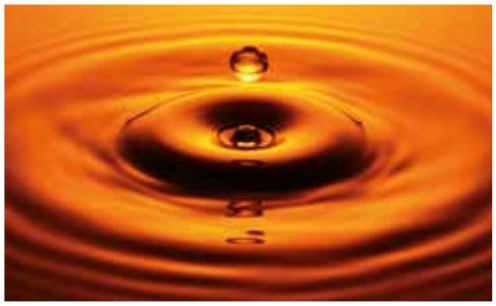
DUNHAM-BUSH

Products that perform...By people who care

Series 600

Cassette Fan Convector



- Ceiling cassette fan convector with optional trim for solid ceilings
- Fully flush with ceiling
- Each model available in 7 sizes with 4 heating coil options
- Electric heating up to 6kW single phase
- 1-13kW output with LPHW 50-130°C heating media
- EC energy efficient fan motors and conventional AC synchronous motors
- Extensive range of thermostatic and user control options including external BMS speed control

Contents

Identification

Introduction

The Series 600 fan convector heater by Dunham-Bush is the ideal heating solution where wall space is not available and surface mounted ceiling units cannot be used. The unit is specifically designed for integration with ceiling grid applications such as in schools, colleges, offices, libraries and commercial properties. They are elegant in design but built to the same robust quality that is typical of all Dunham-Bush products.

Series 600 fan convectors are free suspended high level heaters, designed to fit within a typical lay-in tile 600x600 ceiling system, but can also be installed into solid plasterboard ceilings or similar with an option finishing trim. They provide warm air heating when used with low or medium temperature hot water.

The standard finish is a white polyester powder coating to RAL 9010 30% gloss, with grilles finished in the same. Accessories include remote automatic temperature controls, as well as user switches which can be fitted or remote and access panels which are lockable to prevent tampering with the heater.

Authority

It is accepted practice at Dunham-Bush to maintain exceptional standards in engineering and quality. To this end, Dunham-Bush operates a quality system and is registered as a company of assessed capability to BS EN ISO 9001 : 2008

Description

Composition

Each Series 600 fan convector comprises a sheet metal casing fitted with extruded aluminium alloy grilles and lockable access panel. The casing contains a fan/motor assembly, air filter, hot water heating coil or electric heating element.

Heaters are supplied for single or dual fan speed operation with conventional AC motors or with energ efficient EC motors. Single speed heaters are set to low, medium or high speed. Dual speed heaters are set to low/medium, low/high or medium/high speeds.
Fan control is by means of internal or remote switches, and/or remote air thermostats, listed in the accessories section. There are also options for 24V enable and speed change relays.

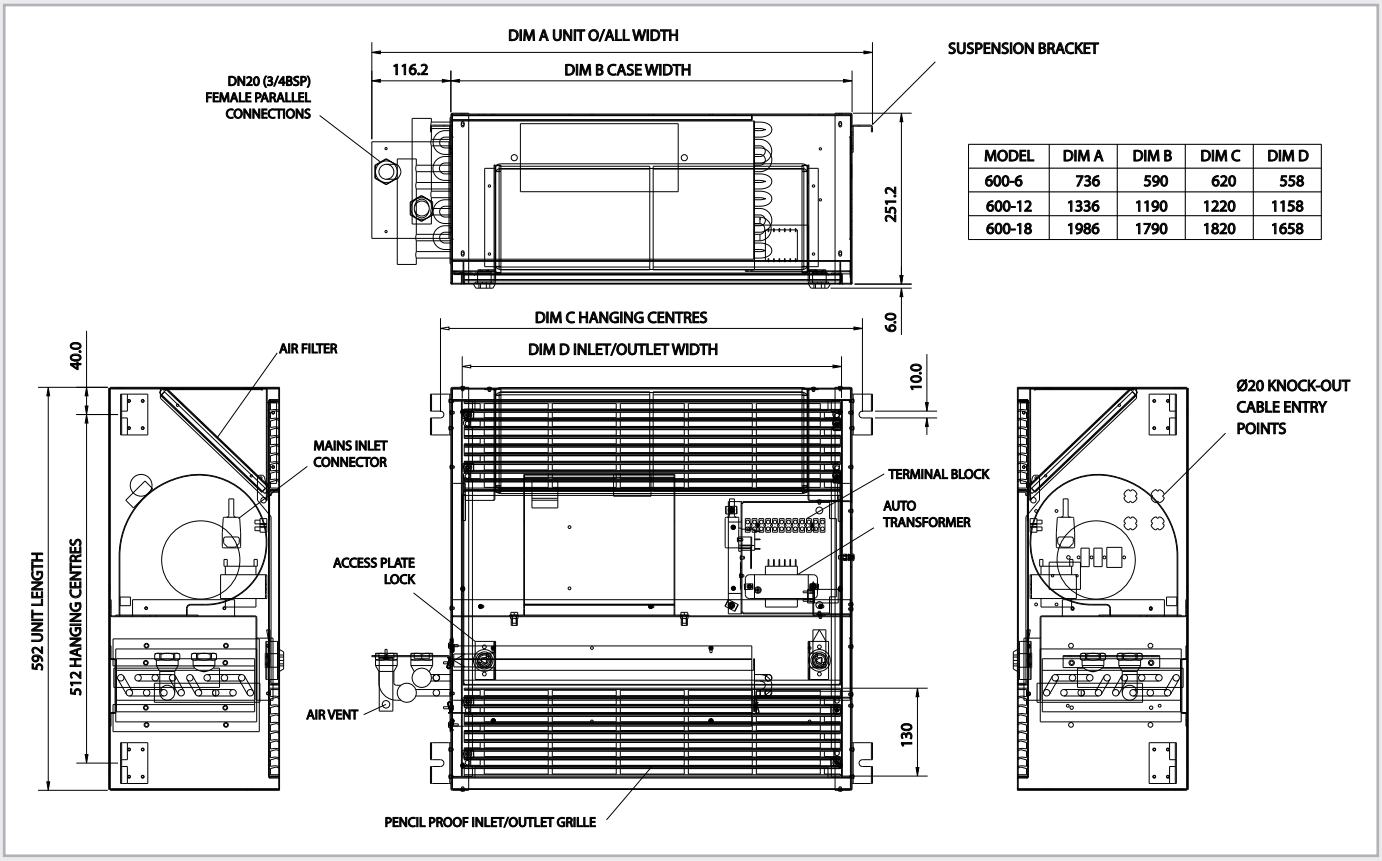
Range

The range consists of nominal sizes 600x600mm, 600x1200mm and 600x1800mm model, available in left or right hand. These are available with 3 types of LPHW heating coils or 1 to 6kW single stage electric heating elements.

Model	Nominal output kW	Casing size mm
600-W-6	3	590 x 590 x 250
600-W-12	6	1190 X 590 X 250
600-W-18	8	1790 X 590 X 250

Features and Dimensions

Model 600 - 6 (left hand connections, right hand opposite)



MODEL	DIM A	DIM B	DIM C	DIM D
600-6	736	590	620	558
600-12	1336	1190	1220	1158
600-18	1986	1790	1820	1658

Accessories

Remote air thermostats

Thermostats can be standard user control or tamperproof. Remote air thermostats can be provided to automatically switch the heater on and off and to change the fan speed/ heat output, in response to a fall or rise in ambient air temperature.

Low-limit thermostat

A low limit thermostat cut out (LTC) can be provided to prevent the heater operating until the heating medium is up to a sufficient temperature for the unit to operate effectively. This thermostat will automatically stop the heater at the end of the normal operating period, when the boiler plant closes down.

Type 3, adjustable setting low limit thermostat, range 30 to 90°C.

If supplied, Type 3 is wired into the control circuit and stored inside of the heater casing, for clamping to the LTHW flow pipe by the installer.

Switches

Fitted internal or remote switches can be provided to switch the heater on/off, to change speed, to allow thermostats to work automatically and to override the LTC (if fitted). The override “manual” switch allows the fans to circulate room air when the boiler plant is shut down during the summer.

Fitted switches

1. On/off, 2.
High/off/low,
3. Manual/off/auto,
4. Manual/off/auto and high/low.

Remote switches-surface or flush mounting

1. On/off,
2. High/off/low,
3. Manual/off/auto,
4. Manual/off/auto and high/low.

Fitted isolating valves

DN20 (3/4” BSP) isolating ball valves complete with ground faced unions or gate valves can be fitted external to the casework, directly to the flow and return connections of the heating coil.

Standard remote on/off and speed change thermostats,

Tamperproof remote on/off and speed change thermostats,

Remote high/low and manual/off/auto switches.

Fitted isolating valves

Performance

Heat outputs (kW), air volume flow rates (l/s), leaving air temperatures (°C), hydraulic resistances (kPa) and guide noise levels (NR)
Conditions: LPHW 80/70°C, entering air temperature 18°C.

Model number	Coil type	Low speed				Med speed				High speed			
		kW	l/s	°C	kPa	kW	l/s	°C	kPa	kW	l/s	°C	kPa
600-W-06	WA2	2.80	81	47	0.73	3.16	91	47	0.91	3.73	117	44	1.25
600-W-12	WA2	6.43	160	51	1.99	7.02	174	51	2.33	8.46	219	50	1.24
600-W-18	WA2	7.23	176	52	2.62	8.08	197	52	1.29	11.17	281	51	2.36

Model number	Coil type	Low speed				Med speed				High speed			
		kW	l/s	°C	kPa	kW	l/s	°C	kPa	kW	l/s	°C	kPa
600-W-06	WA1	2.28	81	41	0.50	2.58	91	41	0.63	3.06	117	40	0.86
600-W-12	WA1	4.52	160	41	1.02	4.97	174	42	1.21	6.03	219	41	1.76
600-W-18	WA1	5.15	176	42	1.37	5.80	197	42	1.72	7.99	281	42	1.26

Model number	Coil type	Low speed				Med speed				High speed			
		kW	l/s	°C	kPa	kW	l/s	°C	kPa	kW	l/s	°C	kPa
600-W-06	WA3	4.23	81	61	1.58	4.37	91	61	1.95	5.76	117	59	2.82
600-W-12	WA3	8.40	160	62	1.23	9.12	174	61	1.43	11.16	219	60	2.09
600-W-18	WA3	9.45	176	63	1.73	10.55	197	62	2.12	14.70	281	61	3.95

Heat outputs (kW) and current load (A) for electric heating (230V/1ph/50Hz)

Model number	Electric heating element	Output	Load (A)
E-06, E-12, E-18	E11	1kW	4.3
E-06, E-12, E-18	E21	2kW	8.6
E-06, E-12, E-18	E31	3kW	13.0
E-12, E-18	E41	4kW	17.4
E-12, E-18	E51	5kW	21.7
E-12, E-18	E61	6kW	26.0

For electric heating, leaving air temperature can be calculated from the equation:
Leaving air temperature (°C) = Entering air temperature (°C) + [815 x heat output (kW) / air flow rate (l/s)]
Leaving air temperatures greater than 60°C are not recommended; select higher air flow rate

Electrical Data for AC mtors
Fan voltage (VAC), airflow rate (l/s), running current (A) and specific fan power (W/l/s)

Model Size	Low speed				Medium speed				Hgh speed			
	VAC	l/s	A	W/l/s	VAC	l/s	A	W/l/s	VAC	l/s	A	W/l/s
W-06	110	81	0.4	0.62	120	91	0.4	0.66	150	117	0.6	0.77
W-12	90	160	0.8	0.44	100	174	0.8	0.48	120	219	0.9	0.55
W-18	100	176	0.8	0.48	110	197	1.0	0.52	150	281	1.2	0.65

Electrical Data for EC motors
Fan voltage (VDC), airflow rate (l/s), running current (A) and specific fan power (W/l/s)

Model Size	Low speed				Medium speed				Hgh speed			
	VDC	l/s	A	W/l/s	VDC	l/s	A	W/l/s	VDC	l/s	A	W/l/s
W-06	4.6	81	0.1	0.16	5.4	91	0.2	0.20	7.6	117	0.4	0.34
W-12	5.2	160	0.3	0.19	5.8	174	0.4	0.22	7.5	219	0.7	0.34
W-18	4.4	176	0.3	0.15	4.9	197	0.3	0.17	7.3	281	0.8	0.31

Correction factors for WA1, WA2 & WA3 heating coils

Mean water (°C)	Entering air temperature (°C)	Water temperature drop across coil							
		5k		10k		15k		20k	
		Output	Hyd. res.	Output	Hyd. res.	Output	Hyd. res.	Output	Hyd. res.
40	0	0.69	1.92	0.59	0.35	–	–	–	–
	18	0.34	0.47	0.24	0.06	–	–	–	–
	20	0.30	0.36	0.21	0.03	–	–	–	–
45	0	0.78	2.46	0.71	0.50	–	–	–	–
	18	0.44	0.79	0.33	0.11	–	–	–	–
	20	0.40	0.65	0.30	0.09	–	–	–	–
50	0	0.88	3.08	0.82	0.68	–	–	–	–
	18	0.54	1.17	0.44	0.20	–	–	–	–
	20	0.50	1.02	0.40	0.16	–	–	–	–
55	0	0.98	3.84	0.93	0.87	–	–	–	–
	18	0.65	1.66	0.58	0.33	–	–	–	–
	20	0.61	1.48	0.54	0.29	–	–	–	–
60	0	1.08	4.68	1.04	1.09	–	–	–	–
	18	0.75	2.23	0.70	0.49	–	–	–	–
	20	0.71	2.05	0.66	0.44	–	–	–	–
65	0	1.18	5.53	1.14	1.30	1.10	0.54	–	–
	18	0.84	2.83	0.80	0.65	0.74	0.24	–	–
	20	0.80	2.59	0.77	0.59	0.70	0.22	–	–
70	0	1.27	6.44	1.24	1.54	1.20	0.64	1.16	0.37
	18	0.94	3.51	0.90	0.81	0.85	0.32	0.81	0.14
	20	0.90	3.23	0.86	0.75	0.81	0.29	0.76	0.12
75	0	1.37	7.47	1.34	1.78	1.31	0.76	1.26	0.40
	18	1.03	4.25	1.00	1.00	0.96	0.41	0.90	0.20
	20	0.99	3.95	0.96	0.93	0.92	0.38	0.86	0.18
80	0	1.46	8.55	1.43	2.05	1.40	0.87	1.37	0.47
	18	1.13	5.07	1.10	1.20	1.06	0.50	1.02	0.26
	20	1.09	4.47	1.06	1.12	1.03	0.47	0.98	0.24
85	0	–	–	1.53	2.33	1.50	1.00	1.47	0.54
	18	–	–	1.19	1.42	1.16	0.60	1.13	0.32
	20	–	–	1.16	1.34	1.13	0.56	1.09	0.30
90	0	–	–	1.62	2.64	1.60	1.14	1.57	0.62
	18	–	–	1.29	1.66	1.26	0.71	1.23	0.38
	20	–	–	1.25	1.57	1.22	0.67	1.20	0.36

Approximate factors for heat output (kW) and hydraulic resistance (kPa), at mean water temperatures (°C), entering air temperatures (°C) and water temperature drops (K) across the coil. Factors may be applied to tables 1, 2 and 3.

Model Size	Approx mass (kg)	Coil capacity (l)
06	26	0.63
12	47	1.03
18	57	1.25

Application

General

Series 600 fan convector heaters are suitable for most applications, where high-level free suspended heaters with front discharge and re-circulation grilles are desirable.

Having an overall nominal size of only 590x590mm, 1190x590mm and 1790x590mm, 600 Series fan convectors are designed for direct integration into a 600x600 ceiling grid application, but care should be taken to ensure heaters are sited so that there are no obstructions directly beneath, as this could affect air circulation.

Typical applications include: Schools, Colleges, Elderly Peoples' Homes, Libraries and Offices.

Selection

It is recommended that heaters are selected to operate at medium speed for general use or at low speed for rooms where noise levels are particularly important. Heaters should only be selected at high speed for non critical applications, such as entrance foyers, corridors etc. or for initial rapid warm up. Sound power levels are available on request.

From the known heat loss of the room to be heated and the operating conditions, select the model and size from the tables of outputs on page 5.

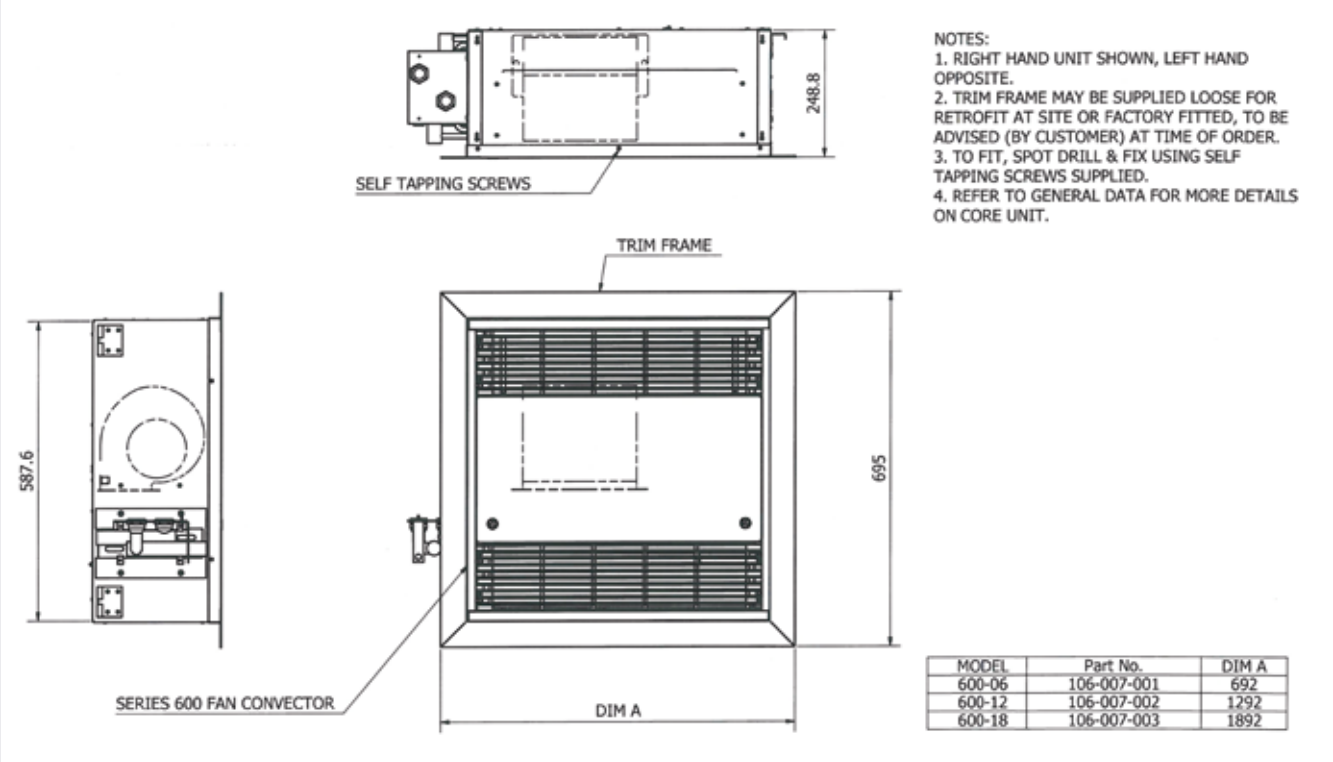
It is recommended that wherever possible, the total volume of the room should be circulated through the sum of the heaters a minimum of three to four times per hour and ideally four to five times per hour.

Whenever possible, heaters should be located near windows or in areas of disproportionately high heat loss.

By design, Dunham-Bush fan convector heaters have moderate leaving air temperatures, low outlet velocities and low air throws.

Comfortable conditions throughout the heated space are achieved by good air circulation.

Optional Ceiling Trim



MODEL	Part No.	DIM A
600-06	106-007-001	692
600-12	106-007-002	1292
600-18	106-007-003	1892

Engineering Specification

The Series 600 fan convector heaters shall be manufactured by Dunham-Bush Limited, Downley Road, Havant, Hampshire, PO9 2JD. The models, figure numbers and quantities shall be as indicated in the schedule and/or on the drawings. The construction of all units must comply with the following specification.

Series 600 fan convector heaters shall be suitable for a 600x600 celing grid application.

Casing construction

Casings shall be constructed from 1.2mm mild steel panels, adequately stiffened to minimise distortion. Each casing shall have an access panel secured with 1/4 turn locks. The access panel shall be removable within the height of the casing and have safe suspended hinge fixings.

Casings shall be designed with knockouts to provided conduit entry in side and back of the casing.

Casing dimensions

Each heater shall have an overall size of 590 x 590mm and a height of 250mm.

Grilles

Discharge and recirculation grilles shall be manufactured from extruded aluminium alloy section.

Heating coil

Coils shall be constructed from 9.35mm O.D. solid drawn copper tubes, expanded into single plate corrugated aluminium fins and brazed to copper headers. Flow and return connections shall be DN20 (3/4 BSP.) female parallel. Coils less air vents shall be tested to 24 bar gauge.

Each coil shall be provided with either a type 1 manual air vent or type 2 automatic air vent, located behind the access panel. Air vent type shall be as specified.

Table 8:
Site test and working pressures – bar gauge

Coils fitted with	Max cold test pressure	Max working pressure
Type 1 air vent	10.5	7.0
Type 2 air vent	9.0	7.0

EC Fan Motors

Fan motors shall be high efficiency, low noise, electronically communtated '3-core dc', external rotor type with resilient mounts to minimise noise and vibration. Winding insulation shall be rated to Class 'B' and bearing shall be 'sealed for life'. Units require a 200/277V 50 or 60Hz single phase power supply. Each fan shall be DIDW forward curved and shall be statically and dynamically balanced.

AC Fan/Motor

Fan/motor assemblies shall be high quality low noise combined external rotor motor type, statically and dynamically balanced. Fans shall be double inlet, double width, direct drive, centrifugal type with low noise, forward curved, multi blade 'tab lock' galvanised steel impellors housed in galvanised steel scrolls. Motors shall be high efficiency, external rotor type with permanent split capacitors. Bearing shall be sealed for life, maintenance free ball race type with a minimum life expectancy of 50,000 hours under normal operating conditions. Overload protection shall be by way of auto-resetting thermal contactors incorporated into the winding's. Insulation shall be to Class 'B' with enclosure to IP44 and electrical supply of 230/240V 1ph. 50Hz. Motor wiring shall be complete with a four-way line connection plug and shall be easily removable for maintenance.

Electrical connections and wiring

Each heater shall be provided with an I.E.C mains inlet connector, fused 2 Amp, with a spare fuse and an IEC mains inlet plug, located behind the access panel. Internal wiring shall be high temperature PVC insulated 16/0.20.

Auto-transformer (on AC specified motors)

An auto-transformer shall be fitted within the heater casing to provide fan motor speed control. Transformers shall be wired to provide one or two speeds from the range low, medium and high, with integral 24vac secondary winding suitable for controls package.

Control PCB (on EC/DC specified motors)

An interface control PCB shall be fitted to convert the speed change switches and thermostatst switched position into a 0-10V dc input signal to produce the specified fan speeds on page 5.

Packaging

Each heater shall be properly packed in a carton, marked with the model and figure number, and any other reference specified on the order for site identification.

Accessories

If specified, accessories listed in the manufacturers Product Catalogue shall be provided.

Air filter

Air filters shall be washable, bonded polyester type; filters shall be G2 to BS EN 779 (EU2).

Construction

Handling

The purchaser is responsible for off loading. Heaters are individually cartoned and two men can usually handle the heaviest heater. When quantities of heaters are delivered, they may be palletised and shrink wrapped, so a fork lift truck or some form of lifting equipment is desirable. Care should be taken to ensure the heaters are not dropped or knocked under any circumstances.

Storage

Heaters should be stored under clean, dry conditions. The cartons should not be removed until heaters are required for installation, unless damage in transit is suspected.

Note - the purchaser must examine the heaters promptly upon receipt and any claims for damage will only be accepted if at the time of delivery, the consignment note is endorsed with a note detailing the damage and counter signed by the transport driver.

Each heater is marked to show the model, figure number, serial number and any reference given on the order for site identification. This information also appears on the consignment note.

Preparation

Make proper provision for fixings. The structure to which heaters are to be fixed must be fit for purpose and capable of accepting the appropriate fixings. Heater casings are supplied with knockouts in the side for conduit or cable entry.

Installation details

The access panel can only be removed with the key provided.

Pipework connections

Coil connections are DN20 (3/4" BSP.) female parallel. Local isolating and regulating valves are recommended.

Observe the correct flow and return positions, to ensure the rated heat output.

Electrical connections

A 230/240 Volt, single phase 50 Hertz supply must be connected to the IEC mains inlet plug. Any remote accessories must be connected as shown on the wiring diagram supplied with the heater.

Please refer to the instructions supplied with the heater. Additional copies are available on request.

Prices & Conditions of Sale

Prices
Dunham-Bush Ltd do not issue price lists but will be pleased to supply a written quotation upon request.

Standard conditions of sale
The standard conditions of sale appear on all quotation and order acknowledgement forms. Additional copies are available upon request

Supply

Availability
Series 600 fan convector heaters are supplied direct from our factory in Havant. The availability varies with demand and should therefore be checked at the time of ordering.

Packaging
Heaters are packed in individual cartons. Each heater is marked to show the model, figure number, serial number and any reference given on the order for site identification. This information also appears on the consignment note.

Ordering

To allow us to process your order promptly, please refer to any quotation we have supplied and any relevant correspondence. Please send your order to our Agent or Sales Engineer who provided the quotation.

There are two ways of providing information necessary for us to supply the required heaters,
a) please photo copy the fan convector description code form and fill in your requirements or,
b) please advise the following details:

1) Quantity of each model and figure number
2) Left or right hand coil connections, as viewed looking at the discharge grille
3) Air vents manual or automatic
4) Fan speed(s)
5) Details of any accessories required
6) Reference or stencil, for site identification

Delivery to Site
Series 600 fan convectors are delivered to site in accordance with our Conditions of Sale. The purchaser is responsible for off-loading and proper safe storage.

600 Series Fan Convector Description Code

Code posn	Component	Component description
1	Series	600
2	Model	W - LPHW coil, E - Electric heating
3	Size	6 - 600 x 600mm, 12 - 600 x 1200mm, 18 - 600 x 1800mm
4	Coil connections	L – left hand, R – right hand
5	Coil Orentation	U - universal
6	Coil Type	WA1 - 6fpi coil, WA2 - 10fpi coil, WA3 - 16fpi coil, E11 - 1kW, E21 - 2kW, E31 - 3kW, E41 - 4kW, E51 - 5kW, E61 - 6kW
7	Air vent	M – manual, A – automatic, P - plugged, N - none
8	Motor type	AC - AC, ED - EC/DC
9	Fan speeds	LN – low, MN – med, HN – high, LM – low/med, MH – med/high, LH – low/high.
10	Low-limit thermostat	3 – adjustable setting 650mm long cable, N – none
11	Air thermostat on/off	R – remote, N – none
12	Air thermostat high/low	R – remote, N – none
13	Switch location	I – fitted internal, E - fitted external, R – remote, N – none
14	Switch function	1 – on/off, 2 – high/off/low, 3 – man/off/auto, 4 – man/off/auto & high/low, N – none
15	Relays	1 - 24V enable relay, 2 - 24V enable & speed change relays, N - none
16	Isolating ball valves	B – ball valves, G – gate valves, C - in line ball valve (for use with control valve below), N – none
17	Control valve	2 - 2-port valve & thermic actuator, 4 - 4-port valve & thermic actuator, N - none
18	Ceiling trim surround	N - none, F - fitted, R - remote

1	2	3	4	5	6			7	8	9		10	11	12	13	14	15	16	17
600				U															

Notes: a) air thermostats are remote option only.
b) please select any remote switches and/or remote thermostats required from the lists below:
c) there are no BMS fault signals available

Remote switches	Flush mounted part number	Quantity	Surface mounted part number	Quantity
on / off	121-601-010		121-601-001	
high / off / low	121-601-011		121-601-002	
man / off / auto	121-601-012		121-601-003	
man / off / auto & high / low	121-601-015		121-601-006	

Remote room thermostat	Standard user control	Quantity	Tamperproof cover	Quantity
Honeywell T6360B1028	903-002-056		–	
Honeywell T6360B1069	–		903-002-057	

Dunham-Bush Ltd
Downley Road
Havant
Hants
PO9 2JD

Tel. 023 9247 7700
Fax. 023 9245 3601
Email: info@dunham-bush.co.uk
www.dunham-bush.co.uk

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