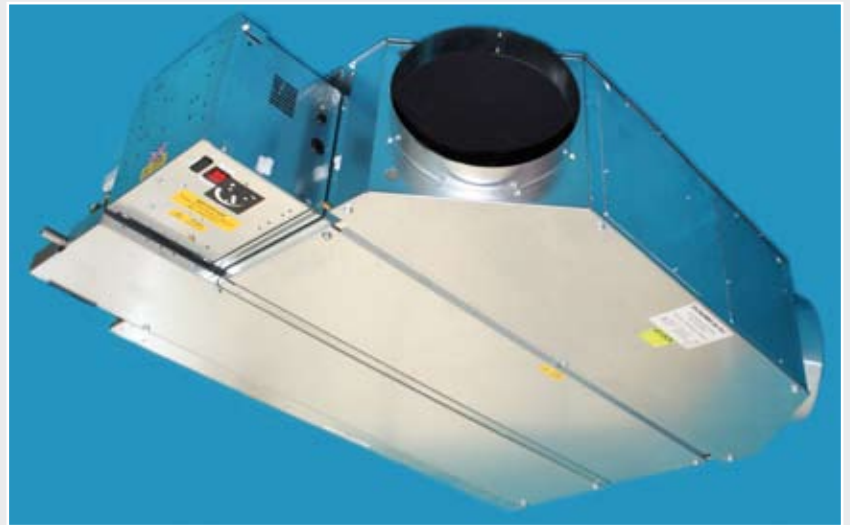
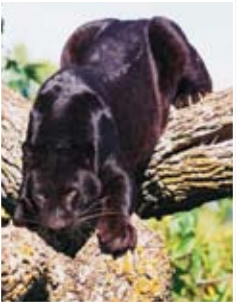




Panther Fan Coil Unit



Energy Efficient EC Motors
280mm Deep Chassis
Horizontal Fan Coil Unit

INTRODUCTION

The 'Panther', manufactured by Dunham-Bush is an adaptable, easy to use fan coil unit, that performs quietly and powerfully, with inherent quality.

'Panther' fan coil units are built to no-compromise engineering standards using only the most modern and reliable components available. Combined with the very latest design and manufacturing technology, the 'Panther' provides the ideal solution to achieve exact thermal and noise criteria. Careful consideration has been given to safe site handling, fast / simple installation and ease of access for maintenance. Designed to offer maximum site flexibility, the 'Panther' is one of the most versatile and user-friendly products available in today's market.

Flexibility Is The Key

The 'Panther' uses a non-handed, dual-purpose coil block covered by a stainless steel 'V' formed condensate pan, terminating with a central drain point at the lowest end of the tray. This universal design is used on both RH and LH configurations and allows the complete coil and condensate pan assembly to be site reversible without the need for any additional parts. The discharge plenum is supplied with a combination of spigots and blanking plates that can be interchanged on site. The added facility to re-locate the controls box from one side of the unit to the other gives the 'Panther' the flexibility to accommodate site layout changes and client fit-outs. If required it can even be used for underfloor applications.

Simple Access For Maintenance

Removing large panels secured by 10-20 screws and then getting them through a 600mm x 600mm ceiling grid, all whilst stood on a stepladder, has made life difficult for the maintenance engineer in the past. Special consideration has been given to overcoming these problems and the resultant 'Panther' now brings a 'breath of fresh air' to maintenance tasks.

The main unit access panel is secured by quarter turn 'quick release' fasteners and gives access for inspecting the fan motor assemblies. Each fan motor is mounted separately onto the main bulkhead plate with an in-line plug and socket to facilitate easy removal.

Filters are simple to remove for cleaning, they withdraw from either the rear or side of the unit without the use of tools or need to remove panels. On model sizes 4-7 both the filters and fan access panels are split into two smaller sections for easier removal and handling.

Electrical and controls work can be easily carried out via two hinged covers giving access to all components.

The stainless steel condensate pan can also be easily removed for cleaning via its own separate access panel.

Energy Efficient EC Fan Motors

The 'Panther' incorporates high efficiency EC (electronically commutated) fan motors. Fan speed is controlled via an external 2-10VDC signal which can be provided by a manual, pre wired or remotely supplied speed control potentiometer. Alternatively, the signal can be supplied directly from the BMS (Building Management System).

High Quality Fan Motor Assemblies

The fan motor assemblies are individually mounted on to a 'floating' bulkhead plate, isolating them from the rest of the unit chassis, reducing resonance and casing breakout noise. Use of the highest quality components available is never more important than in the case of the fan motor assemblies to ensure that quiet and powerful operation is consistently achieved year after year.

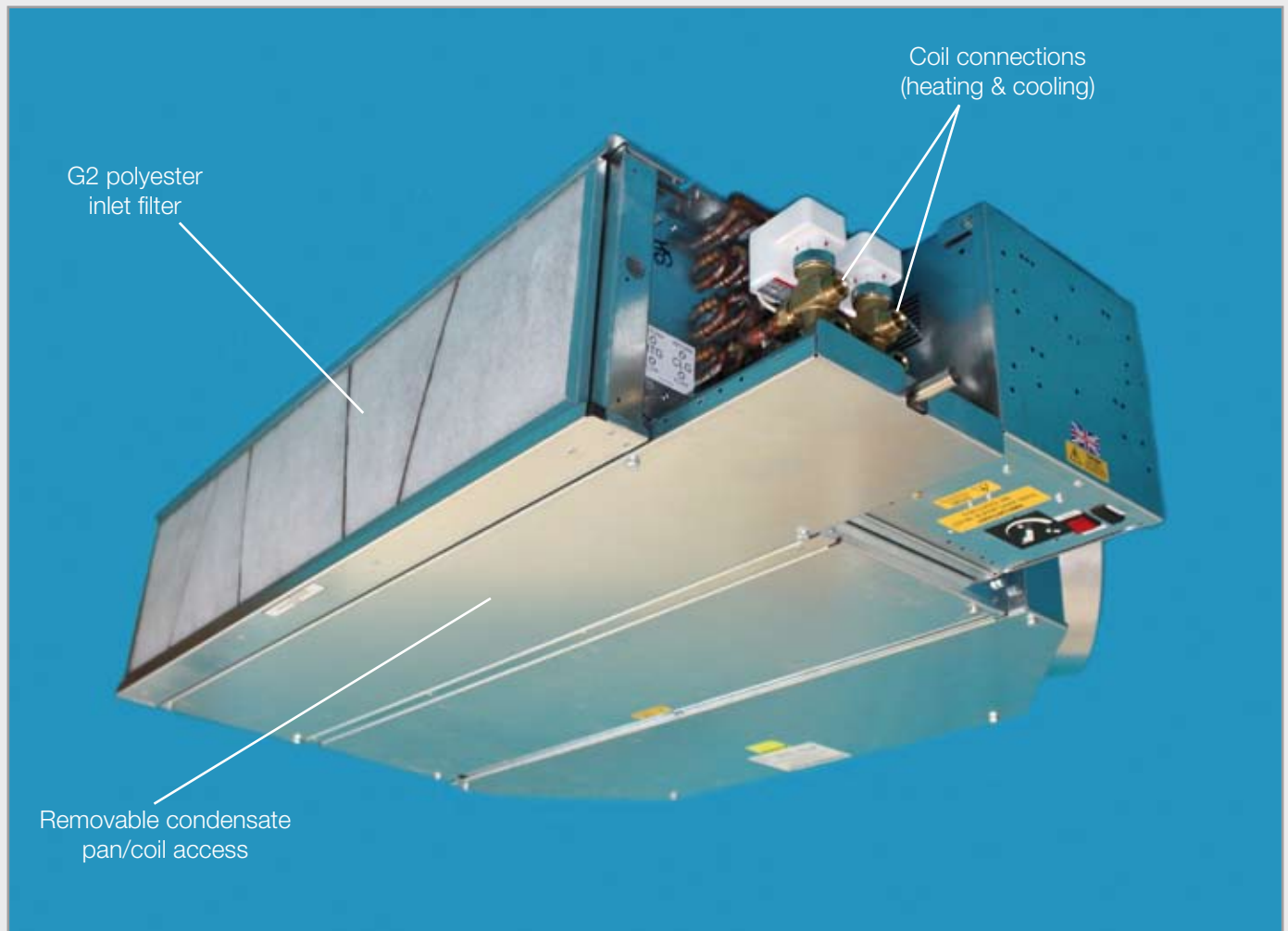
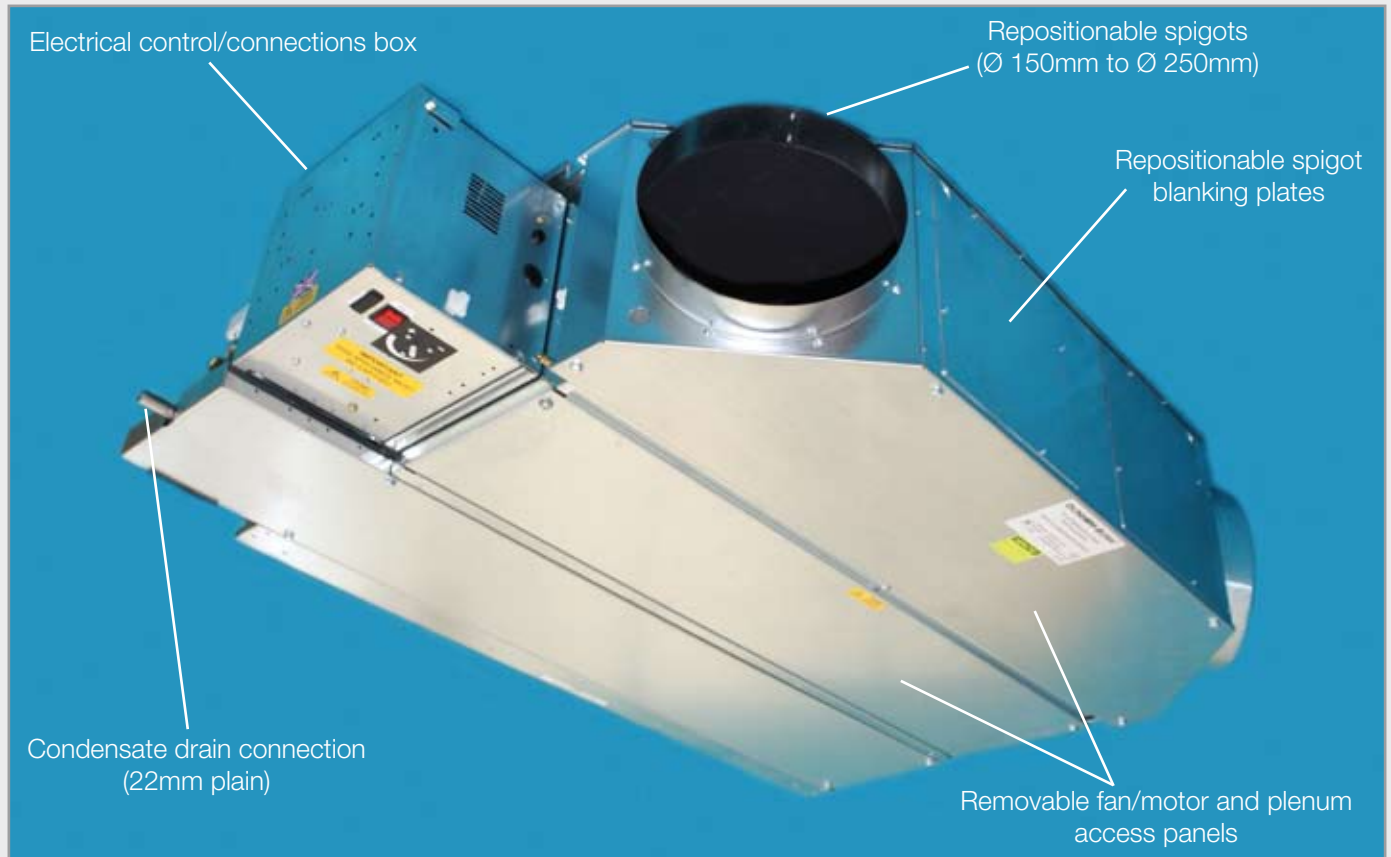
Adaptable Controls Box

'Panther' units are supplied with a well-ventilated controls box supplied with a one metre flying lead for connection to an adjacent fused spur. The box has been designed to accommodate most temperature controllers and associated electrical components. The complete controls box can be disconnected from the unit for any major electrical / controls refurbishment, this design also enables the controls box to be retrofitted after the unit has been installed.

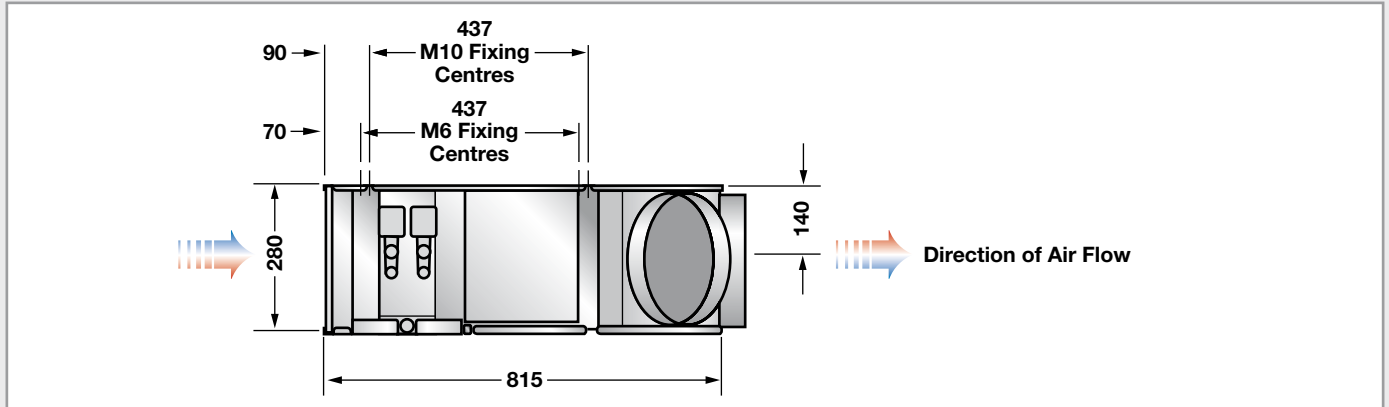
Long Life Stainless Steel Condensate Pan

'Panther' fan coil units incorporate stainless steel condensate pans as standard. By using stainless steel, cleaning is made easier whilst the resistance to corrosion is increased, vastly improving the longevity of the pan. The fully welded 'V' formed pan creates a positive seal against the coil preventing any air bypass. The pan is mounted to provide a positive fall in two directions to the central outlet at the lowest end of the pan. The 22mm O.D. stainless steel outlet is finished flush with the bottom of the pan ensuring that condensate drains completely.

FEATURES



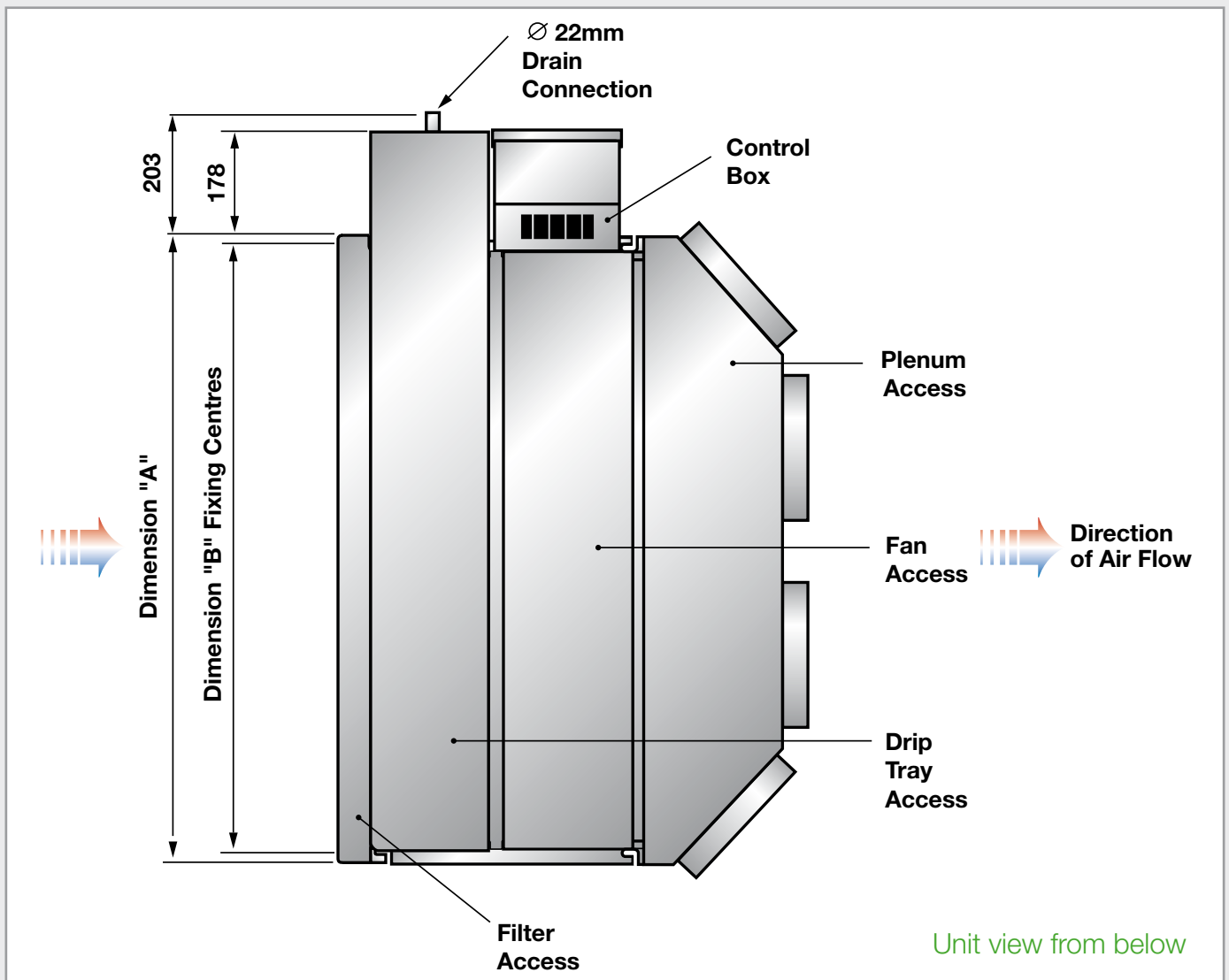
DIMENSIONS



Model	Dimension 'A' (mm)	Dimension 'B' (mm)	Dry weights (kg)
1	675	641	37
2	1075	1041	51
3	1075	1041	56
4	1475	1441	70
5	1475	1441	74
6	1875	1841	92
7	1875	1841	96

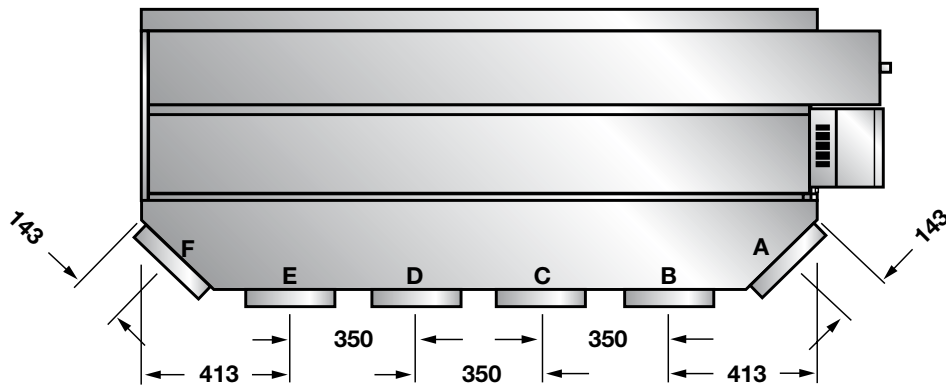
LH Unit shown, RH opposite

Note: unit handings are viewed looking against the direction of air flow

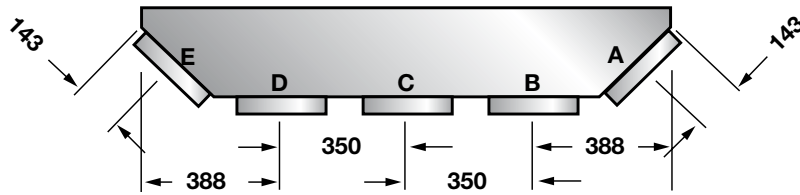


Unit view from below

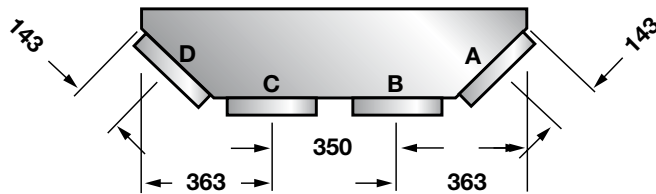
Models
Pan 6 & 7
View from below



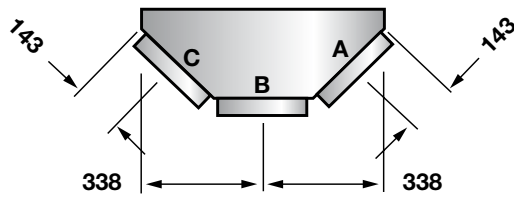
Models
Pan 4 & 5
View from below



Models
Pan 2 & 3
View from below



Model
Pan 1
View from below



Standard discharge options available for all models:

- Octagonal plenum circular spigots (above)
- Rectangular plenum circular spigots
- Rectangular plenum rectangular spigot

Standard
Spigot Sizes (mm)

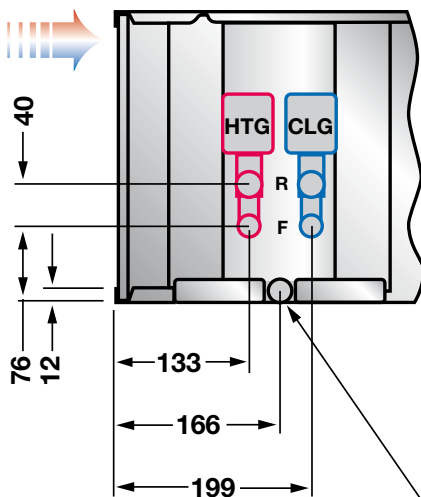
Ø 250

Ø 225

Ø 200

Ø 150

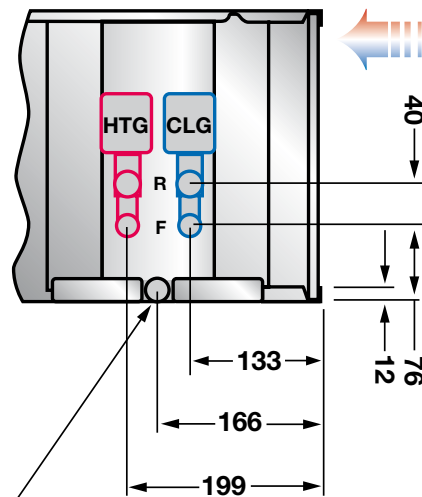
Direction
of Air Flow



LH Pipework detail

Ø 22mm
Drain Connection

Direction
of Air Flow



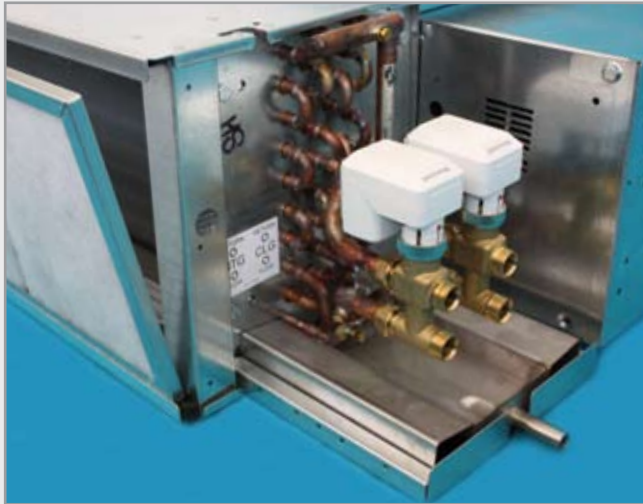
RH Pipework detail

CONTROLS

Standard Thermal Controls

'Panther' fan coil units can be supplied with a number of standard factory fitted control packages. These packages typically consist of a setpoint controller with return air sensor, 2 or 4 port valves and actuators.

More control options available upon request.

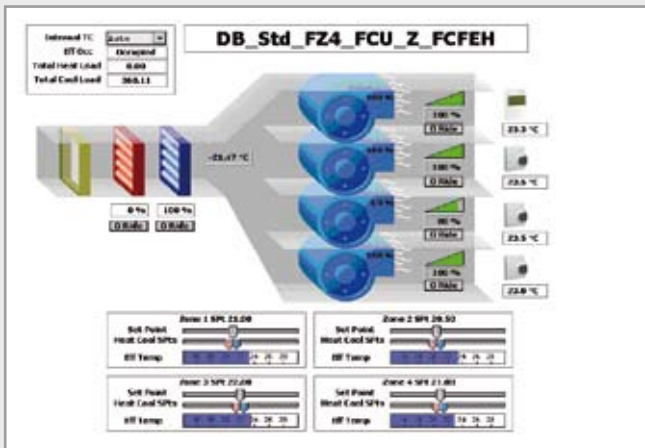


Standard 4 port valves and actuators

Dunham-Bush 'Zone Flow' Fully Communicating Control

The 'Zone Flow' system by Dunham-Bush includes a fully functional communicating controller, enabling FCUs to communicate with external networks. The system allows individual control of FCUs via a router or gateway, communicating to any network such as BACnet, Echelon, Modbus networks as well as BMS networks.

Alterations to the control strategy can be made using a web-serving graphical user interface, allowing the user to edit control software and algorithms. The controller is fitted with an enhanced range of analogue, digital and universal inputs/outputs as well as sensors for monitoring FCU status.



Dunham-Bush 'Zone-Flow' control software

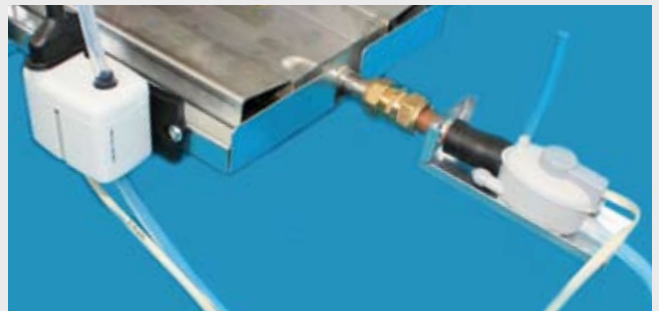


'Panther' control box with fitted speed potentiometer

Free Issued Controls

A service to fit non-standard free issued controls is available. The 'Panther' control box has been designed to accommodate most temperature controllers and associated electrical components.

Please note: Factory fitting of free issued controls is subject to component compatibility and suitability.



Optional fitted condensate pump

Ancillary Components

A range of optional ancillary components for the 'Panther' fan coil unit are available, including:

- Condensate pumps
- Electric heating elements
- Acoustic attenuation
- Pressure independant control valves
- Control relays
- Fan monitoring devices

For any special requirements, please contact the Dunham-Bush sales department for further information and availability.

SPECIFICATION

The 'Panther' Series Fan Coil Units shall be manufactured by Dunham-Bush Limited, Downley Road, Havant, Hampshire, PO9 2JD. Units shall be selected to achieve the required performance data whilst operating against the specified design parameters. 'Panther' units shall be of a draw through design and comprise a washable air filter, multi-block coil with separate connections for cooling and heating, stainless steel condensate pan, low noise external rotor EC/DC fan motors, integral multi-outlet discharge plenum and an electrical / controls enclosure.

Unit Chassis - Chassis shall be of a rivetted construction manufactured from a minimum thickness of 1.2mm galvanised steel. Stiffeners and strengthening folds shall be used to form a solid robust structure. Recessed, reinforced mounting slots able to accept M6, M8 or M10 drop rods or mounting bolts are provided for installation whilst the panel design and use of 'dutch folds' produce a flush external finish with no sharp edges. Fan/Motor assemblies shall be mounted on a 1.6mm 'floating' bulkhead plate, isolated from the rest of the unit to reduce noise resonance through the unit casing. Panels shall be designed to allow separate unhindered access to the serviceable items, namely filters, condensate pan, coil, fans / motors and controls.

Discharge (Supply Air) Plenums - Mitred corner or rectangular, integral acoustically lined discharge plenum shall form part of the unit chassis with multi-outlet spigots with various size options available to match most ductwork configurations. Use of interchangeable circular spigots and blanking plates, secured to the plenum by screws allow outlet positions to be easily moved or extra spigots to be added in the event of a site layout changes or client fit-out.

Access - Access for inspection and service to the fans/motors shall be via an insulated panel secured with 1/4 turn captive quick release fasteners. On model sizes 4 - 7 this panel is to be split into two sections to allow easy removal by a single engineer through a standard ceiling grid. Access to the condensate pan / coil, filters and discharge plenum are via separate insulated panels by M6 setscrews into nutserts. All access panels form a positive airtight seal against the main unit chassis

Insulation - Unit chassis and panel work shall be both thermally and acoustically insulated with 95kg/m³, CFC & HFC free, Class 'O' open cell expanded foam insulation, having a maximum thermal conductivity of 0.047 W/mK, fully complying with London Borough and CAA flammability and toxicity requirements. The adhesive is a modified acrylic, light and ageing resistant synthetic resin with high temperature tolerance.

Air Filters - Filters shall be fully framed, washable, polyester G2 media to BS EN779. Filters shall be easily removable from either the rear or side of the unit without the need to remove any panel work.

Coils - Coil shall be multi-block, dual purpose type, divided into two sections to provide both cooling and heating. To be constructed from 3/8" seamless copper tube mechanically expanded into aluminium fins and brazed into copper headers. Aluminium fins shall have die formed collars to maximise contact with the tubes and provide maximum heat transfer. Coils shall be circuited to provide low hydraulic pressure drops under normal operating conditions whilst being designed to prevent air locks, ensuring positive venting and draining via easily slotted hexagonal vent plugs. Coils to terminate with 15mm O.D. copper tails, spaced at 40mm centres to accept most standard 4-port valves. Tails are to terminate within a restraining plate providing adequate support to the control valves and adjoining pipework. Coils shall be tested by dry air under water to 30 bar.

Condensate Pan - The condensate pan shall be of a one-piece construction manufactured from 1.2mm 304L stainless steel with fully brazed corners. Pans to be 'V' formed and mounted to provide a positive fall in two directions ensuring the free flow of condensate to the 22mm diameter stainless steel end connection. Pans shall be externally insulated with 3mm closed cell class 'O' thermal insulation. Pans to be enclosed within a galvanised steel carriage providing both protection against damage and easy removal for cleaning.

EC Fan Motors - Fan motors shall be high efficiency, low noise, electronically commutated '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.

Fan Motor Assemblies - Fan motor assemblies shall be mounted separately onto a 'floating' bulkhead to isolate noise resonance from the rest of the unit and facilitate easy removal of an individual fan motor for replacement. Alternatively the complete 'floating' bulkhead can be removed from the unit for major attention.

Fan Motor Speed Control - Fan speed control shall be affected by a 2-10VDC control signal to the motor(s). An infinitely adjustable potentiometer fitted within the controls box, or supplied loose for remote mounting, enabling selection of the desired fan speed to be achieved. Alternatively the motors can be controlled directly by a BMS signal, or other source.

Controls Box - Each unit shall be provided with a well-ventilated electrical box complete with two hinged lids for ease of access. The control box shall contain a speed control potentiometer (if not supplied loose for remote fitting), harmonic filter, on/off switch (if not supplied loose for remote fitting) and terminal connection block. Each will also contain a mains fuse whilst also providing space to accommodate most available temperature controllers along with any associated relays (if required). The control box shall be provided with a 1 metre flying lead for site connection to an adjacent fused spur outlet.

Temperature Controls - Temperature controls shall be provided in accordance with the project specification. Standard temperature controls will comprise of modulating 2 or 4 port valves and actuators, acting in conjunction with a return air sensor wired into an electronic stand alone controller. For special or non standard control packages a service to factory fit free issued control components is also available, further information about this service is available upon request.

COOLING DATA

				Chilled Water Flow/Return Temperature							
				5.5/11°C		6/12°C		8/13°C		10/14°C	
Model	Fan Speed	EC Input Voltage (V)	Air Volume (l/s)	Sens (kW)	Total (kW)	Sens (kW)	Total (kW)	Sens (kW)	Total (kW)	Sens (kW)	Total (kW)
Pan 1	Ultra Low	5.2	85	1.46	1.90	1.38	1.74	1.25	1.46	1.11	1.20
	Extra Low	5.7	97	1.62	2.08	1.53	1.90	1.38	1.60	1.24	1.33
	Low	6.2	122	1.95	2.46	1.82	2.21	1.66	1.89	1.50	1.60
	Medium	7.2	146	2.27	2.82	2.10	2.51	1.92	2.17	1.75	1.87
Pan 2	Ultra Low	5.9	117	2.04	2.67	1.92	2.43	1.74	2.05	1.55	1.68
	Extra Low	6.7	143	2.40	3.10	2.26	2.79	2.05	2.37	1.84	1.98
	Low	7.9	168	2.76	3.51	2.56	3.13	2.33	2.68	2.11	2.27
	Medium	8.4	181	2.94	3.72	2.72	3.31	2.48	2.84	2.25	2.42
Pan 3	Ultra Low	5.1	147	2.56	3.36	2.40	3.04	2.18	2.57	1.96	2.12
	Extra Low	5.8	200	3.36	4.32	3.12	3.86	2.85	3.30	2.57	2.77
	Low	6.7	248	4.06	5.16	3.77	4.61	3.45	3.96	3.11	3.34
	Medium	7.5	294	4.72	5.96	4.39	5.34	4.02	4.59	3.63	3.89
Pan 4	Ultra Low	5.3	180	3.13	4.10	2.91	3.67	2.66	3.12	2.38	2.58
	Extra Low	5.9	230	3.88	5.01	3.59	4.45	3.28	3.80	2.97	3.20
	Low	6.8	280	4.61	5.88	4.26	5.22	3.91	4.49	3.54	3.80
	Medium	7.8	332	5.34	6.75	4.96	6.03	4.55	5.19	4.11	4.41
Pan 5	Ultra Low	4.7	185	3.33	4.43	3.12	4.00	2.83	3.38	2.52	2.74
	Extra Low	5.3	244	4.26	5.58	3.97	5.02	3.62	4.26	3.25	3.52
	Low	6.2	319	5.40	6.97	5.04	6.28	4.59	5.34	4.14	4.46
	Medium	7.2	394	6.48	8.27	6.09	7.51	5.55	6.40	4.99	5.36
Pan 6	Ultra Low	5.0	230	4.06	5.34	3.77	4.77	3.43	4.05	3.09	3.35
	Extra Low	5.6	307	5.23	6.78	4.85	6.05	4.44	5.17	4.00	4.32
	Low	6.3	375	6.23	7.98	5.79	7.15	5.30	6.12	4.78	5.14
	Medium	7.2	446	7.24	9.18	6.76	8.26	6.18	7.08	5.56	5.97
Pan 7	Ultra Low	5.1	282	5.05	6.69	4.71	6.03	4.29	5.11	3.84	4.18
	Extra Low	5.3	324	5.71	7.51	5.34	6.78	4.86	5.75	4.36	4.73
	Low	6.1	412	7.04	9.14	6.61	8.29	6.02	7.04	5.40	5.83
	Medium	6.8	499	8.27	10.58	7.84	9.74	7.13	8.26	6.35	6.83

Maximum cooling performance data is based on an entering air condition of 23°C dry bulb and 16°C wet bulb, airflow rates based on external static pressure drop of 30Pa.

Dunham-Bush can offer a selection service for any conditions not stated above. Please contact the Dunham-Bush sales department.

HEATING & ELECTRICAL DATA

				Hot Water Flow/Return Temp.			Electrical Data	
				82/71°C	60/50°C	50/40°C		
Model	Fan Speed	EC Input Voltage (V)	Air Volume (l/s)	Duty (kW)	Duty (kW)	Duty (kW)	SFP (W/l/s)	Normal Max Running Current (A)
Pan 1	Ultra Low	5.2	85	2.27	1.30	0.64	0.21	0.64
	Extra Low	5.7	97	2.47	1.42	0.72	0.22	
	Low	6.2	122	2.88	1.65	0.93	0.24	
	Medium	7.2	146	3.28	1.86	1.15	0.29	
Pan 2	Ultra Low	5.9	117	3.48	2.06	1.38	0.23	0.64
	Extra Low	6.7	143	3.95	2.33	1.57	0.27	
	Low	7.9	168	4.39	2.59	1.73	0.33	
	Medium	8.4	181	4.61	2.72	1.82	0.37	
Pan 3	Ultra Low	5.1	147	4.02	2.37	1.59	0.20	1.28
	Extra Low	5.8	200	4.94	2.91	1.94	0.22	
	Low	6.7	248	5.73	3.37	2.24	0.25	
	Medium	7.5	294	6.43	3.77	2.51	0.29	
Pan 4	Ultra Low	5.3	180	5.05	2.93	1.58	0.20	1.28
	Extra Low	5.9	230	5.92	3.43	2.09	0.22	
	Low	6.8	280	6.76	3.90	2.54	0.27	
	Medium	7.8	332	7.59	4.37	2.84	0.32	
Pan 5	Ultra Low	4.7	185	5.14	2.98	1.63	0.20	1.92
	Extra Low	5.3	244	6.15	3.56	2.23	0.21	
	Low	6.2	319	7.38	4.26	2.77	0.25	
	Medium	7.2	394	8.53	4.90	3.17	0.30	
Pan 6	Ultra Low	5.0	230	6.58	3.87	2.59	0.20	1.92
	Extra Low	5.6	307	7.94	4.66	3.10	0.21	
	Low	6.3	375	9.10	5.32	3.53	0.24	
	Medium	7.2	446	10.26	5.99	3.97	0.29	
Pan 7	Ultra Low	5.1	282	7.50	4.41	2.94	0.21	2.56
	Extra Low	5.3	324	8.23	4.83	3.21	0.21	
	Low	6.1	412	9.70	5.67	3.76	0.25	
	Medium	6.8	499	11.06	6.45	4.27	0.27	

Maximum heating performance data is based on an entering air condition of 20°C, airflow rates based on external static pressure drop of 30Pa.

Dunham-Bush can offer a selection service for any conditions not stated above. Please contact the Dunham-Bush sales department.

ACOUSTIC DATA

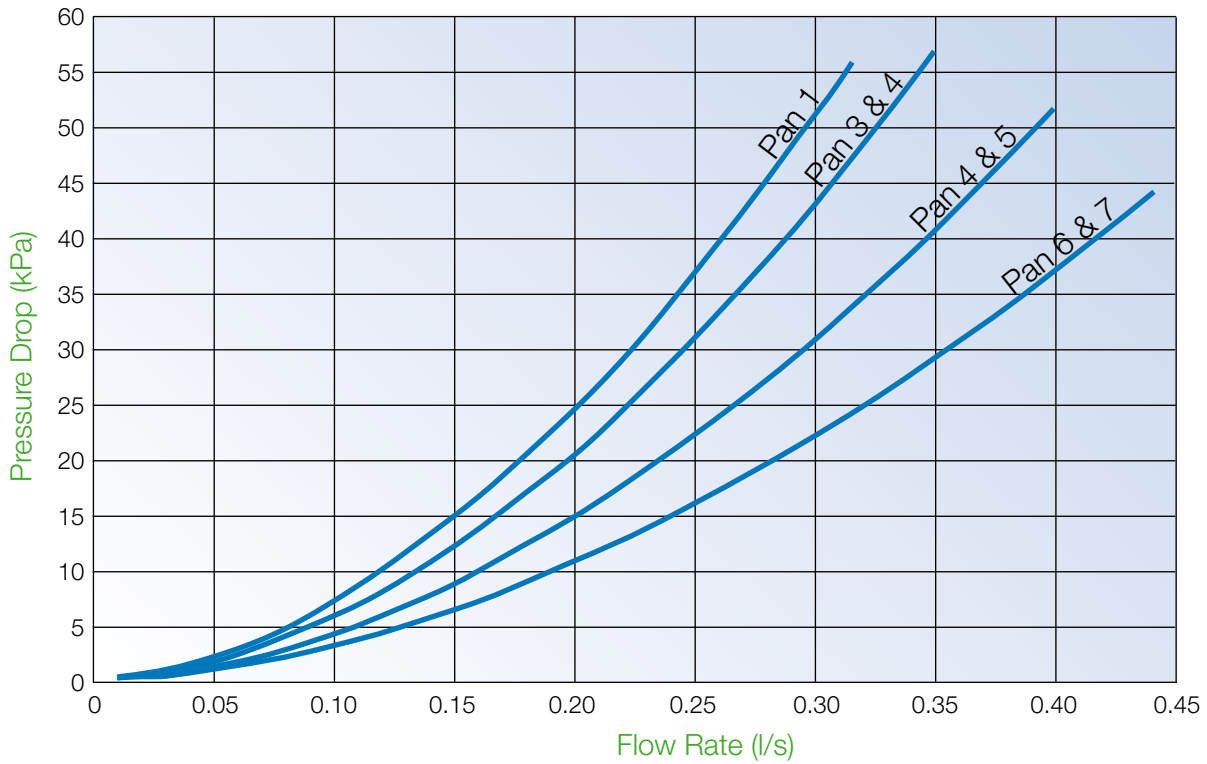
Radiated Sound Power Levels (SWL) dB ref.10 ⁻¹² W														
Model	Fan Speed	Discharge Radiated (dB)						Inlet / Case Radiated (dB)						
		Frequency (Hz)						Frequency (Hz)						
		125	250	500	1k	2k	4k	125	250	500	1k	2k	4k	
Pan 1	Ultra Low	42	45	39	29	11	14	45	44	47	36	30	26	
	Extra Low	43	46	41	31	12	16	46	46	49	38	32	29	
	Low	45	48	42	34	14	18	47	47	50	40	34	31	
	Medium	47	50	45	39	17	23	50	50	51	44	37	35	
Pan 2	Ultra Low	44	46	38	29	12	14	48	46	47	38	34	29	
	Extra Low	45	48	41	32	13	16	49	48	48	40	36	32	
	Low	47	51	42	38	16	20	52	52	51	44	40	36	
	Medium	48	51	43	37	17	21	53	52	52	45	41	37	
Pan 3	Ultra Low	41	44	39	27	10	12	45	46	47	36	29	24	
	Extra Low	44	47	43	32	14	15	47	49	50	40	34	30	
	Low	47	49	44	34	16	19	49	50	51	43	36	33	
	Medium	48	52	46	36	19	22	51	53	53	45	39	36	
Pan 4	Ultra Low	41	43	40	30	13	15	47	44	46	37	31	26	
	Extra Low	44	46	43	35	17	21	49	47	49	43	37	33	
	Low	47	48	45	39	21	25	50	49	51	45	39	36	
	Medium	49	49	47	40	24	28	53	52	53	48	42	39	
Pan 5	Ultra Low	43	44	39	30	14	12	44	44	45	35	28	23	
	Extra Low	45	47	42	34	16	15	47	47	47	38	32	28	
	Low	48	51	45	38	19	19	51	51	51	42	37	34	
	Medium	51	54	48	41	23	23	55	54	53	46	41	39	
Pan 6	Ultra Low	41	43	39	27	12	13	46	45	45	35	30	24	
	Extra Low	42	45	41	31	14	16	48	48	47	38	33	28	
	Low	44	48	43	34	16	20	50	50	50	42	36	33	
	Medium	47	51	45	35	20	23	53	53	52	45	39	37	
Pan 7	Ultra Low	42	45	41	32	16	14	44	45	46	37	31	27	
	Extra Low	43	46	42	33	17	15	45	46	47	38	32	28	
	Low	46	49	45	37	19	19	48	50	50	42	36	34	
	Medium	48	51	47	39	21	22	51	52	52	45	40	37	

End Reflection Losses	Frequency/Hz					
	125	250	500	1k	2k	4k
	8	4	1	0	0	0

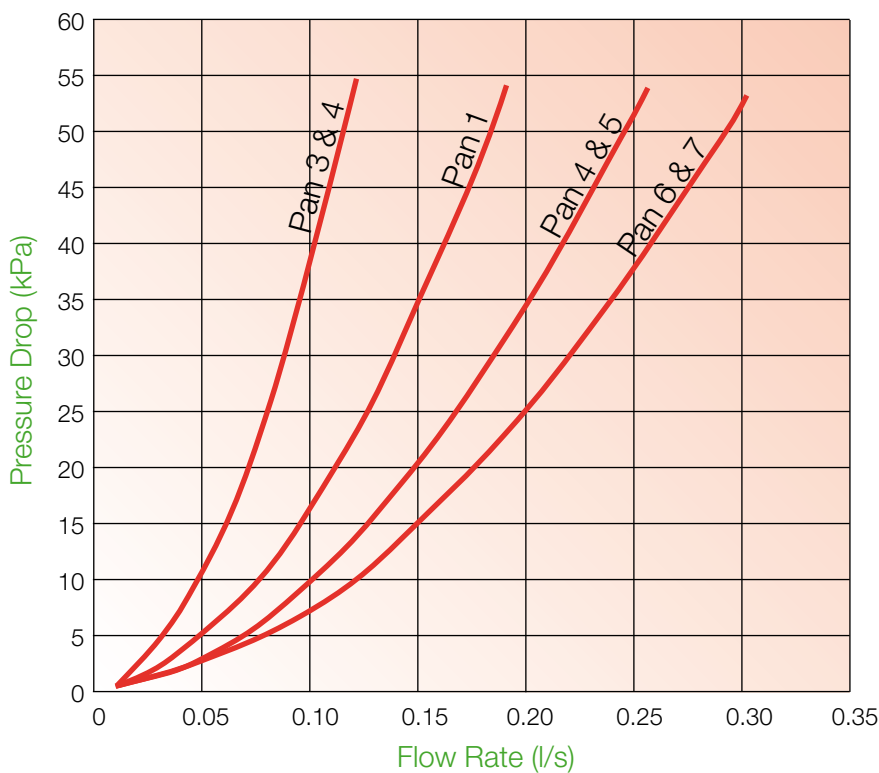
The above Sound Power Levels have been derived using the 'Real Room' test method. All units were tested using two 250mm supply ducts with an external static resistance / pressure drop of 30 Pa applied to the low speed setting. To obtain In-Duct sound Power levels, the end reflection losses shown in the above table should be added to the discharge levels.

HYDRAULIC DATA

Cooling Coil Pressure Drops



Heating Coil Pressure Drops



Model	Water Content of Coil (litres)	
	Clg	Htg
Panther 1	1.70	0.2
Panther 2 & 3	2.55	0.28
Panther 4 & 5	3.68	0.40
Panther 6 & 7	4.53	0.51



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Manufacturer reserves
the right to change any
product specification
without notice

PDS-1000-F-0213-06

Oct 2013