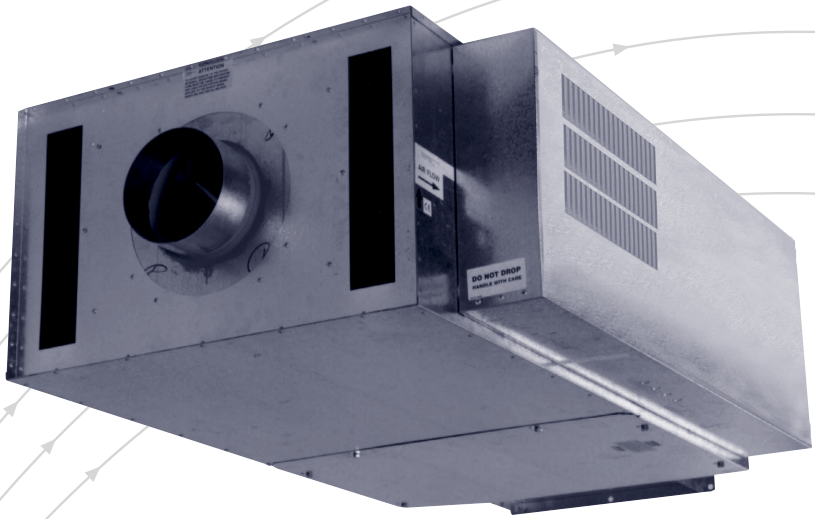
Series Fan VAV Terminal Boxes

Type SFTB



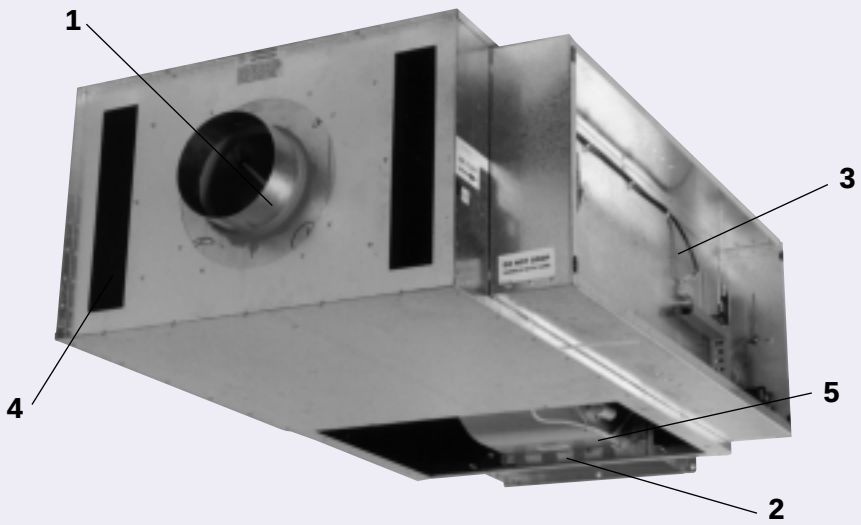
TROX® TECHNIK

Trox (U.K.) Ltd
Caxton Way
Thetford
Norfolk IP24 3SQ

Telephone +44 (0) 1842 754545
Telefax +44 (0) 1842 763051
www.trox.co.uk
e-mail trox@troxuk.co.uk

Contents · Description

1 Velocity Flowgrid Primary Air
2 Fan Motor
3 Controls Package
4 Air Induction Ports
5 Access Panel



Trox Series Fan VAV Terminal Boxes take primary and induction air, mix the two thoroughly and provide a constant air supply to the occupied zone of the building.
Total flow from the diffuser is kept substantially constant thus giving very good air distribution even with high turn down of the primary air volume. The primary air damper can be fully shut.
Trox Series Fan VAV Terminal Boxes have been designed and developed to achieve lower room noise levels. Discharge and case radiated sound pressure levels of NR 35 can be achieved in the occupied zone.
Pressure independent control of the primary VAV damper is accomplished by use of a Multi-point flowgrid which gives accurate control of air flow even with a 90° bend on the inlet spigot.

Mixing between the primary airstream and the induced warm air from the ceiling void is by forward curved blade centrifugal fan with a direct drive motor. This direct drive motor is of the permanent split capacitor type, suitable for use with stepless fan speed controllers.
Trox Series Fan VAV Terminal Boxes are eminently suitable for low temperature air applications. If the supply air temperature is low, then the fan volume flow rate must be higher than the 100% primary air volume flow rate to ensure suitable air temperature at the diffuser.
Design of the SFTB ensures that at 100% primary air, sufficient induced air is mixed with the primary air so that the air discharged has a conventional cooling differential which will not cause draught problems in the space being conditioned.

Trox Series Fan VAV Boxes save energy by utilising the warm air in the building already generated by other sources and mixing it with primary air before distributing a constant volume air supply direct to the occupied zone. This reduces energy consumption, so providing long term operational savings. Available in a range of sizes from 100 l/s to 875 l/s. Trox Series Fan VAV boxes are suitable for pneumatic or electronic control. Volume flow tolerance is dependent on the type of control system but is typically ±5% to ±10% of set volume.
The units are designed for use in VAV systems and in conjunction with DDC controllers permit communications between the boxes and a centralised control area.

General

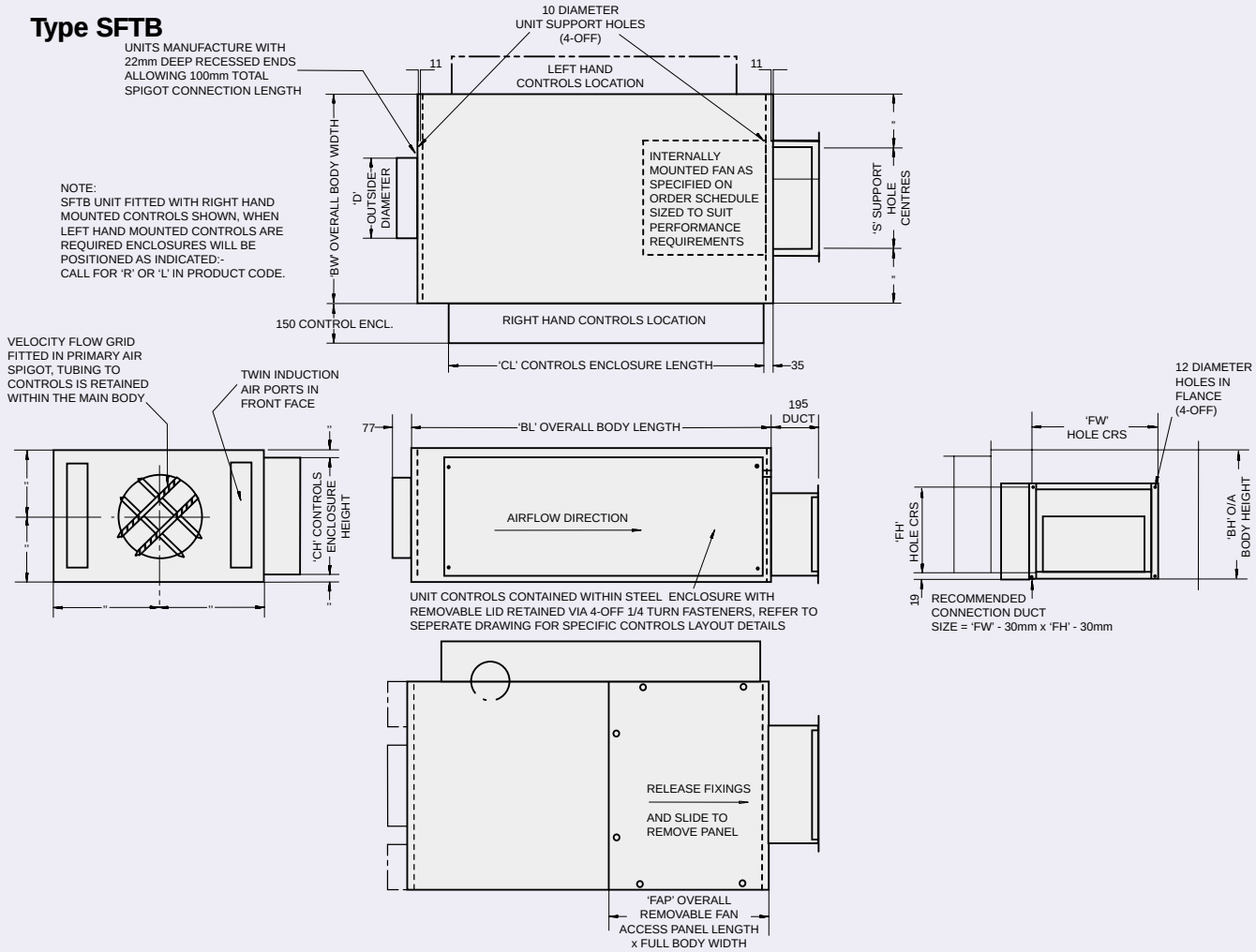
Series Fan VAV terminal VAV boxes are constructed from galvanised steel meeting all relevant UK construction standards. All electrical control components are protected by sheet metal enclosures to meet UK practices. The enclosure has a single electrical (230 V or 400 V) mains entry position.

Casing

The casing is sturdily constructed of galvanised sheet steel. The overall construction is reinforced to meet acoustic performance requirements.

- Casing with acoustic and thermal insulation, erosion resistant up to 20 m/s.
- High pressure side with duct spigot suitable for circular ducting.
- Low pressure side suitable for angle frames or slide-on flanges.
- Casing leakage rate to DW 144 Class A.
- Drilled mounting holes for support rods are provided in the top flange of the casing.

Type SFTB



Unit mm	Spigot mm	D mm	BL mm	BW mm	BH mm	FW mm	FH mm	FAP mm	CL mm	CK mm	S mm	Weight kg
110	125, 160	1mm smaller than spigot size	1015	582	433	284	236	510	850	390	260	50
210	160, 200, 250		1215	712	463	384	288	565	1050	420	340	70
310	160, 200, 250, 315		1415	802	503	484	339	625	1250	460	400	120
410	250, 315		1665	992	543	634	390	660	1500	500	500	150

Access Door

To avoid removal of the terminal box once fitted in the system, an access door is provided in the casing underside so that the fan/motor can be serviced, or in the unlikely event of failure, removed without disturbing the duct connections.

Insulation

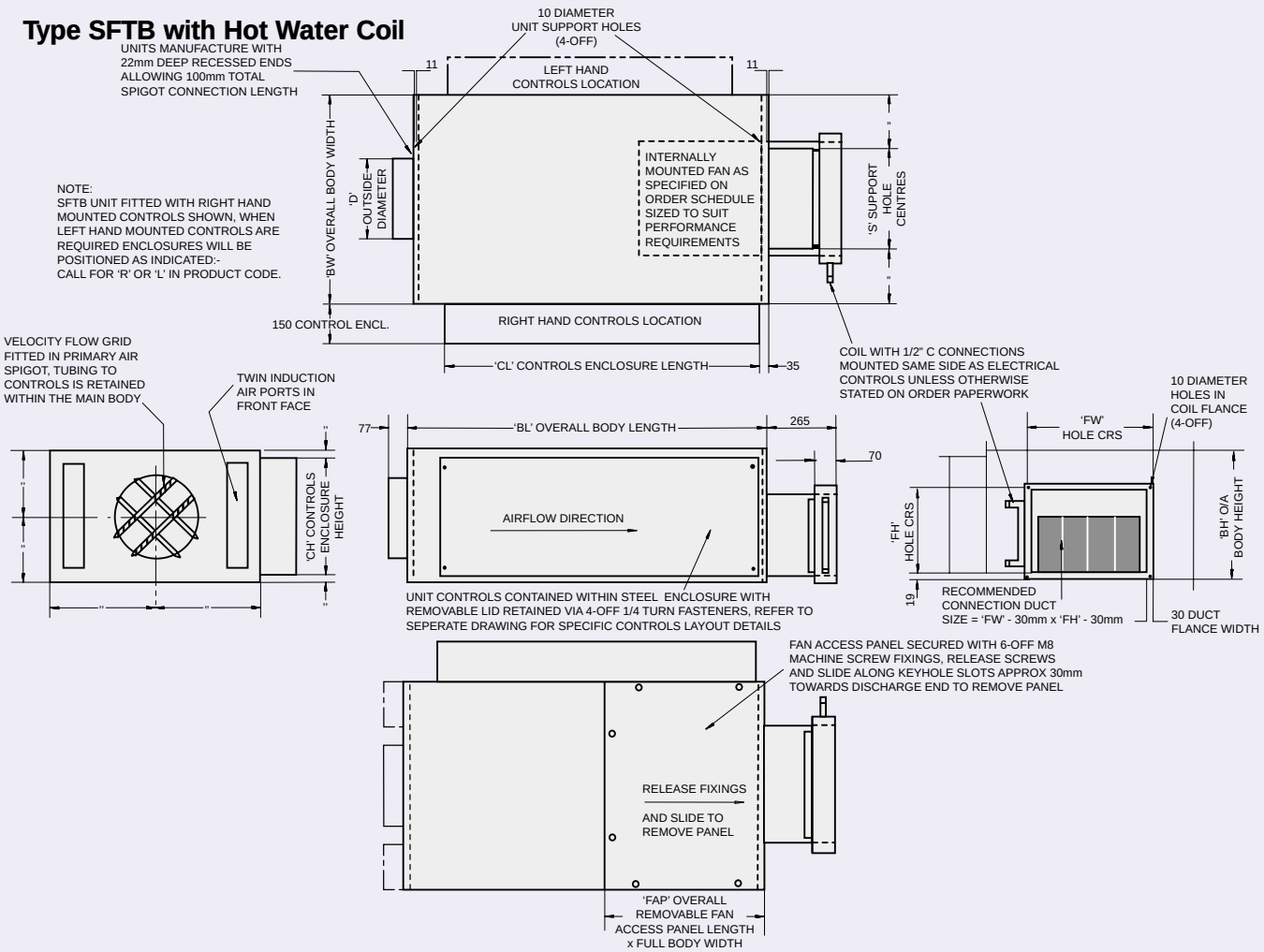
- The inside of the terminal box is acoustically lined with a minimum of 50mm thickness PU foam.
- The access door is also lined with the same material.
- All lining materials have Class ‘O’ fire rating conforming to UK building regulations.

VAV Section – Volume Flow

The Series Fan VAV Terminal Box is suitable for pressure independent control. Volume flow is sensed by a multi-point, averaging flowgrid measuring pressure differential.

- Primary volume flow tolerance is dependent on type of control system but is typically ±5% to ±10% of set volume.
- Primary volume flow control range typically 100% to 10% depending on type of control.
- Pneumatic or electronic controllers can be fitted.
- Primary air volume flow range adjustment at factory.
- Volume measurement can be made on site using the flowgrid; also adjustment of volume flow through controller.
- Control and full shut off is achieved with a single damper.

Type SFTB with Hot Water Coil



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210	160, 200, 250		1215	712	463	384	288	565	1050	420	340	75
310	160, 200, 250, 315		1415	802	503	484	339	625	1250	460	400	130
410	250, 315		1665	992	543	634	390	660	1500	500	500	160

Pressure Differential Flowgrid

- Minimum pressure differential signal from 2Pa upwards.
- Sensor tubes in aluminium.
- Test pressure tappings are supplied with tight fitting caps.
- Calibration graphs and constants are provided to relate volume flow in litres/second to the measured pressure differentials.
- The differential pressure generated by the averaging sensor is within ±3% of the calibration chart value over the range of typical primary air flow rates.

Control Damper

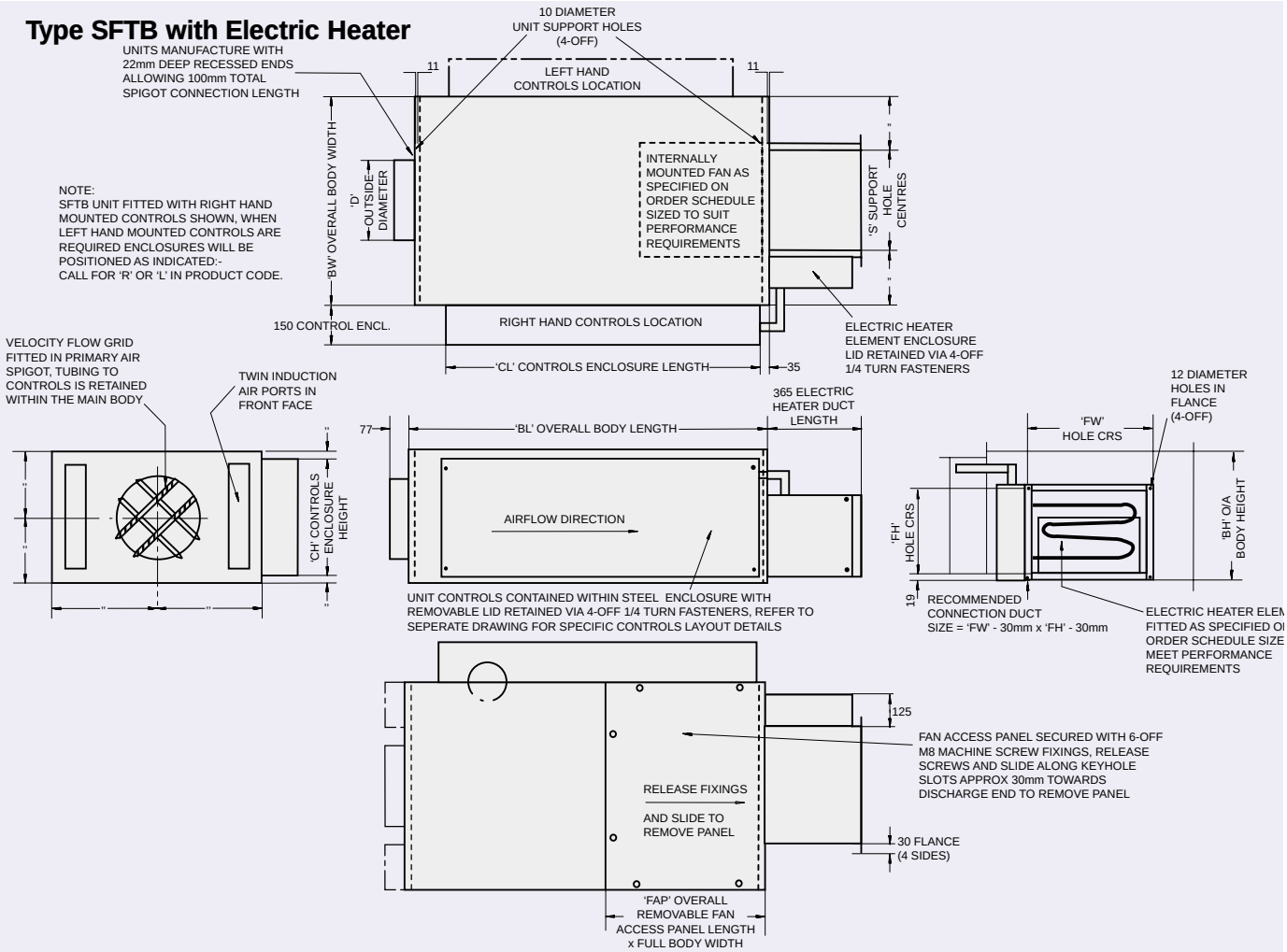
The single blade damper is mounted in the circular duct behind the flow measuring grid. The drive spindle is extended through the casing and a suitable actuator slips over the shaft and locks directly to it.

- The closed damper has a shut off leakage at 500Pa inlet pressure of less than 0.5% of rated flow.
- The damper blade is positively connected to its drive shaft which runs in maintenance free plastic (Pocan) long life bearings.
- Evoprene damper seal, thermoplastic elastomer compound seal suitable for temperatures up to 50°C.

Induction Port Airflow Monitoring

An optional pressure differential sensor can be mounted in one of the induction ports to provide a signal for flow monitoring. The location of the sensor is such that with the calibration chart total induced flow can be determined. Alternatively, a total flow measuring grid can be fitted in the airway of the secondary silencer.

Type SFTB with Electric Heater



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110	125, 160	1mm smaller than spigot size	1015	582	433	284	236	510	850	390	260	55
210	160, 200, 250		1215	712	463	384	288	565	1050	420	340	75
310	160, 200, 250, 315		1415	802	503	484	339	625	1250	460	400	130
410	250, 315		1665	992	543	634	390	660	1500	500	500	160

Aerodynamic Data

Primary Air Volume Range · Fan Volumes

Performance Details

- Discharge flow remains constant within ±7.5% from 100% primary to minimum primary air.
- Minimum primary air pressure differential required typically 25Pa. For actual values see page 7.

Notes

The minimum primary air volume shown is the minimum factory set value for control purposes. See page 7 for leakage on full shut off.
Fan volume is given for typical downstream pressures. Other downstream pressures duties available on request.

Primary Air Volume Range

Spigot Code	Spigot Size	Minimum* Primary Airflow (l/s)	Maximum Primary Airflow (l/s)
125	124	15	125
160	159	25	200
200	199	40	310
250	249	60	490
315	314	105	780

Table 1: Fan Volume SFTB-E with TSFB

SFTB Size	Fan Code	Fan Speed	Total Fan Volume SFTB with TSF (with or without Electric Heater)		
			ESP[1)] 50Pa (l/s)	ESP[1)] 40Pa (l/s)	ESP[1)] 30Pa (l/s)
110	8	Min	100	100	100
		Max	140	145	150
	1	Min	141	141	141
		Max	165	175	180
210	1	Min	166	166	166
		Max	290	300	310
	2	Min	201	201	201
		Max	335	360	380
310	2	Min	271	271	271
		Max	390	420	440
	9	Min	391	391	391
		Max	610	640	660
410	3	Min	611	611	611
		Max	835	855	875

[1)] ESP = External Static Pressure

Table 2: Fan Volume SFTB-1 with TSFB

SFTB Size	Fan Code	Fan Speed	Total Fan Volume SFTB-1 with TSF (with 1 row LPHW coil)		
			ESP[1)] 50Pa (l/s)	ESP[1)] 40Pa (l/s)	ESP[1)] 30Pa (l/s)
110	8	Min	100	100	100
		Max	120	130	140
	1	Min	121	121	121
		Max	150	160	165
210	1	Min	151	151	151
		Max	260	275	290
	2	Min	201	201	201
		Max	335	340	345
310	2	Min	271	271	271
		Max	390	395	400
	9	Min	391	391	391
		Max	600	605	610
410	3	Min	601	601	601
		Max	780	790	800

Selection Method

- First select case size and fan code on basis of fan volume flow rate.
- Select inlet spigot size to meet maximum and minimum primary air requirements.

Example

Given Fan flow 180 l/s (without water heater) ESP 50 Pa
Maximum Primary Air 120 l/s
Minimum Primary Air 35 l/s

Selection

Spigot Code	160
Case size	210
Fan Code	1

Table 3: Minimum Inlet Static Pressure

Primary Inlet Spigot Code	$\dot{V}_1$ (l/s)	p_{SI} min Pa
125	15 110	20 50
160	25 180	20 40
200	40 290	20 35
250	60 440	20 25
315	105 700	20 20

Table 4: Leakage Across Closed Primary Air Damper

Primary Inlet Spigot Code	$\dot{V}_L$ l/s	
	p_{SI} Pa	
	250 Pa	500 Pa
125	0.14	0.20
160	0.20	0.28
200	0.31	0.44
250	0.50	0.69
315	0.78	1.10

Fan and Motor

The Series Fan VAV terminal boxes are fitted with fan casings (Scrolls) manufactured from sheet steel.
The fans have a forward curved fan impeller.
All fan motors are direct drive resiliently mounted via location brackets suitable for 230 volts 50 Hz single phase and are supplied with auto reset thermal overloads.
The fan motors are permanent split capacitor types fitted with permanently lubricated bearings.
All earthing wiring and component selection conforms to BS/IEE wiring requirements.

Fan Motor Speed Control

All fan motors fitted to Trox Series Fan VAV Terminal Boxes are suitable for fan speed control.

Supplied as standard is a manually adjusted solid state Triac based fan speed controller which provides stepless adjustable fan speed – from maximum to minimum. The system is matched to the motor and includes minimum voltage limits to ensure stable motor operation. The control incorporates hard start, ie: maximum voltage for a defined short period to ensure that fan rotation is correct.

Accessories

Provision is made on the induction ports of the unit for the installation of air filters. These can be metal cleanable filters, or glass fibre throwaway filters in cardboard frame.

Table 5: Fan Motor Details

Fan Code	W_2 watts	W_1 watts	A_R amps	A_S amps
1	75	160	0.69	1.4
2	120	275	1.2	2.8
3	320	600	2.6	6
8	40	100	0.43	0.63
9	245	450	2.0	3.6

Power factor: 0.9 approx.

Nomenclature

L_{WNR} : NR rating of octave sound power levels for ductborne regenerated noise.

NR_1 : NR rating of octave sound power levels of ductborne regenerated noise including insertion loss of TSFB secondary silencer and 8 dB room attenuation.

NR_2 : NR rating of octave sound power levels for case radiation and induction port noise including a combined 14 dB ceiling reduction and room attenuation, for the case of zero primary air (fan only)

NR_3 : NR rating of octave sound power levels for case radiation and induction port noise including a combined 14 dB ceiling reduction and room attenuation, for the case of 100% primary air and 200 Pa primary air pressure.

p_{SD} in Pa: Downstream static pressure.

p_{SI} in Pa: Inlet static pressure.

p_{SI} min in Pa: Minimum inlet static pressure.

$\dot{V}_I$ in l/s : Primary air volume flow rate

$\dot{V}_D$ in l/s : Discharge (fan)volume flow rate

$\dot{V}_L$ in l/s : Leakage volume flow rate across closed primary air damper.

W_1 in Watts: Input power to motor at maximum fan volume flow rate.

W_2 in Watts: Output power of motor.

A_S in amps: Motor starting current

A_R in amps: Motor running current

$\dot{M}_W$ in kg/s: Mass flow water

$\dot{Q}$ in kW: Heat output.

Δp_W in kPa: Water pressure drop.

Quick Selection

Table 6: Quick selection

Case Code	Fan Code	$\dot{V}_D$ l/s	p_{SD} Pa Pa	L_{WNR}	NR_1	NR_2	NR_3
110	8	100 140	50 50	53 56	30 33	17 20	24 26
	1	141 165	50 50	53 55	30 32	16 19	23 24
210	1	166 250	50 50	55 59	31 35	19 28	22 30
	2	251 335	50 50	53 58	28 33	28 29	25 29
310	2	336 390	50 50	59 61	33 34	19 24	25 27
	9	391 610	50 50	56 65	27 34	18 29	24 32
410	3	611 835	50 50	65 73	31 36	29 36	34 39

Refer to table on page 6 for relationship of inlet spigot diameter and primary air flow rate.

Sound Power Level spectrum available on request.

Insulation

- The inside of the TSFB Attenuator is acoustically lined with a minimum 50mm thickness.
- Face of the mineral wool has a glass fibre tissue covering securely fixed to the substrate. PU Foam side liners are incorporated.
- All lining materials have Class ‘O’ fire rating conforming to UK building regulations.
- A perforated plate liner is available on request.

Secondary Attenuator Type TSFB

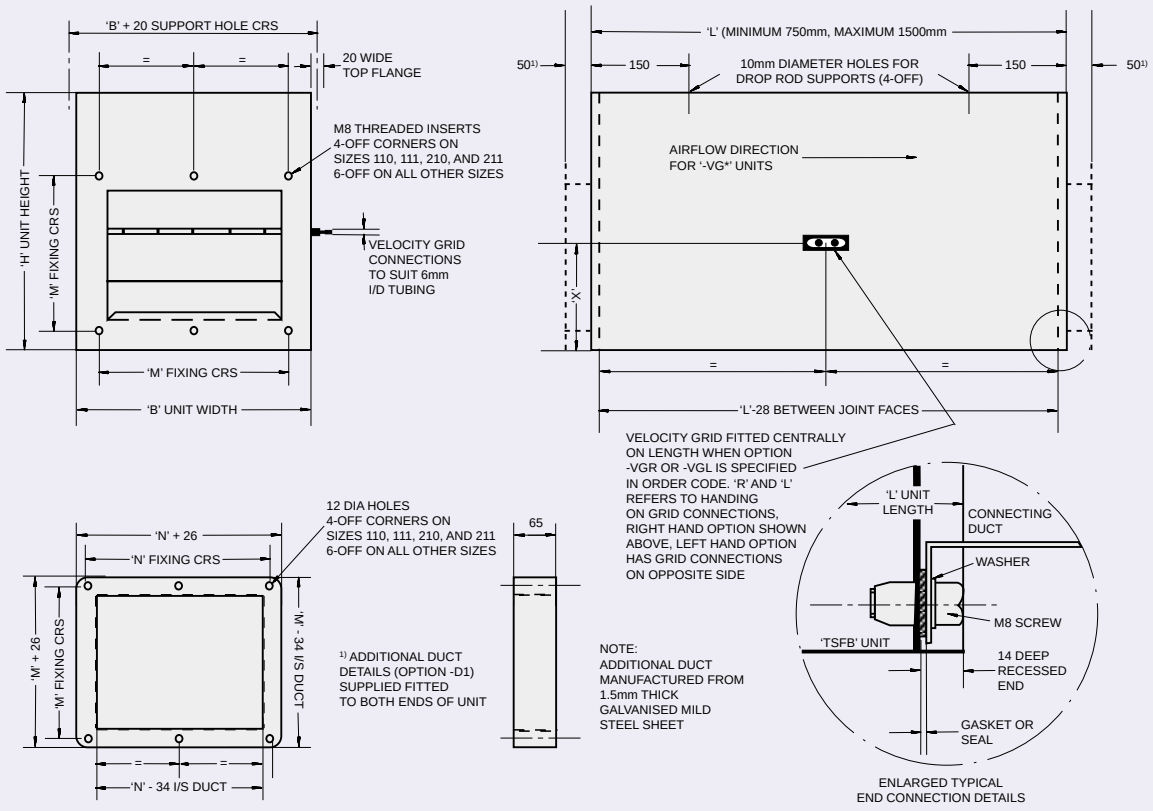


Table 7:

Case Size	L	B	H	N	M	X
110	750	354	392	284	239	170
210	1000	454	402	384	288	175
310	1200	554	402	484	339	175
410	1500	704	452	634	390	188

Water Coil Output Data

Hot Water Coils

The hot water heating coil is manufactured from 3/8 inch diameter copper tube with aluminium fins spaced at 1.8mm. The tubes are formed into circuits to limit water velocity and mounted in a galvanised sheet steel flanged frame with copper headers. The heating coils meet the requirements of British Standards/Codes as applicable. Coil connections are 1/2 inch BSP as standard.

Plugged air vent and drain points are provided.
Water control valves can be supplied as a loose item if required.
The maximum coil output is shown in kW for water temperatures of 82°C flow and 71°C return and based on air temperature entering the coil of 22°C. The water pressure drop is shown in kPa and the water rate in kg/s. Other water/air temperatures available on request.

Table 8: One Row Coil.

Coil Size	$\dot{V}_D$ l/s	$\dot{Q}$ kW	$\dot{M}_W$ kg/s	Δp_W kPa
110	100	2.2	.052	3
	125	2.6	.062	5
210	165	3.8	.090	2
	220	4.4	.105	3
	250	4.6	.110	3
	305	5.3	.126	4
310	305	6.5	.155	2
	360	7.1	.170	3
	450	7.9	.188	4
	520	8.7	.207	5
	580	9.3	.220	5
410	650	12.1	.288	5
	780	13.5	.320	6
	850	14.2	.338	6

Electric Heaters [1)]

The electric heater is available as an integral unit complete with controls including fuses and interlocks. The integral air heater has elements designed for black heat operation and consists of 80/20 nickel chrome wire in a stainless steel tube (grade 312) filled with magnesium oxide.
An automatic reset high temperature cut out is fitted and a brass earth stud included. The heater is manufactured to British Standards/Codes as applicable and fully factory tested. A low air pressure switch is fitted. This switch will disconnect the heater if the fan stops. The heater elements are wired back into the control enclosure, including the earth, and heater fuses can be supplied.
Control of the heater can be arranged for stepless control by thyristors. Control type should be selected to suit the temperature controller used and the degree of accuracy required on temperature control.

1) Electric heaters are available on request. Full details required such as kW, Voltage, Phase should be stated.

Table 9: Electric Heaters

Size	$\dot{Q}$ kW	
	Supply Voltage	
	230V / 1ph 50Hz	400V / 3ph 50Hz
110	1.0 – 3.0	–
210	1.0 – 3.0	3.0 – 6.0
310	1.0 – 6.0	3.0 – 12.0
410	1.0 – 6.0	3.0 – 18.0

Order Details

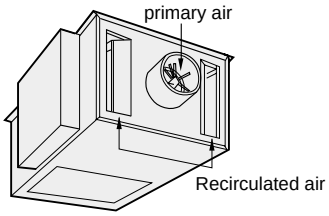
Specification Text

Series Fan VAV boxes type SFTB for constant room air supply volume combined with VAV primary air control having high turndown by use of a multi-point flowgrid. Induction of warm air from the ceiling void by forward curved blade centrifugal fan with direct drive motor.
Single blade control damper with seal for shut off. Stepless speed controller to enable fan duty to be set to match the downstream duct system pressure.

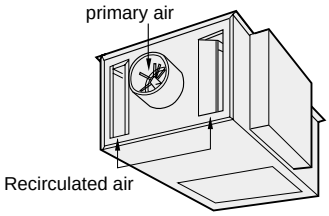
Materials

Casing manufactured from galvanised sheet steel. Internally lined with PU Foam.
Multi-point flowgrid construced from aluminium tubes. Fan casing manufactured from sheet steel. Fan impeller from aluminium alloy or steel according to size.

Left Hand Connection



Right Hand Connection



Order Example

Make : TROX
Type : SFTB-R/110x125x1/0/BC0/120-100-50

SFTB - R - 1 - C - S | **110 x 125 x 1** | **0** | **BC0** | **120 - 100 - 50** | **00B479**

Product Type

Handing
L = Left Hand
R = Right Hand

Reheat
1 = with 1 row LPHW coil
E* = with electric reheat coil
or no entry

Filter
M = Metal
C = Throwaway
or no entry

Induction flowgrid
S = induction port with flow pressure differential sensor
or no entry

Case Size: 110, 210, 310, 410

Fan Code: 1, 2, 3, 8, 9

Spigot Size: 125, 160, 200, 250, 315

Always 0

Controller
Refer to Trox

Minimum primary air volume l/s

Maximum primary air volume l/s

Fan volume l/s

Control Diagram
Refer to Trox

*Electric Heater available on request

Order Code - Secondary Silencer for SFTB Box

TSFB - LB - VGR - D1 / **210** / **0** / [ ]

Product Type

Lining
LB = Perforated plate lining
or no entry

Flowgrid
VGL = Left Hand
VGR = Right Hand
or no entry

Duct Piece
D1 = Additional ducts fitted
or no entry

Size: 110, 210, 310, 410

Not used

No entry for standard length or special length in mm on request