
935-H2	
940-H2	
975-H2	0.045

CORRECTION FACTORS

F&R temperature	Entering air temperature				
	23°C	21°C	20°C	18°C	16°C
80/60°C	0.77	0.81	0.83	0.87	0.90
70/50°C	0.59	0.63	0.65	0.68	0.72

HOW TO SPECIFY YOUR PRODUCT

Placing an order couldn't be easier, simply tell us the model size, followed by the range and the casing style. For example 915 (Model size) H2 (Range) FI (Casing style).

FORCEFLOW CB (LOW WATER TEMPERATURES)

Our CB variant of the Forceflow fan convector range has been specially designed for use with new heating technologies. Heat pumps and condensing boilers are proven to be a much more environmentally friendly method of heating water, however they provide water temperatures at lower levels.

To ensure that the CB provides the same efficient and reliable heating performance, the convector has been designed to provide similar heating duties to a conventional fan convector, but with using lower water temperatures of 60°C flow and 40°C return, or lower.

BENEFITS:

- High output despite low water temperatures
- Available in all 21 Forceflow H2 Select styles
- Works with water temperatures of less than 60°C delivering even greater energy efficiency
- Quick heat up
- Good heat distribution
- Simple to install
- Various control options

HOW IT WORKS

A purpose-designed coil/heater battery with a greater surface area than those used in traditional fan convectors optimises heat transfer. So, although air volumes are reduced by circa 8%, similar heating duties are achieved. Control is identical to that used on a H2 Select fan convector, via on/off and speed change thermostats. If the water temperature in the coil drops below 35°C, (typically because the boiler plant is turned off centrally), a low water temperature cut-out thermostat turns the fans off.

PROVEN PERFORMANCE

BSRIA tests confirm heat output by measuring the water flow rate at a water flow temperature of 60°C and a water return temperature of 40°C. The heat output is then calculated using the formula: Heat Output (kW) = Water Flow Rate (kg/sec) x Water Temperature Drop (°K) x Specific Heat Capacity of Water (kJ/kg°K). The Forceflow 'CB' fan convector is manufactured and tested in accordance with BS EN 442, under a BS EN ISO 9001:2015 quality system.

STYLES:

The Forceflow CB is available in 21 styles as standard see page 13 for details. More styles and configurations are available on request.

CONTROLS & ACCESSORIES

Please see page 16 for a comprehensive list of standard and optional accessories.

PERFORMANCE TABLE

Model	Fan speed	Air volume (l/s)	Heating duty (kW)	Noise level (NR)	Water flow rate (l/s)	Water pressure drop (kPa)	Full load current (Amps)
915-CB	High	109	4.13	40	0.050	0.6	0.33
	Medium	80	3.11	35	0.038	0.4	0.28
	Low	54	2.26	27	0.027	0.2	0.21
930-CB	High	175	7.32	41	0.089	2.1	0.49
	Medium	162	6.88	35	0.084	1.8	0.48
	Low	96	4.08	25	0.049	0.7	0.43
935-CB	High	234	11.27	43	0.138	5.7	0.45
	Medium	186	8.93	35	0.109	3.7	0.42
	Low	125	5.94	24	0.073	1.8	0.38
940-CB	High	293	14.58	42	0.177	10.7	0.50
	Medium	229	11.60	35	0.142	7.1	0.43
	Low	151	7.49	30	0.092	3.2	0.39
975-CB	High	428	17.25	46	0.210	5.6	1.70
	Medium	375	15.41	37	0.188	4.6	0.91
	Low	230	9.38	29	0.115	1.9	0.74

*Based on Entering Air Temperature of 20°C and Water Temperatures of 60°C Flow and 40°C Return

CORRECTION FACTORS

Water flow temperature	Water temperature drop = 20°C Entering air temperature				
	23°C	21°C	20°C	18°C	16°C
60°C	0.89	0.96	1.00	1.07	1.15
55°C	0.71	0.78	0.82	0.89	0.96

HOW TO SPECIFY YOUR PRODUCT

Placing an order couldn't be easier, simply tell us the model size, followed by the range and the casing style. For example 915 (Model size) CB (Range) FI (Casing style).



FX1 style with optional plinth and key lockable access panel



FORCEFLOW LST (LOW SURFACE TEMPERATURE)

Whereas most fan convectors have a surface temperature in excess of 50°C, the surface temperature of the Forceflow LST is no greater than 43°C. This is a significant safety benefit, especially in environments where there are young children or vulnerable adults, such as nurseries, infant and special needs schools, sheltered accommodation and care homes.

Forceflow LST offers all the benefits of a conventional Forceflow Fan convector, despite having a lower surface temperature, and heat output per metre length is over twice that of an equivalent LST radiator.

BENEFITS:

- Low surface temperature - no greater than 43°C
- Much smaller than a typical LST radiator
- Twice the heat output of an equivalent sized LST radiator
- Quick heat up
- Good heat distribution
- Simple to install
- Performance tested by BSRIA

HOW IT WORKS

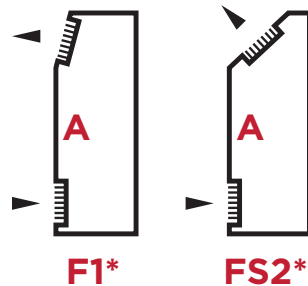
A special Thermostatic Radiator Valve (TRV) is fitted to the heating coil pipework and a temperature sensor positioned immediately behind the discharge grille. The valve modulates between the open and closed positions carefully maintaining the discharge air temperature, so that surface temperature satisfies LST regulations whilst optimising heat output.

PROVEN PERFORMANCE

Two separate tests have been carried out by BSRIA. The first confirms heat output and the second confirms that no part of the surface rises above 43°C. The Forceflow LST fan convector is manufactured and tested in accordance with BS EN 442, under a BS EN ISO 9001:2015 quality system, and complies with DHSS Engineering Data DN4 and NHS Estates Health Guidance Note 'Safe Hot Water and Surface Temperatures' 1998 (less than 43°C surface temperature with water flow temperatures of 80°C). The design is so innovative the product has a patent pending.

STYLES:

The Forceflow LST is available in two styles.



CONTROLS & ACCESSORIES

Please see page 16 for a comprehensive list of standard and optional accessories.

AUTOMATIC TEMPERATURE REGULATION

During normal operation, the fans run at a constant speed set by the installer or end user. A second TRV, with a temperature sensor positioned immediately behind the return air grille, is fitted into the heating coil pipework. This controls the room temperature by adjusting the water flow rate to ensure the set temperature is constantly maintained.



F1 style with optional plinth

PERFORMANCE TABLE

Model	Fan speed	Air volume (l/s)	Heating duty (kW)	Noise level (NR)	Water flow rate (l/s)	Water pressure drop (kPa)	Full load current (Amps)
915-LST	High	118	2.83	40	0.041	1.6	0.33
	Medium	87	2.09	35	0.028	0.8	0.28
	Low	59	1.42	27	0.018	0.3	0.21
930-LST	High	190	4.56	41	0.051	2.4	0.49
	Medium	176	4.22	35	0.047	2.2	0.48
	Low	104	2.50	25	0.028	0.8	0.43
935-LST	High	254	6.40	43	0.068	4.5	0.45
	Medium	202	5.09	35	0.057	3.2	0.42
	Low	136	3.43	24	0.040	1.6	0.38
940-LST	High	318	8.01	42	0.070	5.0	0.50
	Medium	249	6.28	35	0.059	3.4	0.43
	Low	164	4.13	30	0.042	1.8	0.39
975-LST	High	465	11.72	46	0.114	9.8	1.70
	Medium	408	10.28	37	0.100	7.7	0.91
	Low	250	6.30	29	0.062	3.0	0.74

*Based on Entering Air Temperature of 20°C and Water Flow Temperatures of 80°C

Higher water flow rates and flow temperatures above 70°C will not produce higher or lower heat outputs respectively, as the leaving air temperature is fixed by the LAT TRV to achieve a satisfactory low surface temperature. Only an increase in fan speed and/or a decrease in entering air temperature to below 20°C will result in higher heat outputs than those shown in the performance table.

HOW TO SPECIFY YOUR PRODUCT

Placing an order couldn't be easier, simply tell us the model size, followed by the range and the casing style. For example 915 (Model size) LST (Range) F1 (Casing style).

FORCEFLOW SECTIONAL

Forceflow Sectional has been designed to replace any manufacturer's existing 'back access' fan convector. Its unique sectional configuration ensures compatibility with previous building work and utilises existing grilles.

The three sections are delivered separately for ease of handling. Quick and easy to fix together the unit can be secured to virtually any wall and utilises existing apertures, minimising building work.

BENEFITS:

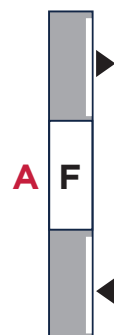
- Three easy to fix sections
- Minimises building work
- Reduces installation time and cost
- Utilises existing apertures in walls
- Replaces any previously installed 'back access' unit

OPTIONS

- 9 x combinations, giving 5 x heights, 150mm increments, from 1800mm to 2400mm
- 5 x widths, 250mm increments, from 750mm to 1750mm
- Heat outputs between 3.8kw and 17.9kw (when LPHW = 82/71°C & entering air = 20°C)
- Heat outputs between 3.1kW and 15.4kW (when LPHW = 60/40°C & entering air = 20°C)

STYLES:

The Forceflow Sectional is available in nine combinations. (Please refer to options table to the right.)



SBX1

CONTROLS & ACCESSORIES

Please see page 16 for a comprehensive list of standard and optional accessories.

Forceflow Sectional



STYLES

There's a Forceflow 900 Series fan connector for any, and every application, no matter how big or small. Forceflow H2 Select and Forceflow CB are available in 21 styles as standard, and many more on request. Forceflow LST is available in two different styles (F1 and FS2). While, Forceflow Sectional offers a choice of 5 different heights and widths, which can be used together in a variety of different combinations. Whatever the building, or room size, the Forceflow 900 Series will meet your needs – precisely.

STYLES AVAILABLE:

The Forceflow 900 Series is available in 21 styles. Our fan convectors can be mounted almost anywhere on the wall or ceiling.



Exposed/cased, with integral discharge and return air grilles and bevelled ends



Concealed/recessed, with discharge and return air spigots, loose grilles and square ends



More styles and configurations are available on request.

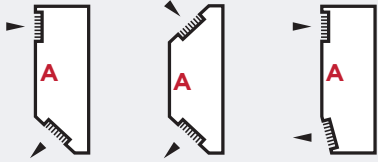
PIPE CONNECTIONS

Pipework connections are manufactured as left or right-hand (when looking at the access panel). The 'handing' on the H2 Select, CB and Sectional can easily be changed on site, whereas the 'handing' on the LST is fixed at production stage.

Although the following 21 styles represent the vast majority of installations, many more styles and configurations are available on request. Access is indicated by 'A'.

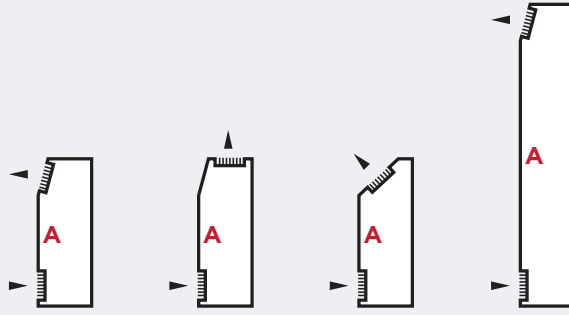
The H2 Select, CB and Sectional are all available with a reversed air flow.

Inverted Exposed/
Cased for high level wall
mounted applications



FS21 **FS3** **F11**

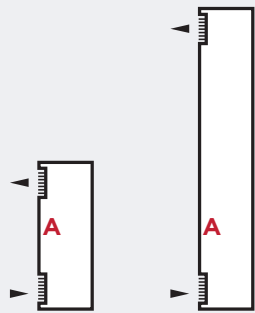
Vertical Exposed/Cased for freestanding low
level wall/floor mounted applications



F1* **F2** **FS2*** **FX1**

*LST available in these styles only.

Exposed/Cased for
alcove* applications



AF1 **AFX1**

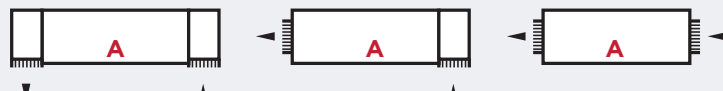
*with bevelled or square ends

Horizontal Exposed/Cased for ceiling
mounted applications



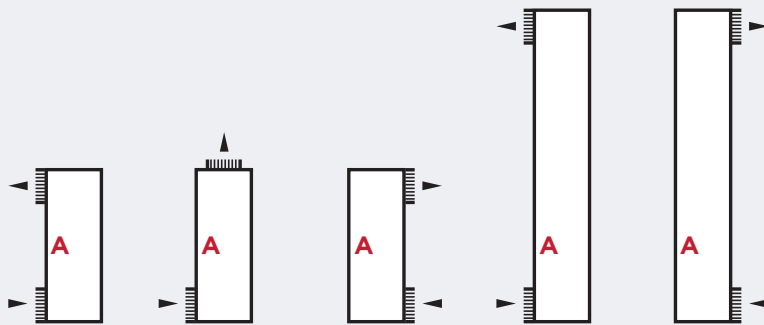
C1 **C2** **CS2** **CS3**

Horizontal Concealed/Recessed for
ceiling void applications



CR1 **CR2** **CR3**

Vertical Recessed for Concealed low
level wall/floor mounted applications



R1 **R2** **RB1** **RX1** **RBX1**

Sectional



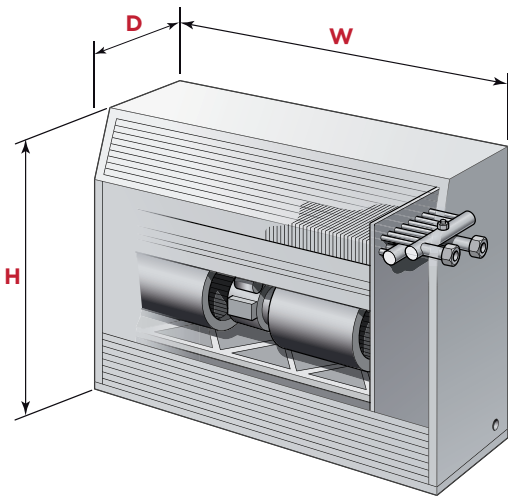
SBX1

DIMENSIONS

VERTICAL STYLES

Model	'D'	'W'			
		All Vertical Styles	Exposed/Cased	Alcove (bevelled ends)	Alcove (square ends)
915	207	805	805	750	750
930	207	1055	1055	1000	1000
935	207	1305	1305	1250	1250
940	207	1555	1555	1500	1500
975	250	1805	1805	1750	1750

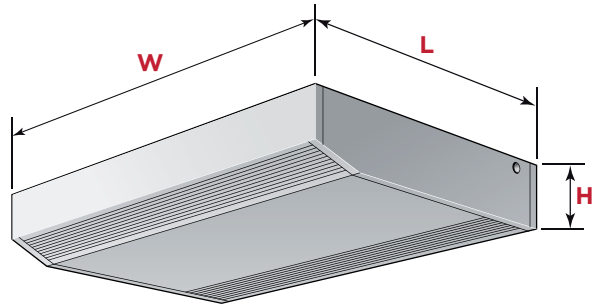
Style	'H'
F1, F2, FS2, AF1 (with bevelled ends), F11, FS21	660
AF1 (with square ends)	600
FS3	810
FX1, AFX1	1850
R1, R2, RB1	600
RX1, RBX1	1850



HORIZONTAL STYLES

Model	'H'		'W'	
	All Horizontal Styles (except CR1, CR2)	CR1 & CR2	Exposed/Cased	Concealed/Recessed
915	207	290	805	750
930	207	290	1055	1000
935	207	290	1305	1250
940	207	290	1555	1500
975	250	333	1805	1750

Style	'L'
C1, C2, CS2	660
CS3	810
CR3	600
CR2	743
CR1	886



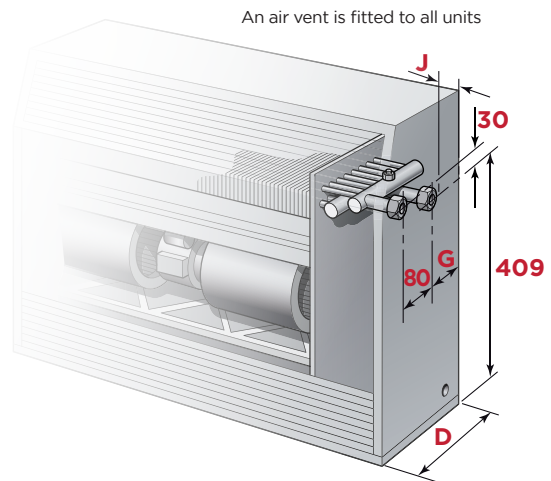
PIPE CONNECTIONS

RC 3/4 (3/4" BSP EXTERNAL)

For H2 Select units only

Model	'D'	'G'	'J'	
			Exposed/Cased	Concealed/Recessed
915	207	64	158	130
930	207	64	158	130
935	207	64	158	130
940	207	64	158	130
975	250	86	158	130

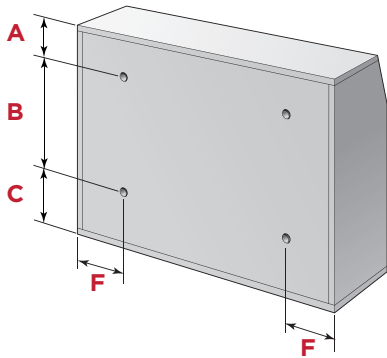
Standard pipe entry is through the base, apart from CR1, CR2 and CR3 style units when pipe entry is through the side. If required, pipe entry through the top may be available on some styles. The flow header connection should be on the air leaving side of the coil.



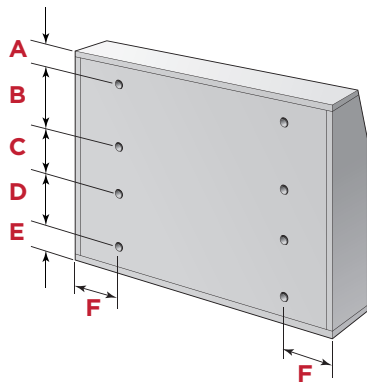
For dimensional detail on the CB, LST or Sectional ranges, please contact the Biddle sales office.

FIXING CENTRES 9MM KEY HOLED SLOTS

Style	A	B	C	F
F1, F2, FS2, AF1, F11, FS21, C1, C2, CS2	50	540	70	87
R1, R2, RB1, CR1, CR2, CR3	35	530	35	60
FX1, AFX1	50	1190	70	87
FS3, CS3	50	670	90	87



Style	A	B	C	D	E	F
RX1, RBX1	183	900	202	530	35	60

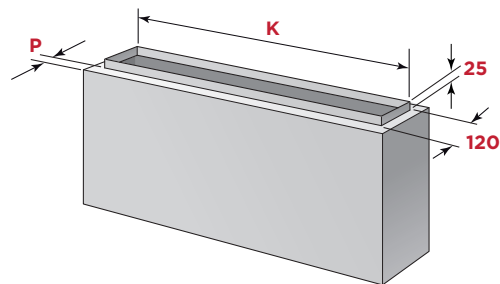
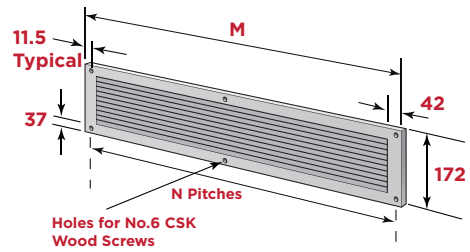
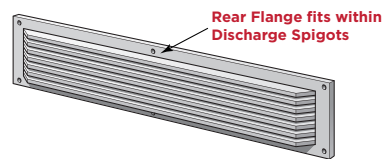
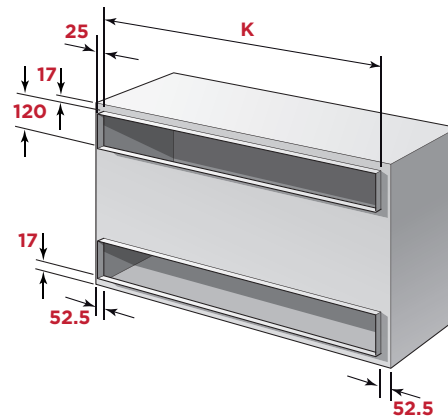


UNIT WEIGHT

Unit	915	930	935	940	975
Approx. operating weight kg units 600 or 660mm high	29	39	45	52	66
Approx. operating weight kg units 1850mm high	49	65	75	88	109

SPIGOT & GRILLE DETAILS

Model	K	M	N	P
915	645	704	2x340.5	43.5
930	895	954	2x465.5	43.5
935	1145	1204	2x590.5	43.5
940	1395	1454	3x477.0	43.5
975	1645	1704	3x560.3	65.0



All dimensions are in millimetres

HOW TO SPECIFY YOUR PRODUCT

Placing an order couldn't be easier, simply tell us the model size, followed by the range and the casing style. For example 915 (Model size) H2 (Range) FI (Casing style).

CONTROLS & ACCESSORIES

FORCEFLOW H2 SELECT FORCEFLOW CB FORCEFLOW SECTIONAL

Each of these Forceflow units have three fan speeds and is supplied as standard with:

- ❶ Built-in on/off, fan speed and summer/winter rocker switches
 - ❷ An on/off (T1) thermostat
 - ❸ A medium/low speed change (T2) thermostat
 - ❹ A low water temperature cut-out (T4) thermostat
 - ❺ A textured white (RAL9010) paint finish
 - ❻ An EU3 grade disposable panel filter
 - ❼ A screw-fixed access panel
 - ❽ Discharge and return air grilles
 - ❾ Horizontal 3/4" BSP female pipe connections
-

Further control options and accessories are available:

- ❶ Remote on/off, fan speed and summer/winter switches
 - ❷ Adjustable or tamperproof remote thermostats
 - ❸ Adjustable low water temperature cut-out (T4) thermostat
 - ❹ Pencil and finger proof grilles
 - ❺ Group control and fan enable relays
 - ❻ 100mm high plinth
 - ❼ Key lockable access panel
 - ❽ Metal framed EU2 grade nylon non-woven filter
 - ❾ Special paint colour
 - ❿ Pre-fitted radiator and lockshield valves
-

FORCEFLOW LST

Each Forceflow LST fan convector runs continuously at a single fan speed which is chosen and set by the installer or end user.

The unit is supplied as standard with:

- ❶ Built-in on/off, fan speed and summer/winter rocker switches
 - ❷ A low water temperature cut-out (T4) thermostat
 - ❸ A textured white (RAL9010) paint finish
 - ❹ An EU3 grade disposable panel filter
 - ❺ A screw-fixed access panel
 - ❻ Integral discharge and return air grilles
 - ❼ 22mm plain copper pipe connections
 - ❽ A factory set TRV valve, fitted into the heating coil pipework, with discharge temperature sensor
 - ❾ An installer or end user set TRV valve, fitted into the heating coil pipework
-

The unit has the following options:

- ❶ Key lockable access panel
 - ❷ Remote room temperature sensor (max. distance from valve 10m)
 - ❸ Pencil and finger proof grilles
 - ❹ 100mm high plinth
 - ❺ Special paint colour
-



Key lockable access panel



Tamperproof remote thermostat



Adjustable low water temperature cut-out (T4) thermostat



Pencil and finger proof grille





ENGINEERING SPECIFICATIONS

The Forceflow 900 series fan convectors, as manufactured by Biddle Air Systems Limited, incorporate materials and components to the following specification:

CASING

Manufactured from 20 gauge zinc coated sheet steel, welded together and stiffened to form a rigid structure preventing distortion and drumming. The screw-fixed top panel is removable to provide ease of access for fitting of valves. The detachable access panel is secured to the casing by two countersunk screws or, if requested, by two key operated locks. When the access panel is removed the cabinet can withstand, without permanent deformation, a 90kg load placed over an area of 300mm x 200mm in the centre of the top panel.

FINISH

The metal case is treated prior to finishing in a textured epoxy polyester powder paint, RAL 9010 (white).

GRILLES

Integral and loose grilles are of a linear pattern, with 70% free area and a minimum material thickness of 2.2mm, manufactured from extruded aluminium, treated and finished in a textured epoxy polyester powder paint, RAL 9010 (white).

FILTER

Fitted on the return air side of the fan(s) the cardboard framed panel is removable via the front of the unit, once the access panel has been removed, and is manufactured from EU3 grade nylon type material.

PLINTH

Suited for walls with and without skirting board, plinths are manufactured from 0.9mm zinc coated sheet steel, treated and finished in a textured epoxy polyester powder paint, RAL 9010 (white).

HEAT EXCHANGER

Leak tested to 30bar and with maximum operating conditions of 121°C flow 10bar, the heat exchangers are of a two or four row configuration with aluminium fins expansion bonded to copper primary tubes, brazed in turn to copper headers with a 1/8" BSP air vent.

PIPE CONNECTIONS

H2 SELECT, CB AND SECTIONAL RANGE
3/4" BSP female horizontal flow and return connections.

LST RANGE

22mm vertical plain pipetails for flow and return connections.

FAN/MOTOR ASSEMBLY

Screw fixed to guide rails and easily removable for maintenance purposes without disturbing any wiring.

MOTORS

Suitable for use with a 240v, 1ph, 50Hz mains power supply, of the multi-tapped permanent capacitor induction type, being totally enclosed and with a built-in self-resetting thermal overload cut-out.

FANS

Balanced double inlet double width centrifugal type, with forward curved blades and metal impellers, and directly mounted onto the motor shaft.

WIRING

Factory and site wiring of thermostats and switches is via a fused electrics box fitted within the unit at the opposite end to the pipe connections.

PACKAGING

Each fan convector is despatched in a purpose-made cardboard box, or shrink-wrapped with polystyrene protection, which is marked with unit details.

CE

Marking: The fan convector complies with all currently relevant EU directives.

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Biddle