

Series BM Fan Convectors

Installation, Operation & Maintenance Instructions

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INSTALLER: Please leave these instructions, heater wiring diagram and any other accessories with the user.

INTRODUCTION

This booklet provides guidance for site activities necessary to identify, handle, install and commission Dunham-Bush Series BM fan convectors. The instructions apply to models from the standard range only, as described in "Range of standard models and sizes". Please study the instructions carefully before commencing any installation work.

IDENTIFICATION

The fan convector serial number, model description, figure number (size) are displayed on a label found on the heater access panel. If specified, a stencil reference may also be marked on the heater access panel for on-site identification.

DESCRIPTION

Dunham-Bush Series BM fan convector comprises a basic galvanised sheet steel casing with an access panel, fan/motor platform, air filter, hot water heating coil and electrical connections box. Each unit is available with fitted or loose accessories, as specified on the order. A single phase electric heating element can be fitted instead of the hot water coil. Heaters are designed for one or two fan speed operation, with fan control provided by means of an autotransformer, switches and/or thermostats.

STANDARD RANGE MODELS & SIZES

There are eight standard models in the Series BM range, each model available in nine sizes.

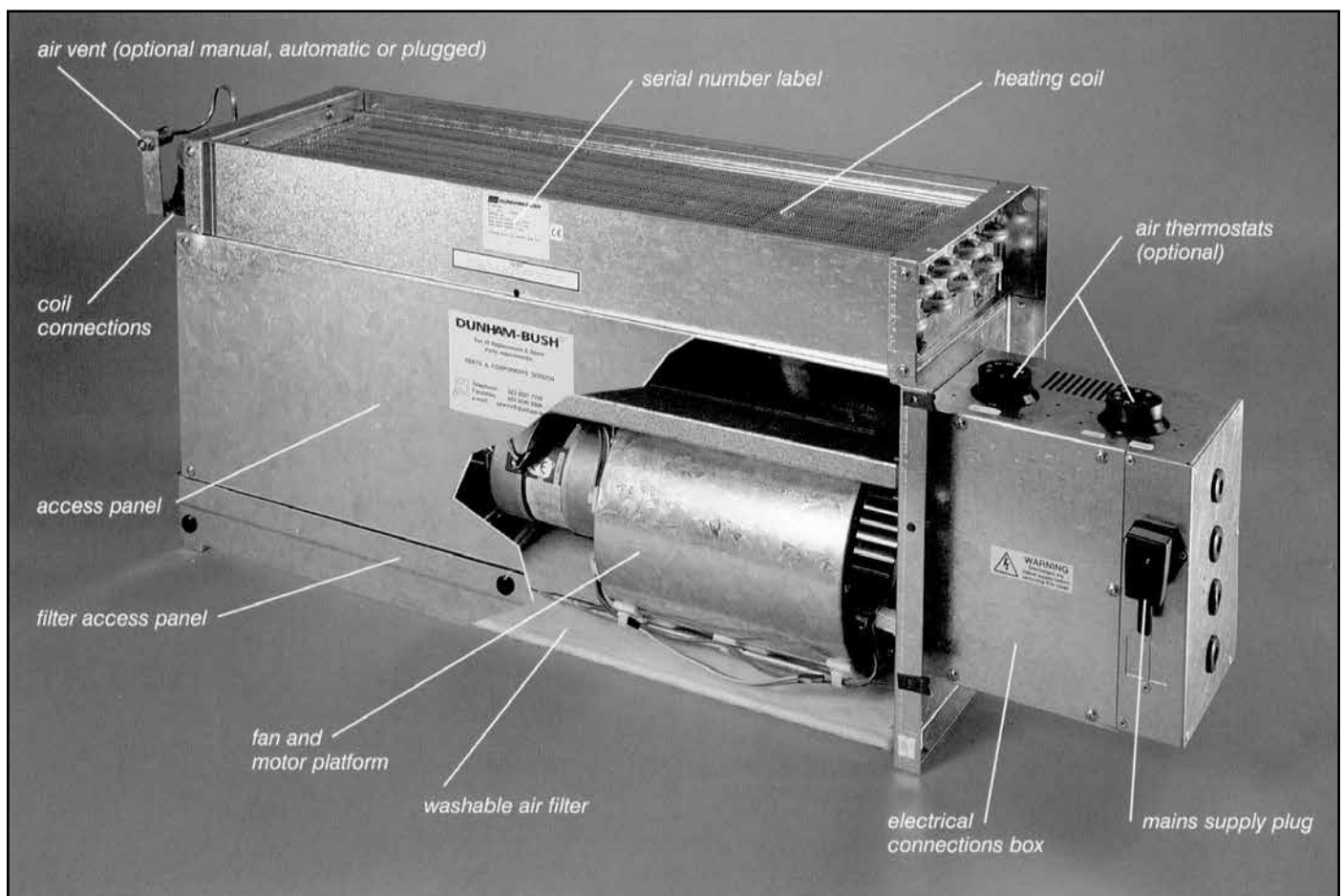


Diagram 1 - Series BM Model 1 Figure 04 LH connections

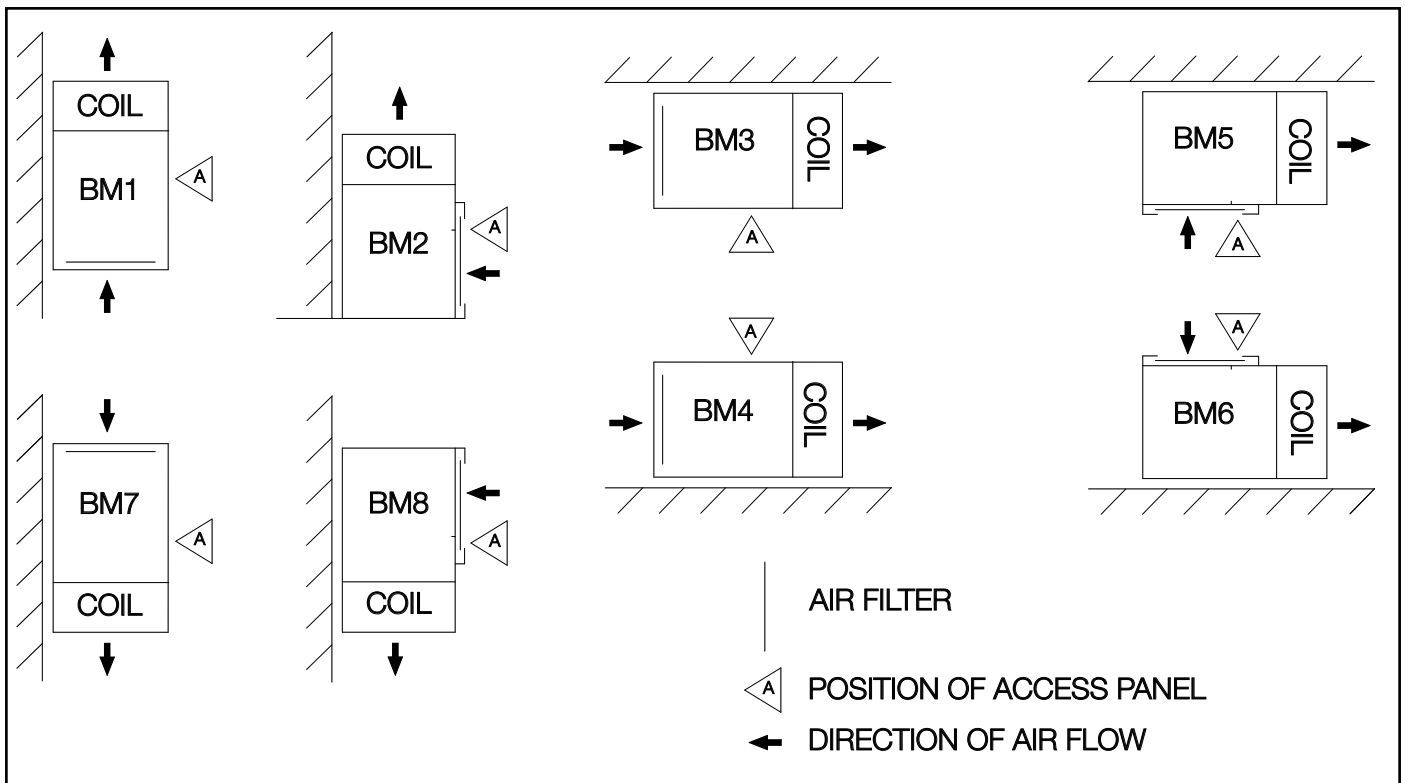


Diagram 2 - Range of standard models

Size	Nominal output (kW)	Nominal length (mm)
Fig 03	2.6	800
Fig 04	4.8	1000
Fig 06	5.9	1000
Fig 08	8.0	1300
Fig 10	9.3	1300
Fig 12	11.3	1600
Fig 15	12.7	1600
Fig 16	15.4	1300
Fig 18	19.1	1600

Table 1 - Range of standard size - Nominal outputs are based on LTHW 80/70°C, entering air at 18°C, 25Pa external resistance at medium fan speed and coil WA2.

ACCESSORIES

The following accessories are available as standard on Series BM.

Air thermostats

Low temperature cut-out thermostat

Switches

Electric heating

Electronic speed control

Special controls Inlet/outlet boxes 01 and 02

180° manual damper box 03

180° motorised damper box 04

90° manual damper box 05

90° manual damper box 06

90° motorised damper box 07

90° motorised damper box 08

Circular spigot box SB

Circular spigot plate

SP Rectangular spigot plate

RS Plinth P1 (100mm) or P2 (150mm) Isolating valves B

(ball) or G (gate)

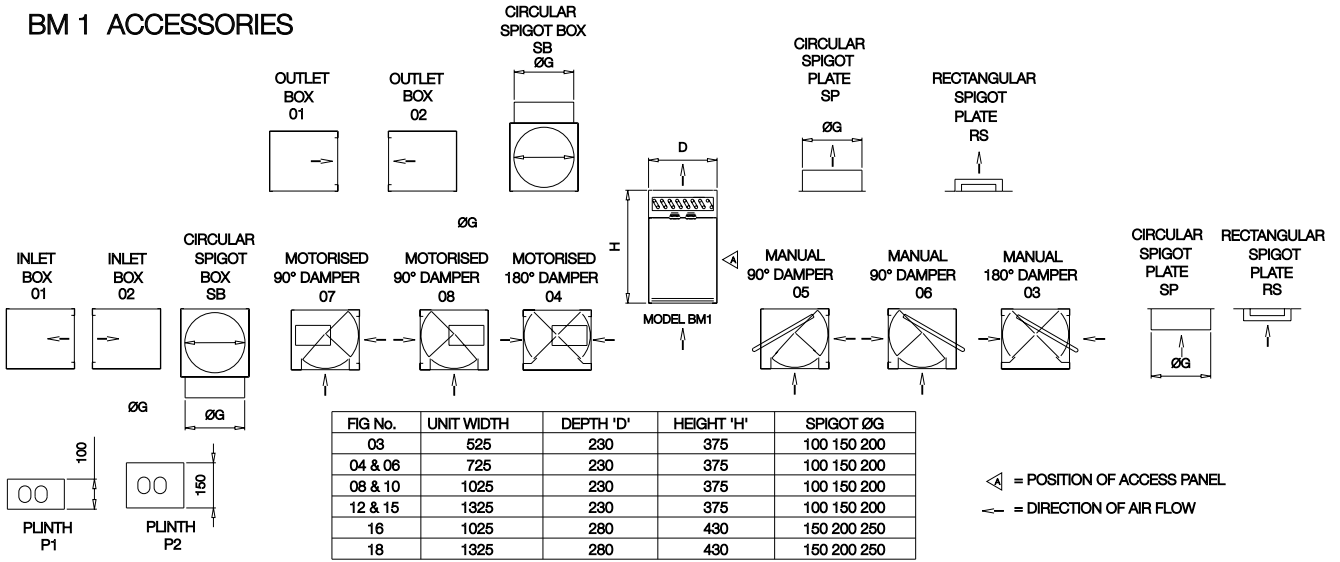
Loose grille LG and fixing frame FF

Extension duct E1, E2 or E3

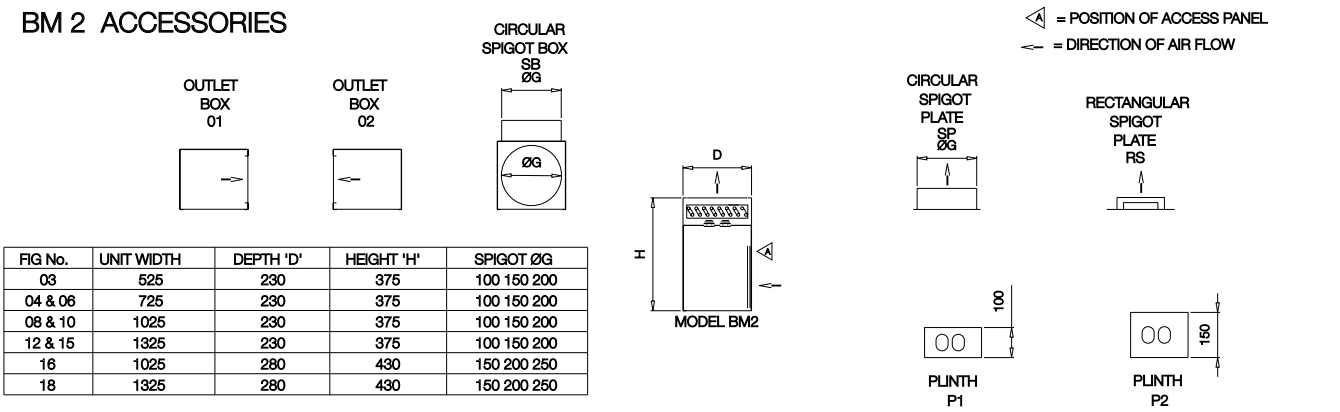
Most accessories are supplied fitted, except extension ducts E1, E2 and E3 which are supplied loose. Remote control items (switches and thermostats) are also supplied loose for on-site fitting, with remote wiring not supplied by Dunham-Bush

Refer to page 3 and 4 for application and configuration of accessories

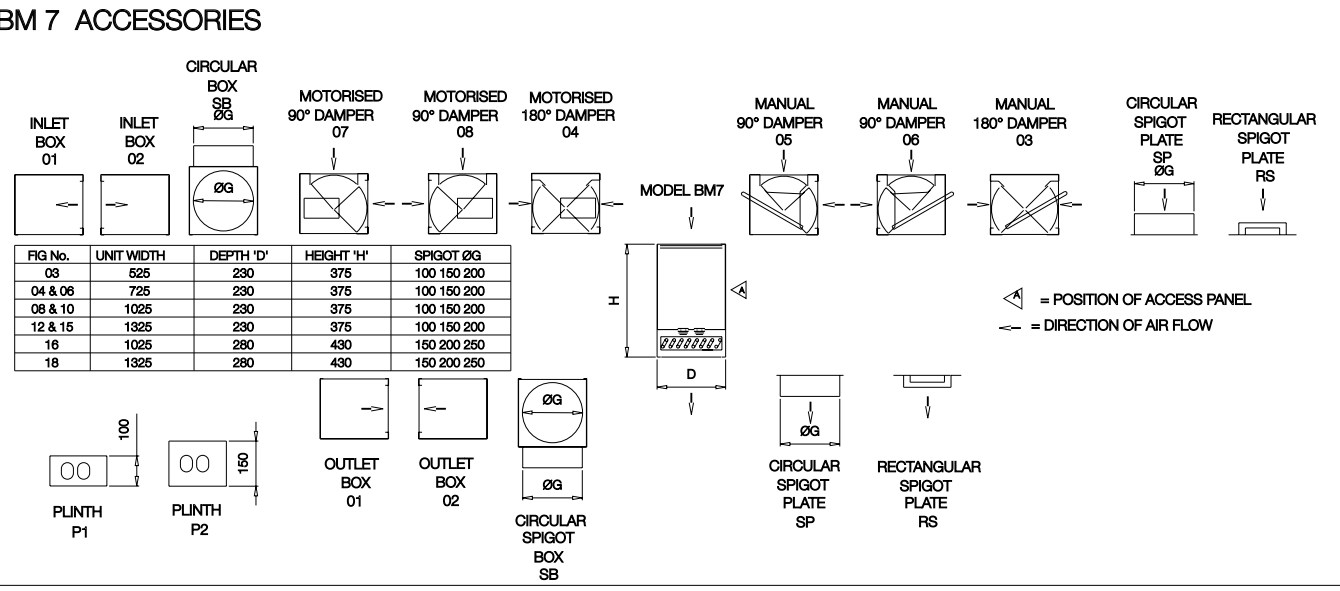
BM 1 ACCESSORIES



BM 2 ACCESSORIES



BM 7 ACCESSORIES



BM 8 ACCESSORIES

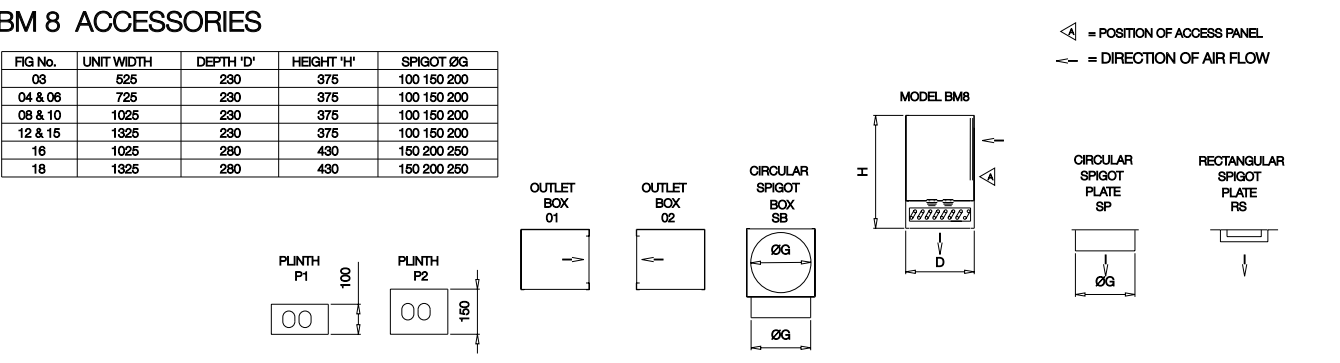


Diagram 3 - Range of accessories for models 1, 2, 7 and 8

BM 03 & 04 ACCESSORIES

BM 05 & 06 ACCESSORIES

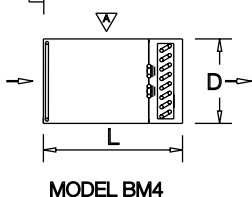
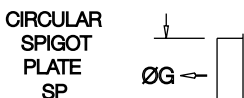
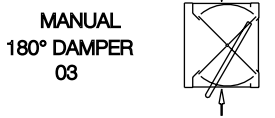
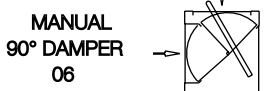
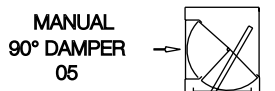
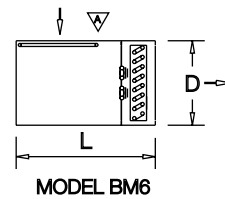
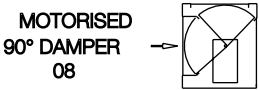
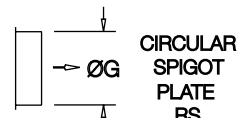
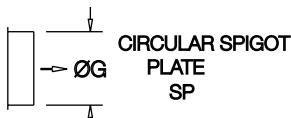
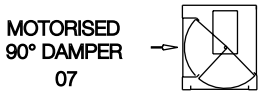
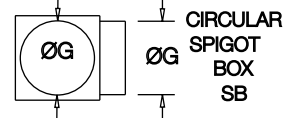
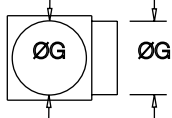
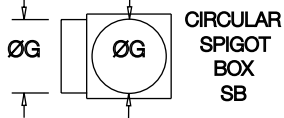
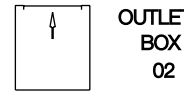
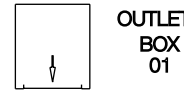
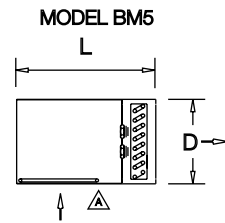
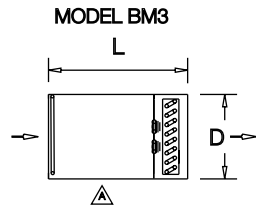


FIG No.	UNIT HEIGHT	DEPTH 'D'	LENGTH 'L'	SPIGOT ØG
03	525	230	375	100, 150, 200
04 & 06	725	230	375	100, 150, 200
08 & 10	1025	230	375	100, 150, 200
12 & 15	1325	230	375	100, 150, 200
16	1025	280	430	150, 200, 250
18	1325	280	430	150, 200, 250

▽ = POSITION OF ACCESS PANEL

⇨ = DIRECTION OF AIR FLOW

Diagram 4 - Range of accessories for models 3, 4, 5 and 6

CONSTRUCTION

Delivery

The purchaser is responsible for off-loading, and must examine the heaters promptly upon receipt. Any claims for damage will only be accepted if, at the time of delivery, the consignment note is endorsed with the details and counter signed by the transport driver. Each heater is marked to show the model, figure number, serial number and stencil reference if specified.

Handling and Storage

Heaters are individually packed and two/three persons can usually handle the heaviest heater. When a significant quantity of heaters is delivered, they may be palletised and shrink-wrapped, so a fork-lift or similar will be required for lifting. The heaters must not be dropped or suffer impact in any circumstances.

Storage

Heaters should be stored in clean, dry conditions. Any packaging should not be removed until the heater is required for installation. Packaging should only be removed if damage is suspected at the time of delivery.

Preparation

High level models will require suspension fixings, suitable for the loads given in table 2. Floor mounted models requires a level, horizontal surface, with a sound, perpendicular wall surface to fix back to. Access is required for maintenance i.e. pipe and electrical connections and removal of heater access panels. Ceiling tiles, builders work etc should be removable with sufficient clearance.

Piping and electrical conduit should, as far as possible, have been completed and any wall apertures for loose grilles and ductwork should be fully prepared.

Warning

Some components on the heater may have sharp edges. Care must be taken when handling the product and protective gloves should be worn.

Approximate masses (kg)	Fig 03	Fig 04	Fig 06	Fig 08	Fig 10	Fig 12	Fig 15	Fig 16	Fig 18
Model 1 - 8	19	25	25	33	33	37	37	45	45
Inlet/outlet box 01 & 02	4	5	5	7	7	8	8	9	9
Damper box 03, 05 & 06	6	7	7	9	9	11	11	13	13
Damper box 04, 07 & 08	7	8	8	10	10	12	12	14	14
Circular spigot box SB	5	6	6	9	9	11	11	13	13
Circular spigot plate SP	1	2	2	3	3	4	4	5	5
Extention duct E3	19	26	26	33	33	44	44	45	45
Loose grille & fixing frame LG & FF	2	2	2	3	3	4	4	5	5
Plinth P2	2	3	3	3	3	4	4	5	5
Rectangular spigot plate RS	1	2	2	2	2	3	3	4	4

Table 2 - Approximate masses of Series BM heater accessories

INSTALLATION

General

1. Before removing any packaging, check the identity of the heater against the stencil reference marked on the access panel. Packaging should be retained to protect the heater from damage by other works after installation.
2. To allow easier lifting, the fan/motor platform may be removed. Remove the access panel, disconnect the motor wiring harness and slide the platform out. On ceiling models, remove the platform retaining brackets before sliding the platform out.
3. Prior to refitting the platform, ensure the rubber mounting channels are seated correctly.
3. Connect any ductwork as required. The circular spigots on spigot boxes (SB) and spigot plates (SP) can be moved and/or blanked off if required. Flexible duct connections are recommended where sheet metal ductwork is used.
4. Fit loose grilles and fixing frames (refer to page 7).
5. Connect pipework as shown in frame 5 below.
6. Connect electrical supply and control accessories as shown in wiring diagrams enclosed with the heater.
7. If supplied, fit the type 2 adjustable LTC thermostat to the flow pipe (the thermostat will be factory wired).
8. After filling the hot water system, check for leaks (refer to Commissioning).
9. Replace all components previously removed.

Fitting

1. Position and fix the heater, with all accessories fitted.
2. Ensure a good air seal is made between inlet/outlet boxes (01 or 02) or damper boxes (03, 04, 05, 06, 07 or 08) and ducting apertures

Note: for correct operation, the back face of a adjustable LTC needs to be in contact with a straight length of pipe not less than 100mm long.

Pipework Connections

Coil connections are DN20 (3/4" BSP) female parallel. Local isolating and regulating valves are recommended. Refer to frame 5 below for correct flow and return connections.

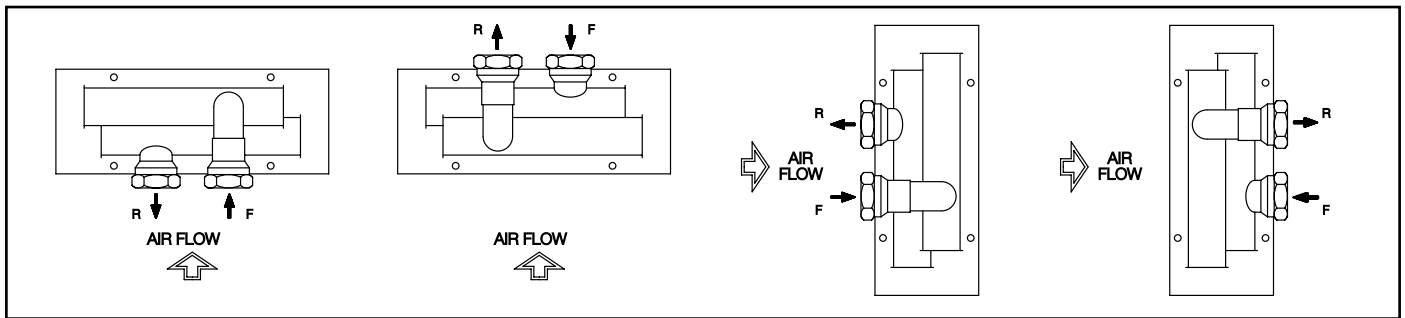


Diagram 5 - Hot water coil connections, as viewed on header/connection end of coil

Avant Garde & LST Heaters

Avant -Garde and LST heaters are fitted with controls valves which automatically shut off the water flow when the fan is not running.

Flow and return connections must be connected as shown in Diagram 8. The diagram shows 4 port valve arrangement, with the LTC position indicated.

N.B. LTC thermostats will not function with 2 port valve arrangement.

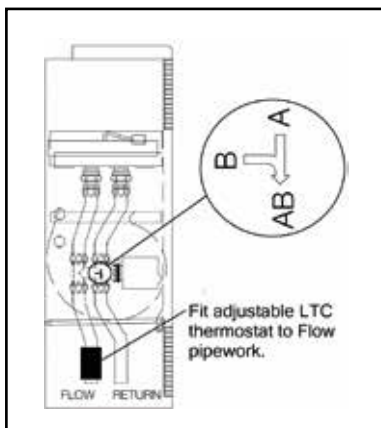


Diagram 6 - Avant-Garde and LST control valve and LTC fitting locations

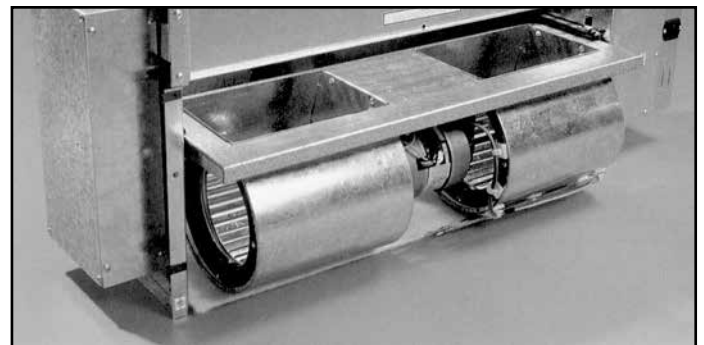


Diagram 7 - Fan/motor access panel removed

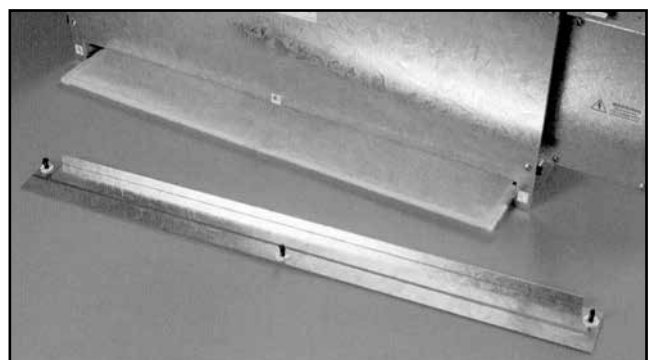


Diagram 8 - Filter access panel and filter

Loose Grille and Fixing Frame

1. Check dimensions and position of the loose grille and fixing frame in relation to the heater.
2. Prepare an appropriate aperture to accept the fixing frame.
3. Fit spire captive nuts into the slots in each corner of the fixing frame, and fix the frame into the aperture, using appropriate fixings (not provided).
4. Fit the loose grille to the fixing frame, aligning the holes in the grille with the spire nuts in the fixing frame, and fix using the black self-tapping screws provided.
5. An alternative fixing can be to omit the fixing frame and screw through the grille flanges directly onto a wooden (or similar) surround.

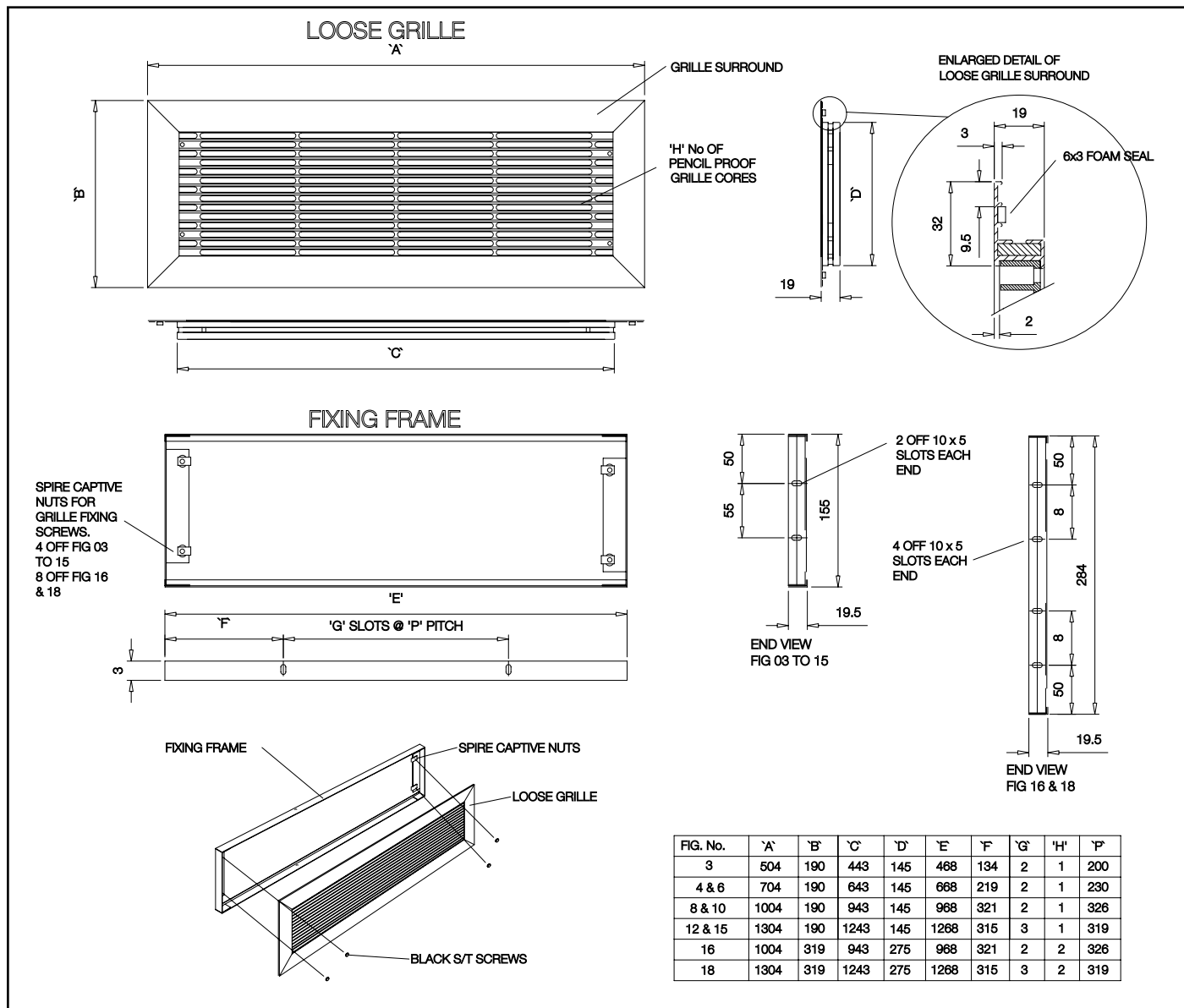


Diagram 9 - Loose Grille & Fixing Frame

Electrical connections and controls

Remove the IEC mains inlet connector from the fused inlet on the electrical connections box. Connect a 230V/1ph/50Hz supply to the connector. Fit any remote accessories in their appropriate locations and connect to the 12 way terminal block inside the electrical connections box. Frame 9 overleaf shows a typical wiring diagram.

Refer to the wiring diagram enclosed with the heater for specific wiring details. The motor voltage for the application will be set at the factory to suit the particular heater. In the event that the motor voltage(s) need to be changed refer to frame 10 overleaf for details on wiring to the autotransformer. Note that for any set of voltage configurations, the 10V trimmer connection can be used once only.

Installation of Duct extensions.

Where specified or supplied as optional accessories the duct extension can be fitted to the inlet or discharge of the BM series fan heaters (where indicated).

Type E1 covers the extension range 225-400mm, type E2 425-800mm & type E3 825-1600mm

The duct extension is supplied with fixing bolts and sealing tape where necessary.

1. Remove inlet or discharge accessory (if factory fitted to the fan heater where necessary) using a suitable hand tool.
2. Affix either the top or bottom extension to the fan heater using the fixings provided, and the matching section to the inlet or discharge accessory using the fixings provided, (if not supplied factory fitted).
3. Extend duct to length required and fix with self-tapping screws or rivets (through the overlapping sections) seal air gap with a proprietary sealant as necessary.



Diagram 10 - Typical duct extension, may be fitted to inlet or outlet of models 1, 3, 4 & 7 or outlet of 2, 5, 6 & 8

COMMISSIONING

1. Purge air from the coil using the manual or automatic air vent fitted, or through the mains above the coil if applicable. Balance the water flow rate through the whole system to accepted practice to achieve the specified flow rate.
2. If fitted, the LTC thermostat will switch power to the fan only when the thermostat clipped to the flow pipe reaches the required temperature. For a type 1 (fixed setting) - 54°C ± 3K or for type 2 (adjustable setting) 30-90°C. (set @ approx 20°C below the MWT).
In the absence of hot water, a temporary link can be used to run the fan (see frame 8 wiring diagram).
3. If air thermostats are fitted (either to the heater or remote mounted on a wall), adjust to the specified temperatures. If no settings are specified, typical settings are :-
 - a) on/off thermostat set to 20°C
 - b) high/low thermostat set to 16°C.

Check the operation of all thermostats by varying their settings to achieve the desired effect on the fan.
4. If switches are fitted (either to the heater or remote mounted on a wall), check for satisfactory operation.
5. A man/off/auto switch will bypass all thermostats when in the manual position. This allows the fan to circulate room air when no hot water is present (i.e summer conditions).
6. If an 03, 05 or 06 manual damper box, check the operation of the damper lever.
7. If an 04, 07 and 08 motorised damper box is fitted, check for correct polarity to the damper motor and for satisfactory operation. Damper control is provided by a FAI/recirc. switch, if fitted.
8. Leave this document, wiring diagrams and End User Instructions with the end user.

Air vent type	Cold test pressure (bar g)	Working pressure (bar g)
M - manual	10.5	7.0
A - automatic	9.0	7.0
P- plugged	24.0	18.0

Table 3 - Site Test and Working Pressures

Fan Speed Adjustment (AC Motors)

1. Heaters fitted with AC motors are supplied with factory-set fan speeds, fed from tapplings on the autotransformer.
2. In the unlikely event that fan speeds require adjustment, refer to the wiring diagram supplied with the heater. Contact Dunham Bush for guidance on selecting appropriate tapplings on the autotransformer.
3. The autotransformer is located inside the control box.
4. Cables should be disconnected from the autotransformer carefully; ensure that the male spade connectors not pulled from the autotransformer.

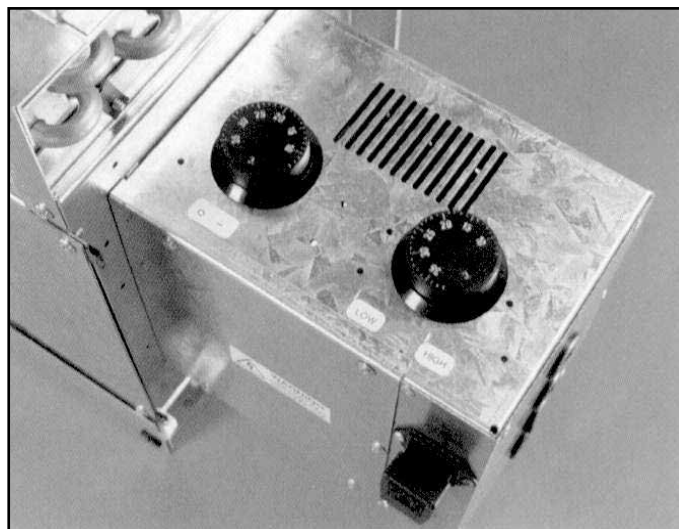


Diagram 12 - Fitted thermostats

Fan Speed Adjustment (EC Motors)

1. Heaters fitted with EC motors are available as one of two standard options:-
 EC1 - variable fan speed with speed control by an external 2-10VDC signal (e.g. from BMS)
 EC2 - single or dual fan speed with speed control using switches or thermostats via a fitted speed controller.
2. In the unlikely event that fan speeds require adjustment, refer to the wiring diagram supplied with the heater. Contact Dunham-Bush for guidance on adjusting fan speeds and selecting appropriate DC signal voltages.
3. The EC2 speed controller is located underneath the fan/motor platform and comprises electronic controls with inputs from thermostats and/or switches and a single analogue 2-12VDC output signal to the motor(s).
4. Refer to Diagram 11; three fan speeds are available. Single speed heaters will use one speed and dual speed heaters will use two speeds, which can be varied by adjusting the appropriate potentiometers; signal voltage can be measured across 0V and CTRL terminals.
5. Avoid setting fan speeds too low:-
 a) low fan speeds can cause stratification of heated air within the room, reducing effective comfort
 b) low fan speeds with electric heating can cause false tripping of high-temperature safety cut-outs in the heater.
6. All connections to the EC fan controller shown in Diagram 11 are safe low voltage of 10VDC or less.

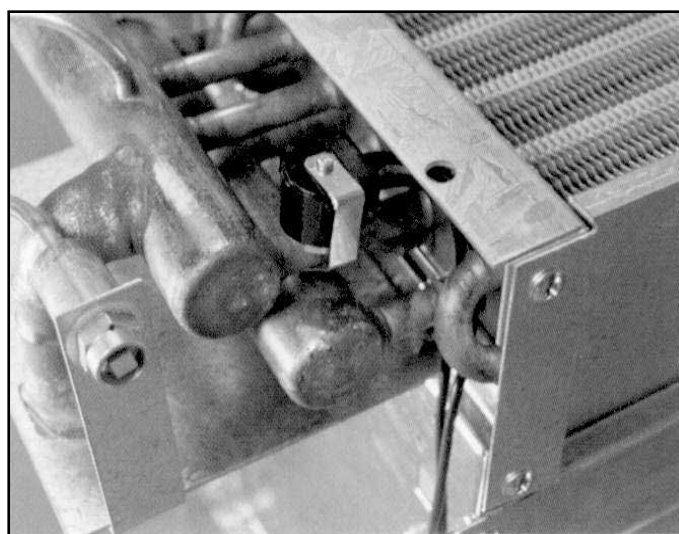


Diagram 13 - Fitted type 1 (fixed setting) LTC



Diagram 11 - Fitted 3 speed EC fan controller (EC2 fan motor option only)

**MODEL BM1 HEATER - APPLICATION BEHIND WALL WITH ACCESSORIES:
 02 INLET BOX AND 02 OUTLET BOX, P PLINTH,
 LG LOOSE GRILLE AND FF FIXING FRAMES.
 (LEFT HAND CONNECTIONS SHOWN)**

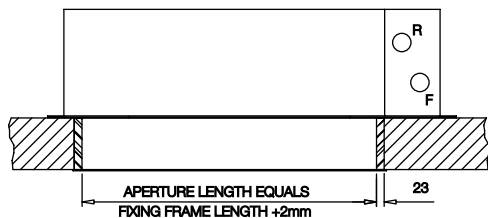
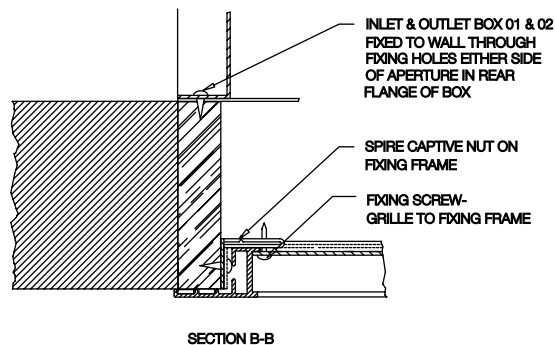
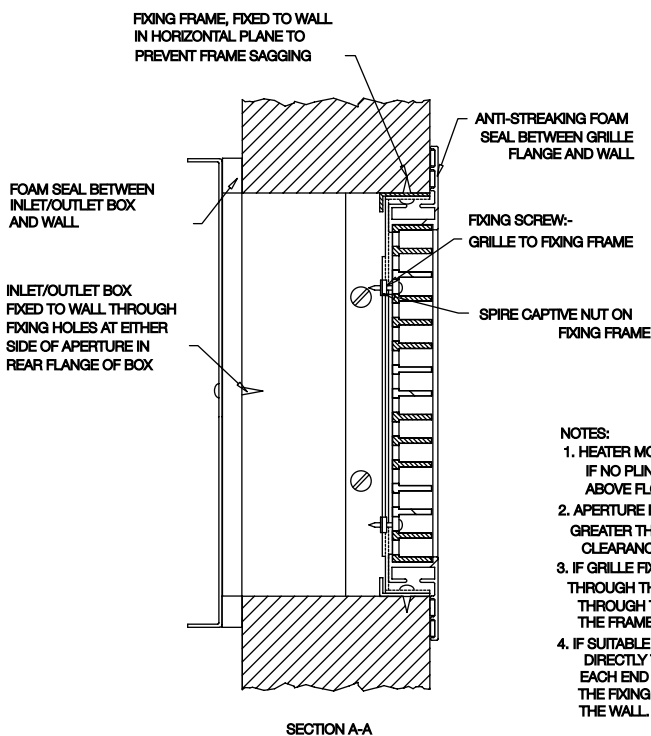
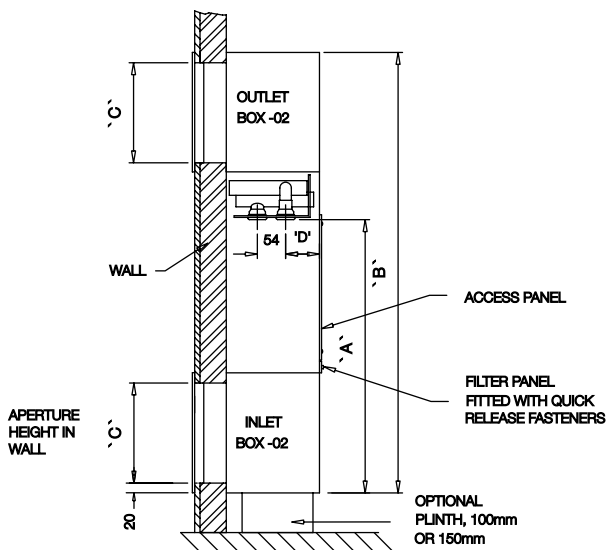
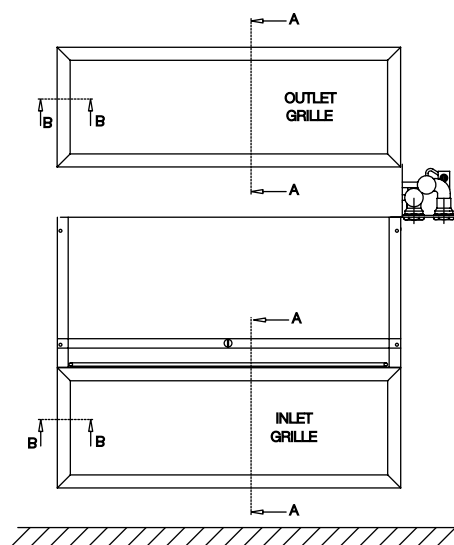


FIG No.	DIM 'A'	DIM 'B'	DIM 'C'		DIM 'D'
03	478	775	157		86
04 & 06	478	775	157		86
08 & 10	478	775	157		86
12 & 15	478	775	157		86
16	686	930	286		111
18	686	930	286		111



- NOTES:**
1. HEATER MOUNTED ON OPTIONAL 100mm OR 150mm HIGH PLINTH
 IF NO PLINTH IS FITTED, LOWER FLANGE OF INLET GRILLE WILL BE 2mm ABOVE FLOOR OR FALSE FLOOR LEVEL
 2. APERTURE DIMENSIONS STATED (LENGTH AND HEIGHT) ARE TWO MILLIMETRES GREATER THAN THE MAXIMUM SIZES OF THE GRILLE FIXING FRAME FOR CLEARANCE
 3. IF GRILLE FIXING FRAME IS ADEQUATELY FIXED AT BOTH ENDS THROUGH THE FIXING SLOTS PROVIDED, IT SHOULD NOT BE NECESSARY TO FIX THROUGH THE TOP AND BOTTOM SLOTS, EXCEPT TO PREVENT THE FRAME FROM SAGGING
 4. IF SUITABLE FIXINGS ARE USED, THE GRILLE FIXING FRAME MAY BE FIXED DIRECTLY TO THE WALL, THUS ELIMINATING THE NEED FOR TIMBER LINING AT EACH END OF THE APERTURE. IN THIS CASE, IT WILL BE POSSIBLE TO REVERSE THE FIXING FRAME, TAKING THE FIXING POINTS FURTHER FROM THE EDGE OF THE WALL.

Diagram 14 - Typical installation detail of Model BM 1 fan convector

**MODEL BM3 HEATER - APPLICATION IN CEILING VOID WITH ACCESSORIES:
01 INLET BOX AND 01 OUTLET BOXES,
LG LOOSE GRILLE AND FF FIXING FRAMES
(LEFT HAND UNIT SHOWN)**

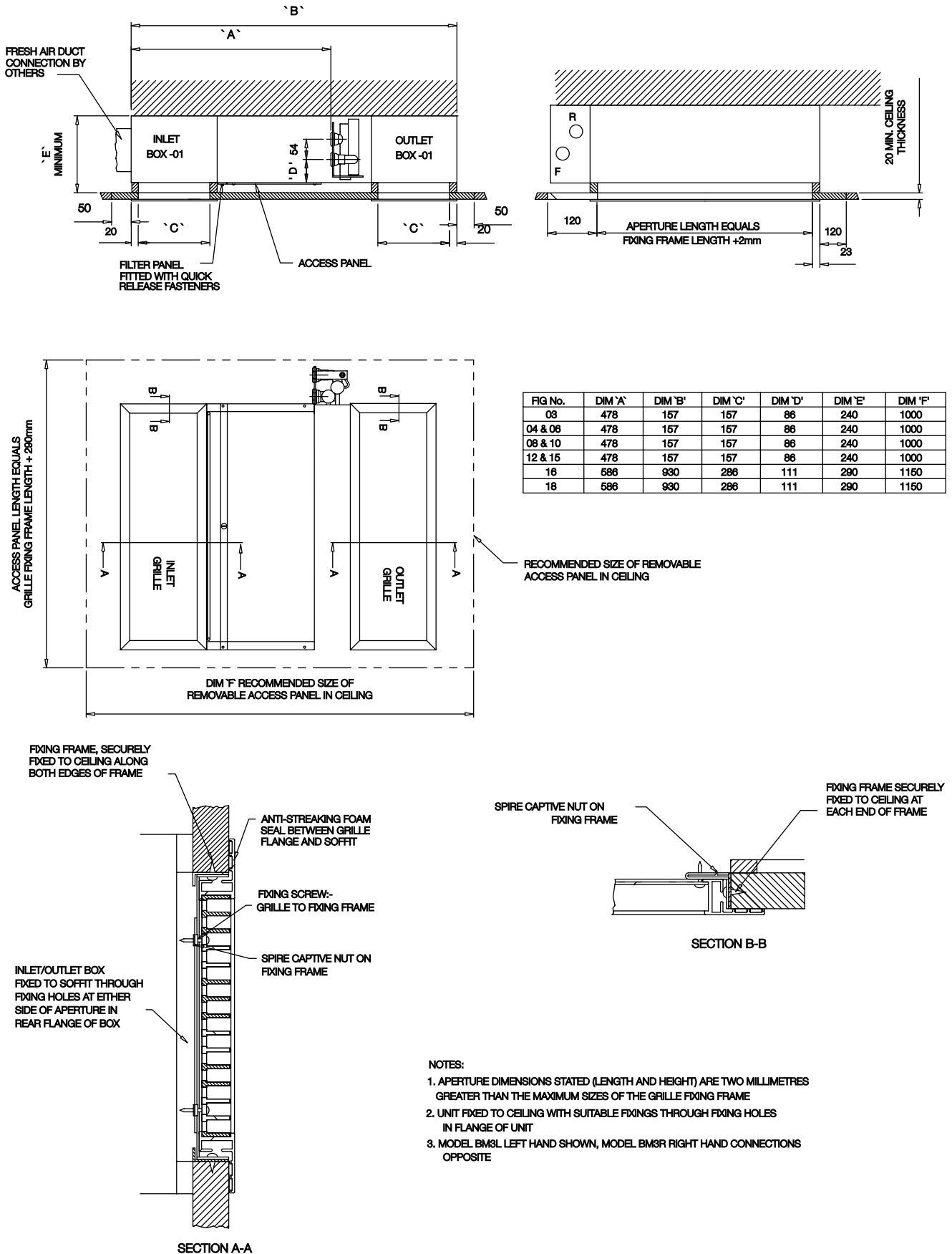


Diagram 15 - Typical installation of Model BM 3 fan convector

CLEANING AND MAINTENANCE

WARNING:

Prior to undertaking any cleaning or maintenance, ensure that all electrical supplies are disconnected from the heater via local isolators. Some internal components may have sharp edges. Protective gloves should be worn.

Inspection

Frequency of cleaning and inspection depend upon the operating conditions. Initially, it is suggested that the air filter is inspected after 6-8 weeks and cleaned as required at regular intervals. Cleaning the air filter ensures that the heater delivers the required air flow rate and heat output. The heater should not be operated without a filter, since the heater coil fins will become clogged with fluff and dust particles, resulting in reduced performance.

Filter access and removal

To gain access to the air filter, unlock and remove the access panel with the special key provided. Floor, wall and duct models, pull the access panel at the top and lift clear. Ceiling models, hinge the access panel down and allow it to hang from the safety screws (note: access panel can be removed by removing the safety screws).

Cleaning

1. Air filters can be cleaned by tapping out excess dust and washing in warm water (up to 40°C), using detergent if necessary. The filter must be rinsed and allow to dry naturally before replacing. Do not use a vacuum cleaner, as it can damage the filter media. Filters should be replaced after approximately 20 washes.
2. Because the air filter retains most of the dusty particles, it will only be necessary to clean the fan/motor assemblies and heater coil annually. An industrial vacuum cleaner can be used to clean the inside of the heater, in particular the heater coil (or electric element) and fans, with the air being sucked through the heater coil in the opposite direction to normal air flow. All accessible surfaces can be wiped with a dry cloth

Maintenance

1. Coil - Purge any air from the coil using the manual air vent (using a suitable key) or by turning the knurled thumbwheel on the automatic air vent if fitted. Automatic air vents have a built-in check valve which allows the head to be removed without draining the system.
2. Motors - The fan motor has 'sealed for life' bearings which do not require any maintenance, other than visual inspection.
3. Fuse - The mains inlet connector on the electrical connections box incorporates a 2A anti-surge fuse. A spare fuse is supplied in a slide out fuse holder next to the socket.
4. Controls - see accessories. A wiring diagram is supplied with each heater. Further copies are available on request, please quote the serial number from the nameplate, located inside the heater.

Please note :

1. If fitted, the LTC thermostat will switch power to the fan only when the thermostat reaches the required temperature. For a type 1 (fixed setting) approx. 50°C ± 3K or for type 2 (adjustable setting) 30-90°C (the recommended setting is 20K less than the mean water temperature)
2. If air thermostats are fitted (either to the heater or remote mounted on a wall), adjust to the specified temperatures.
Typical settings are:
 - a) on/off thermostat - set to 20°C
 - b) high/low thermostat - set to 16°C.
3. If fitted or remote switches are being used, check that they operate correctly. Note : if manual/off/auto switch is provided, all thermostats are by-passed in the manual position, which allows the fans to circulate room air when the boiler plant is shutdown.

Spares / Service

PLEASE WRITE THE DETAILS OF THE UNIT HERE.

These details will be required when ordering spares for you Dunham-Bush Series AM Fan Convectector.

UNIT TYPE AND MODEL INFORMATION

SERIAL NUMBER

DATE OF INSTALLATION
