



Restaurant Projects Ltd Ventilation Strategy



COMMERCIAL KITCHEN VENTILATION

Odour & Noise Risk Assessment

Ventilation System Design Compliance Report

Project	Shake Shack, Commercial Kitchen Ventilation
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Designed to	BESA DW/172 (2018), EMAQ+/DEFRA (2018), TR/19, BS 9999

This report has been prepared by Restaurant Projects Ltd with all reasonable skill, care and diligence. It is confidential to the client.



1. Summary

This report documents the design and compliance of the commercial kitchen ventilation system at 121–122 Broad Street, Reading, RG1 2BD (Shake Shack, operated by Diverse Dining). The kitchen is entirely electric, there are no gas appliances or gas supply on these premises.

The system has been designed to comply with BESA DW/172 (2018), BESA DW/144, TR/19, and the EMAQ+/DEFRA 'Control of Odour and Noise from Commercial Kitchen Exhaust Systems' guidance (2018), subject to installation in accordance with the approved drawings and verification at commissioning.

Assessment Item	Outcome
EMAQ+/DEFRA Inherent Odour Risk Score	19, Low to Medium (below 20 point High Risk threshold)
Cooking Equipment	All electric, deep fat fryers and chrome griddles (no gas appliances)
Canopy Type (DW/172)	Type 08, Overhead Wall Type (open one end) Factor: 1.20
Design Extract Airflow Q	1.796 m ³ /s (DW/172 Thermal Convection Method, Type 08)
Design Supply Airflow Q	1.527 m ³ /s (85% of extract per DW/172)
Extract Fan EF1	Systemair MUB/T 062 630D4 , design duty 1.796 m ³ /s @ 289 Pa
Supply Fan SF1	Systemair MUB 062 560D4 MULTIBOX , design duty 1.527 m ³ /s @ 234 Pa
Grease / Smoke / Particulate Control	Canopy baffle filters + Purified Air ESP 4500, grease, smoke and fine particulate removal
Discharge / Dispersion	High level discharge above roof ridge into private courtyard; EMAQ+/DEFRA 'Good' dispersion (≥ 15 m/s at cowl throat)
Electric Interlock	S&S Northern Merlin 1250XE, monitors EF1+SF1; cuts kitchen power on fan fault, fire alarm or fire suppression activation
Residual Odour Risk	Low and acceptable, subject to installation, commissioning and maintenance



2. Introduction

2.1 Background

Shake Shack Reading, occupies the ground and first floors of 121–122 Broad Street, Reading, RG1 2BD. The commercial kitchen produces burgers, fries and fried chicken. All cooking equipment is electric; there is no gas supply on the premises.

This report documents the technical design of the mechanical ventilation system and presents an odour and noise risk assessment in accordance with EMAQ+/DEFRA guidance (2018) and BESA DW/172 (2018).

2.2 Scope

- EMAQ+/DEFRA odour risk assessment and FIDOL analysis
- BESA DW/172 Thermal Convection Method flow rate calculations (Type 08, open one end, factor 1.20)
- Duct routing analysis from drawing RP SSR 910
- Hydraulic calculations: duct velocities, component resistances, system pressures
- Fan selection and commissioning duties
- Grease, smoke and particulate control strategy, canopy filters and ESP 4500
- S&S Northern Merlin 1250XE electric interlock and safety system
- Acoustic attenuation strategy
- TR/19 cleaning and maintenance programme

2.3 Site and Context

The extraction plant is located on the internal courtyard roof. The courtyard is private, enclosed and occupied solely by the client operator. There are no neighbouring tenants, no public access, and no highly sensitive receptors identified in close proximity. The extraction duct rises vertically up the external courtyard wall and terminates above the ridge of the roof.



3. Policy and Guidance

3.1 Applicable Standards

Document	Application
EMAQ+ (2018) / DEFRA 'Control of Odour and Noise from Commercial Kitchen Exhaust Systems'	Primary odour and noise risk assessment methodology. EMAQ+ (2018) is the current amendment of the original DEFRA (2005) document and represents current best practice guidance for commercial kitchen odour control.
BESA DW/172 (2018), Specification for Kitchen Ventilation Systems	System design standard: Thermal Convection Method airflow, canopy, filtration, fire safety, ductwork sizing
BESA DW/144, Specification for Sheet Metal Ductwork	Ductwork fabrication standard
TR/19 (BESA), Internal Cleanliness of Ventilation Systems	Cleaning intervals and maintenance regime
CIBSE Guide B2, Ventilation and Air Conditioning	Velocity limits and pressure drop methodology
BS 9999, Fire Safety in the Design, Management and Use of Buildings	Fire damper specification
BS EN 1366, Fire Resistance Tests for Service Installations	Fire damper testing standard
IAQM, Guidance on Assessment of Odour for Planning (v1.1, 2018)	FIDOL assessment framework for odour impact evaluation
Building Act 1984 / Building Regulations	Statutory compliance framework
Regulatory Reform (Fire Safety) Order 2005	Fire suppression requirements



3.2 FIDOL Odour Impact Assessment

The FIDOL framework (IAQM 2018, referenced in EMAQ+/DEFRA guidance) has been applied to assess the likely odour impact from the kitchen extract system.

FIDOL Factor	Assessment
Frequency	Kitchen extract emissions will occur during normal trading hours only and will be intermittent, linked to active cooking periods. The system will not operate continuously overnight.
Intensity	The cooking type includes fried food, burgers and chicken, which has a high inherent odour and grease loading. Mitigation is provided through canopy grease baffle filtration and an ESP unit for grease, smoke and fine particulate removal. High level discharge above the roof ridge further assists dispersion.
Duration	Emissions will be limited to active cooking periods during trading hours. There will be no continuous overnight extract discharge from cooking operations.
Offensiveness	Fast food cooking odours can be noticeable if untreated. The proposed filtration system and high level discharge arrangement will reduce the likelihood of objectionable odour beyond the site boundary. The private courtyard location means there are no public amenity areas immediately adjacent to the discharge.
Location / Receptor Sensitivity	The discharge is to a private courtyard and roof area. No residential or other highly sensitive receptors have been identified within close proximity. The closest public activity is at street level, separated from the discharge by the building height and roofline. This significantly reduces the risk of odour nuisance reaching any third party.

Based on the EMAQ+/DEFRA risk assessment and the FIDOL review, the inherent odour risk is considered Low to Medium. With the proposed canopy grease filtration, ESP treatment, high level discharge above the roof ridge and the maintenance regime set out in Section 12, the residual odour impact is assessed as low and acceptable, subject to correct installation, commissioning and maintenance.



4. Airflow Calculations, BESA DW/172 Thermal Convection Method

4.1 Methodology and Canopy Type

Airflow rates have been calculated in accordance with BESA DW/172 (2018) using the Thermal Convection Method. The canopy has been identified as Type 08 Overhead Wall Type (open one end), attracting a canopy type factor of 1.20 per DW/172 Table 3.

Project Reference	Shake Shack, Reading (RP SSR 910)
Designer	Restaurant Projects Ltd Date: 18/05/2026
Canopy Reference	SSR1 (CANOPY 1 + CANOPY 2)
Hood Size	1,300 mm × 500 mm (500/500 profile)
Canopy Type	Type 08, Overhead Wall Type (open one end)
Canopy Type Factor	1.20 (DW/172 Table 3)
Make up Air Ratio	0.85 (supply = 85% of extract per DW/172)
Cooking Equipment	All electric (no gas appliances)



4.2 Appliance Schedule and Flow Rate Calculation

Cooking Appliance	Plan Size (m)	Area (m ²)	TCC (m ³ /s/m ²)	Flow Rate (m ³ /s)
Deep Fat Fryer, Electric (single)	0.43 × 0.84	0.36	0.45	0.16
Chrome Griddle, Electric (0.91 m wide)	0.91 × 0.80	0.73	0.40	0.29
Chrome Griddle, Electric (0.61 m wide)	0.61 × 0.80	0.49	0.40	0.20
Chrome Griddle, Electric (0.61 m wide)	0.61 × 0.80	0.49	0.40	0.20
Deep Fat Fryer (4 No. & above), Electric	0.86 × 0.84	0.72	0.45	0.33
Deep Fat Fryer (4 No. & above), Electric	0.86 × 0.84	0.72	0.45	0.33
THEORETICAL FLOW RATE (sum)				1.50 m³/s
Canopy Factor: Type 08, Overhead Wall Type (open one end) × 1.20 DW/172 Table 3				
SPECIFIC EXTRACT FLOW RATE				1.796 m³/s
Make up Air Ratio: 0.85 × extract				
MAKE UP AIR FLOW RATE				1.527 m³/s

- TCC values from BESA DW/172 (2018) Table 2, Thermal Convection Coefficients.
- Multiple deep fat fryers treated as '4 No. & above' per DW/172 CO₂ reduction provisions.
- Design extract Q = 1.796 m³/s. Design supply Q = 1.527 m³/s.
- The DW/172 Flow Rate Calculator (Restaurant Projects Ltd, dated 18/05/2026) is provided in Appendix E and confirms these figures.



5. Ventilation System Design and Hydraulic Calculations

5.1 Design Parameters

Kitchen Type	Commercial fast food, Medium (approx. 50 covers)
Cooking	Fast food, Fries, Burgers, Fried Chicken (all electric)
EMAQ+/DEFRA Category	Very High, fried food, burgers, chicken (Table 2A)
Design Extract Q	1.796 m ³ /s (DW/172, Type 08, factor 1.20)
Design Supply Q	1.527 m ³ /s (85% of extract)
Extract Duct	550 × 550 mm rectangular
Supply Duct	500 × 450 mm rectangular
Canopy Height	2,000–2,100 mm above FFL (DW/172)
Canopy Arrangement	Two canopies, CANOPY 1 + CANOPY 2 (Ref: RP SSR 910)
Discharge	Above ridge; private courtyard; no restriction

5.2 Canopy (Drawing Ref: RP SSR 910)

Two canopies (CANOPY 1 and CANOPY 2) serve the full cooking line, open at one end (Type 08). Each is manufactured from 304 food grade stainless steel with a full perimeter condensate drain channel. The extract plenum is fitted with removable stainless steel baffle grease filters (Stage 1 grease filtration). The insulated fresh air plenum delivers supply air via perforated stainless steel diffusers. Integral high temperature LED lighting is fitted and grease collection trays are provided. Canopy underside height is 2,000–2,100 mm above FFL per DW/172. Wall mounted, with a minimum of one spigot per 3 m of canopy length.

5.3 Extract Duct Routing (RP SSR 910) and Hydraulic Calculations

Duct Routing

- CANOPY 1 and CANOPY 2 spigots combine into 550×550 mm main extract duct at kitchen ceiling level
- Horizontal run approximately 2 m, then Bend 1 (90° segmented)
- Horizontal run approximately 2 m to external wall, then Bend 2 (90° segmented)
- Vertical riser approximately 7 m up external courtyard wall to above roof ridge, then Bend 3 (90° segmented at ridge)
- Short horizontal run ~1 m to weather cowl | Total duct run: 12 m | 3 × 90° segmented bends
- ESP 4500 installed inline on horizontal section, upstream of EF1 | Splitter silencer downstream of EF1



Extract Velocity, 550 × 550 mm

Cross sectional area A	$0.550 \times 0.550 = 0.3025 \text{ m}^2$
Design extract Q	$1.796 \text{ m}^3/\text{s}$
Duct velocity $V = Q/A$	$1.796 / 0.3025 = 5.94 \text{ m/s}$
DW/172 maximum (main extract)	8.0 m/s maximum. Design velocity 5.94 m/s — compliant.
Hydraulic diameter D_e	0.55 m (square duct)
Dynamic pressure $\rho V^2/2$	$0.5 \times 1.2 \times 5.94^2 = 21.2 \text{ Pa}$
Duct friction $(f/D_e) \times DP$	$0.02/0.55 \times 21.2 = 0.77 \text{ Pa/m}$
Discharge velocity note	The EMAQ+/DEFRA 'Good' dispersion criterion ($\geq 15 \text{ m/s}$) applies to the exit velocity at the final cowl/outlet throat, not the main duct velocity. The weather cowl shall be sized to achieve $\geq 15 \text{ m/s}$ at its throat. This shall be confirmed by final cowl selection and commissioning measurement.



Total Extract System Resistance

Component	Qty	Unit Resistance (Pa)	Total (Pa)
Spigot connections: CANOPY 1 and CANOPY 2 combined into 550×550 mm extract duct (well formed transitions)	2	Negligible	0.5
Horizontal duct at kitchen ceiling, 550×550 mm (Ref: RP SSR 910, ~2 m)	—	0.77 Pa/m	1.5
Bend 1: 90° segmented, 550×550 mm (horizontal to transition, kitchen level)	1	9.5	9.5
Horizontal duct to external wall, 550×550 mm (~2 m)	—	0.77 Pa/m	1.5
Bend 2: 90° segmented, 550×550 mm (horizontal to vertical riser, courtyard wall)	1	9.5	9.5
Vertical riser, external courtyard wall, 550×550 mm (~7 m to above ridge)	—	0.77 Pa/m	5.4
Bend 3: 90° segmented, 550×550 mm (vertical to horizontal at ridge level)	1	9.5	9.5
Short horizontal run to weather cowl, 550×550 mm (~1 m)	—	0.77 Pa/m	0.8
Total duct run: 12 m 3 × 90° segmented bends (per drawing RP SSR 910)			
Reducer (duct to ESP 4500 saddle, $\zeta = 0.25$)	1	5.3	5.3
Saddle connections to Purified Air ESP 4500 ($\zeta = 1.0$ each)	2	21.2	42.4
Splitter silencer, 600 mm long (downstream of EF1)	1	10.0	10.0
Purified Air ESP 4500, clean condition pressure drop	1	160.0	160.0
Weather cowl at termination point above ridge	1	33.0	33.0
TOTAL EXTRACT SYSTEM RESISTANCE			289 Pa

Total extract system resistance = 289 Pa at 1.796 m³/s.



5.4 Supply System

Cross sectional area A	$0.500 \times 0.450 = 0.225 \text{ m}^2$
Design supply Q	$1.527 \text{ m}^3/\text{s}$
Duct velocity $V = Q/A$	$1.527 / 0.225 = 6.79 \text{ m/s}$
DW/172 main supply duct range	3.0–8.0 m/s main supply duct range. Design velocity 6.79 m/s — compliant.
Dynamic pressure	$0.5 \times 1.2 \times 6.79^2 = 27.7 \text{ Pa}$
Duct friction	$0.02/0.474 \times 27.7 = 1.17 \text{ Pa/m}$

Total Supply System Resistance

Component	Qty	Unit Resistance (Pa)	Total (Pa)
Short horizontal intake at first floor, 500×450 mm (~1 m)	—	1.17 Pa/m	1.2
90° segmented bend, 500×450 mm (intake turn)	1	12.5	12.5
Horizontal run to vertical drop, 500×450 mm (~3 m)	—	1.17 Pa/m	3.5
90° segmented bend, 500×450 mm (horizontal to vertical)	1	12.5	12.5
Vertical drop to kitchen supply plenum, 500×450 mm (~4 m)	—	1.17 Pa/m	4.7
Reducer (fan outlet to supply duct, $\zeta = 0.25$)	1	6.9	6.9
F7 filter cassette, supply intake (clean condition)	1	100.0	100.0
Attenuator, 600 mm long	1	10.0	10.0
Weather louvre at fresh air intake	1	33.0	33.0
Air valves, diffusers and grilles (combined downstream)	1	50.0	50.0
TOTAL SUPPLY SYSTEM RESISTANCE			234 Pa

Total supply system resistance = 234 Pa at 1.527 m³/s.



6. Fan Selection

6.1 EF1, Kitchen Extract Fan: Systemair MUB/T 062 630D4

The kitchen extract fan EF1 is a Systemair MUB/T 062 630D4 centrifugal duct fan, installed on the external courtyard roof (Ref: RP SSR 910). The fan is to be commissioned to 1.796 m³/s at a system resistance of 289 Pa. The 630 mm impeller of the MUB/T 062 frame has ample capacity for this duty; the equivalent EC variant (MUB CAV/VAV 062 630EC) has a maximum airflow of 3.965 m³/s, making the design duty approximately 45% of maximum capacity. Anti vibration mounts and flexible duct connectors are fitted on both sides. The fan is monitored by the Merlin 1250XE (Section 11).

Ref	EF1
Model	Systemair MUB/T 062 630D4
Design duty	1.796 m ³ /s @ 289 Pa
Fan frame	062 (820×820 mm face) Impeller: 630 mm
Motor	D4 (IE2 class) 3 phase, 400 V
Weight	112.5 kg
Location	External roof area Feed from MCP
EC equivalent data sheet	MUB CAV/VAV 062 630EC, Item #230505 (Appendix C)

6.2 SF1, Kitchen Supply Fan: Systemair MUB 062 560D4 MULTIBOX

The kitchen supply fan SF1 is a Systemair MUB 062 560D4 MULTIBOX, installed on the external roof area and to be commissioned to 1.527 m³/s at 234 Pa. The equivalent EC variant (MUB CAV/VAV 062 560EC) has a maximum airflow of 3.017 m³/s; the design duty is approximately 51% of maximum capacity. Manufacturer product data is provided in Appendix C.

Ref	SF1
Model	Systemair MUB 062 560D4 MULTIBOX
Design duty	1.527 m ³ /s @ 234 Pa
Fan frame	062 (820×820 mm face) Impeller: 560 mm
Motor	D4 (IE2 class) 3 phase, 400 V
Weight	107.5 kg
Location	External roof area Feed from MCP
EC equivalent data sheet	MUB CAV/VAV 062 560EC, Item #230501 (Appendix C)



6.3 Ancillary Fans

Ref	Description	Model	Duty	Location	Data Sheet
EF2	GF BOH Extract	Systemair PRIO 315EC	0.65 m³/s	External Roof	Prio ECO MAX 315 EC #486762 (App. C)
EF3	FF BOH Extract	Systemair PRIO 200C	0.22 m³/s	FF BOH Area	Prio ECO MAX 200 EC #486760 (App. C)
EF4	FF Bin Store Extract	Systemair PRIO 150C	0.08 m³/s	FF BOH Area	Prio ECO MAX 150 EC #486759 (App. C)
EF5	FF Bin Store Lobby	Systemair PRIO 150C	0.04 m³/s	FF BOH Area	Prio ECO MAX 150 EC #486759 (App. C)
TEF1	Toilet Extract	Systemair PRIO 200C	0.22 m³/s	FF BOH Area	Prio ECO MAX 200 EC #486760 (App. C)
SF2	FF BOH Supply	Systemair PRIO 315C	0.48 m³/s	FF BOH Area	Prio ECO MAX 315 EC #486762 (App. C)



7. Grease, Smoke and Particulate Control Strategy

7.1 Overview

Although the inherent EMAQ+/DEFRA risk score of 19 falls within the Low to Medium category, the cooking type includes high grease and high odour operations (deep fat frying, griddle cooking, burgers and fried chicken). Enhanced grease and smoke control has been incorporated as a precautionary measure in line with EMAQ+/DEFRA best practice for this cooking type.

The combination of canopy grease filtration, ESP 4500 grease/smoke/particulate removal, and high level discharge above the roof ridge is assessed as appropriate and sufficient mitigation for a Low to Medium risk installation of this type.

7.2 Stage 1, Canopy Grease Baffle Filters

Stainless steel baffle type grease filters are installed within both canopy extract plenums. These provide the first line of grease separation, removing the largest airborne grease droplets and protecting downstream components. Fully removable and washable; grease collection trays provided. This is the standard first stage treatment recognised in EMAQ+/DEFRA and DW/172.

7.3 Stage 2, Purified Air ESP 4500

Unit	Purified Air ESP 4500
Type	Electrostatic Precipitator (ESP)
Location	Inline on 550×550 mm extract duct, upstream of EF1 (Ref: RP SSR 910)
Primary function	High efficiency removal of fine grease particles, smoke and airborne particulates from the kitchen extract airstream
EMAQ+/DEFRA recognition	ESPs are recognised within EMAQ+/DEFRA Best Practice Guidance as an effective primary treatment technology for grease, smoke and fine particulate removal from commercial kitchen extract air
Clean pressure drop	160 Pa (included in Section 5.3 resistance table)
Secondary pollutants	To manufacturer's technical data. The ESP shall be installed, operated and maintained in accordance with the manufacturer's instructions. No secondary pollutant issue is anticipated subject to installation and maintenance in accordance with manufacturer's requirements.
Access	Full side access panels for regular cell cleaning and maintenance
Interlock	Single phase; interlocked with EF1 via Merlin 1250XE

7.4 Dispersion

The high level discharge point, above the ridge of the roof, discharging into open air, provides the dispersion element of the combined mitigation strategy. The discharge arrangement achieves the EMAQ+/DEFRA 'Good' dispersion rating (Score 5), which is the most favourable category available for a building mounted system. The weather cowl shall be selected and sized to achieve ≥ 15 m/s at its throat, consistent with the 'Good' dispersion criterion. This shall be verified at commissioning.



8. EMAQ+/DEFRA Odour Risk Assessment

8.1 Methodology

The odour risk assessment uses the EMAQ+ (2018)/DEFRA scoring methodology. The method assesses the inherent odour risk by scoring four criteria, Dispersion, Proximity of Receptors, Kitchen Size and Cooking Type, to determine the inherent risk category and indicate the level of odour control required. Abatement is then addressed separately as mitigation.

Score	Risk Category	Odour Control Typically Required
< 20	Low to Medium	Low level odour control
20–35	High	High level odour control
> 35	Very High	Very high level odour control

8.2 Inherent Risk Assessment

Criteria	Descriptor / Basis	Score
Dispersion	Good, discharge above ridge of roof; private open courtyard; ≥ 15 m/s at cowl throat (see Section 5.3); no restriction or downwash. Per EMAQ+/DEFRA: 'Discharging 1 m above ridge at 15 m/s'	5
Proximity of Receptors	Far / low sensitivity, No residential or other highly odour sensitive receptors have been identified within close proximity of the discharge point. The discharge is above roof ridge level in a private courtyard, away from public areas. Closest public activity is at street level, separated by building height and roofline. Assessed on available site information; to be confirmed by commissioning review.	1
Size of Kitchen	Medium, approximately 50 covers; 30–100 cover range per EMAQ+/DEFRA.	3
Cooking Type	Very High, fries, burgers, fried chicken. EMAQ+/DEFRA Table 2A: pub/high level of fried food, fried chicken or burgers.	10
TOTAL INHERENT RISK SCORE		19
RISK CATEGORY	Low to Medium (score < 20 per EMAQ+/DEFRA)	



8.3 Commentary

Dispersion, Score 5 (Good)

The kitchen extract terminates above the ridge via a duct rising vertically up the external courtyard wall (Ref: RP SSR 910), discharging into clear open air with no restriction, no downwash potential and no enclosed courtyard at the discharge level. The EMAQ+/DEFRA 'Good' criterion (≥ 15 m/s at cowl throat; 1 m above ridge) is met by the discharge arrangement, subject to final cowl selection. This is the most favourable dispersion category available for a building mounted system.

Proximity of Receptors, Score 1 (Far)

No residential or other highly odour sensitive receptors have been identified within close proximity of the discharge point. The discharge is above roof ridge level into a private courtyard, away from public areas and pedestrian activity. The closest public activity is at street level, separated from the discharge by the full building height and roofline. Receptor sensitivity is assessed as Far / low, based on available site information and the discharge location. This assessment should be confirmed by site inspection and final commissioning review.

Kitchen Size, Score 3 (Medium)

Approximately 50 covers, 'Medium' category (30–100 covers) per EMAQ+/DEFRA.

Cooking Type, Score 10 (Very High)

Fast food: fries, burgers and fried chicken. EMAQ+/DEFRA Table 2A 'Very High' category. Maximum cooking type score of 10. A conservative and transparent classification has been applied throughout.

Total Score: 19, Low to Medium

The inherent risk score of 19 falls below the 20 point High Risk threshold, placing the kitchen in the Low to Medium category. This reflects the proposed high level discharge arrangement, the favourable dispersion conditions, and the lack of identified sensitive receptors in close proximity to the discharge point.



8.4 Proposed Mitigation

Although the inherent score is Low to Medium, the cooking type includes high grease operations. Enhanced mitigation has been included as a precautionary measure consistent with EMAQ+/DEFRA best practice for this type of operation:

- Stage 1: Stainless steel grease baffle filters at canopy level (EMAQ+/DEFRA and DW/172 standard first stage treatment)
- Stage 2: Purified Air ESP 4500, high efficiency grease, smoke and fine particulate removal (EMAQ+/DEFRA recognised treatment technology)
- High level discharge above the roof ridge providing good dispersion (EMAQ+/DEFRA 'Good' rating)
- TR/19 maintenance programme to maintain system performance throughout the operational life of the premises

The combination of these measures is assessed as appropriate and sufficient for the level of risk identified. This design has been prepared to meet applicable EMAQ+/DEFRA guidance for a Low to Medium risk commercial kitchen installation.

Inherent risk: Score 19, Low to Medium per EMAQ+/DEFRA.

Mitigation: Canopy grease filtration + ESP 4500 + high level discharge, assessed as appropriate and sufficient.

Residual risk: Low and acceptable, subject to installation, commissioning and maintenance.

9. Acoustic Attenuation Strategy

The primary noise sources are EF1 (MUB/T 062 630D4) and SF1 (MUB 062 560D4 MULTIBOX). Both fans operate at approximately 45–51% of maximum airflow capacity at the design duty, resulting in actual noise levels substantially below rated maximum values.

Measure	Location	Effect
Splitter silencer, baffle type, 600 mm long	Inline on extract duct, downstream of EF1	–14 to –30 dB insertion loss across 250 Hz–4 kHz
Anti vibration mounts	Under EF1 and SF1	Prevents structural vibration transmission to building structure
Flexible duct connectors	Both sides of EF1 and SF1	Acoustic isolation between fan and ductwork
Acoustic lined fan casings	Both fans	30 mm mineral wool, reduces casing breakout noise
Attenuator on supply duct, 600 mm	Supply duct, FF BOH	Reduces supply fan noise into kitchen and occupied areas

The extract discharges above the ridge of the roof into a private courtyard. No noise sensitive receptors have been identified in close proximity. Given the town centre location, existing background noise levels on Broad Street are expected to be relatively high. Final noise compliance should be verified by commissioning checks and, if required by the Local Authority, a site-specific acoustic assessment.



10. Fire Safety Provisions

10.1 Extract, No Fire Damper (DW/172 7.6)

No fire damper is fitted on the kitchen extract duct, in accordance with DW/172 7.6. A fire damper on the extract side would trap heat and burning grease in the event of fire, significantly increasing risk. Confirmed on drawing RP SSR 910.

10.2 Supply, Fire Damper at Compartment Boundary

A fire damper compliant with BS 9999 and tested to BS EN 1366 is installed at the supply duct compartment boundary penetration (item FD on drawing RP SSR 910).

10.3 Access Panels

Access panels (items A/D on drawing RP SSR 910) are installed on both sides of every bend and at maximum 1.5 m intervals in horizontal runs, per DW/172 and TR/19.

10.4 Fire Suppression, Noble

A fire suppression system (supplied by Noble) is installed above the cooking appliances, behind the grease filters, and within the extract spigots. On activation, the Noble system triggers the Merlin 1250XE EM STOP input, immediately cutting power to all kitchen cooking equipment. Service intervals per Noble maintenance schedule.



11. Electric Interlock and Safety System, Merlin 1250XE

11.1 Purpose

The S&S Northern Merlin 1250XE continuously monitors EF1 (extract) and SF1 (supply) via built in current monitoring and controls a power contactor supplying the kitchen cooking equipment. Kitchen equipment cannot operate unless both fans are confirmed as functioning correctly within their calibrated current range.

11.2 Interlocking Logic

Condition	Merlin 1250XE Action	Effect on Kitchen Equipment
Normal, both fans within calibrated range	Electric LED on; contactor closed	Kitchen equipment powered
EF1 current fault detected	Fan LED flashes; after 20 seconds contactor opens	Kitchen equipment power cut
SF1 current fault detected	Fan LED flashes; after 20 seconds contactor opens	Kitchen equipment power cut
Fire alarm activation (EM STOP input)	EM Stop LED; contactor opens	Kitchen equipment power cut
Noble suppression activation (EM STOP input)	EM Stop LED; contactor opens	Kitchen equipment power cut
Manual emergency stop	EM Stop LED; contactor opens	Kitchen equipment power cut
Restart after fault	All inputs must be manually reset	Re powered only after deliberate operator reset

11.3 Technical Specification

Model	Merlin 1250XE
Manufacturer	S&S Northern Limited snsnorthern.com
Type	Electric Controller & Ventilation Interlock System
Enclosure (H × W × D)	180 × 255 × 77 mm
Housing	ABS PA765 (UL94 V 1 flame rated)
Power supply	100–240 V AC, 50/60 Hz; 5 W max
Internal fuse	Anti surge 3.15 A 250 Vac
Fan current monitoring	Single phase AC 0.1–18 A per channel; display 0–22 A
Fans monitored	Up to 2 independent channels (EF1 Extract + SF1 Supply)
Contactor output	100–240 V AC, opens on fault condition
Volt free relays	2 × 240 Vac 5 A (latching)
CO2 monitor connection	24 Vdc output + open/close switch; max 90 mA
EM STOP input	Remote open/close circuit; factory linked closed



Display	1.8 inch TFT internal; 4 button navigation
Indicators	LED: Power, Electric, EM Stop, CO ₂ High, Supply Fan, Extract Fan, Fan Fault
Audible alarm	85 dB internal buzzer (mutable)
Operating	–10 to 50°C; 30–80% RH non condensing
Approvals	UKCA CE
Warranty	3 years

Full S&S Northern Merlin 1250XE Installation, Operation & Maintenance Manual (Rev 01, 08 24) provided at Appendix E.



12. Cleaning and Maintenance, TR/19 Programme

12.1 Requirement

The kitchen extract system must be cleaned in accordance with BESA TR/19 'Guide to Good Practice: Internal Cleanliness of Ventilation Systems'. Cleaning must be by a BESA registered ductwork cleaning contractor. Commercial insurance policies frequently require cleaning at greater frequency than TR/19 minima; the operator must confirm requirements with their insurer.

12.2 Grease Classification and Cleaning Intervals

Grease Level	Typical Example	≤6 hrs/day	6–12 hrs/day	12–16 hrs/day	16+ hrs/day
Low	No significant grease aerosol	12 months	12 months	6 months	6 months
Medium	Moderate grease aerosol	12 months	6 months	4 months	3 months
High	Heavy/significant grease aerosol	6 months	3 months	3 months	2 months

Classification for this installation: HIGH grease production (multiple deep fat fryers and electric griddles; EMAQ+/DEFRA Very High cooking type). Typical operating hours: 8–14 hours per day. Required minimum intervals:

- Extract ductwork (550×550 mm): every 3 months
- Canopy plenums: every 3 months minimum (or more frequent per insurer requirements)
- ESP 4500 collection plates: monthly or as directed by Purified Air control panel
- Grease baffle filters: daily by kitchen operator



12.3 Maintenance Schedule

Task	Frequency	Responsible
Canopy, filters, drain trays, visual check and grease cup emptying	Daily	Kitchen operator
Grease baffle filter removal, wash and refit	Daily / as required	Kitchen operator
Merlin 1250XE, visual check of all LED status indicators	Daily	Kitchen operator
ESP 4500, check indicator lights; report faults	Weekly	Kitchen operator
Full canopy and filter deep clean	Monthly minimum	Specialist contractor
ESP 4500, cell removal, wash and reinstatement	Monthly (or per indicator)	Purified Air engineer
Supply F7 filter cassette, inspect and replace	Monthly	Ventilation engineer
Extract ductwork TR/19 inspection and clean	Every 3 months	BESA registered contractor
Noble fire suppression service and pressure test	Per Noble schedule	Noble contractor
Merlin 1250XE, full system test (calibration, EM stop, contactor)	Quarterly	Electrical engineer / S&S Northern
EF1/SF1 fan maintenance, vibration, mounts, fixings	Annually	Ventilation engineer
Full system airflow measurement and verification	Annually	Ventilation engineer
Access panels and duct support brackets, inspect	Annually	Ventilation engineer

12.4 Record Keeping

Service and cleaning records must be retained at the premises and made available to the relevant authority upon request. Records must include: date, contractor name and BESA number (for ductwork cleaning), work carried out, findings and any remedial actions.



13. Ductwork Design and Construction

13.1 Standards

All ductwork is fabricated and installed in accordance with BESA DW/144. Internal surfaces are rectangular, free from irregularities promoting grease accumulation, and suitable for TR/19 inspection and cleaning. All joints are airtight. Support spacing complies with DW/144.

13.2 Extract (Ref: RP SSR 910)

- Main duct: 550×550 mm, from CANOPY 1+2 spigot combination; 12 m total run; 3×90° segmented bends; vertical riser to above roof ridge
- Velocity: 5.94 m/s, within DW/172 8.0 m/s limit
- Access panels (A/D): both sides of every bend; max 1.5 m in horizontal runs, as shown on RP SSR 910
- Anti vibration brackets at all external wall fixings; external ductwork weatherproofed and insulated
- No fire damper on extract, mandatory per DW/172 7.6

13.3 Supply (Ref: RP SSR 910)

- Main supply duct: 500×450 mm, from weather louvre intake, through F7 filter and 27 kW heater battery, descending to kitchen canopy supply plenum
- Fire damper at compartment boundary, BS 9999 / BS EN 1366 (item FD on RP SSR 910)
- Volume control dampers on all branch legs for system balancing

13.4 BOH and WC

BOH, bin store and WC areas are served by dedicated extract fans (EF2–EF5, TEF1) with individual weather louvres and volume control dampers. Circular duct sizes: 300Ø (BOH main), 150Ø–250Ø (ancillary) as shown on drawing RP SSR 910. All DW/144 compliant. These, fans and attenuation is located inside the demises in insulated ceilings complete with soundsheild lining, these do not present a noise assessment with regards to this report.



14. Compliance Summary

Requirement	Standard	Status
Canopy at 2,000–2,100 mm above FFL	DW/172	Both canopies, confirmed
Baffle filters, grease trays, spigots @ 3 m	DW/172	Compliant
Airflow by Thermal Convection Method, Type 08 ×1.20	DW/172 (2018)	Extract 1.796 m³/s; Supply 1.527 m³/s — confirmed
Ductwork to DW/144	DW/144	Compliant
Extract velocity (5.94 m/s < 8.0 m/s)	DW/172	Compliant
Access panels: both sides of bends; max 1.5 m	DW/172 / TR/19	Confirmed on drawing RP SSR 910
No fire damper on extract	DW/172 7.6	Confirmed
Fire damper on supply at compartment boundary	BS 9999	Confirmed on drawing RP SSR 910
EMAQ+/DEFRA inherent risk score < 20	EMAQ+/DEFRA (2018)	Score 19, Low to Medium
Discharge above ridge, 'Good' dispersion	EMAQ+/DEFRA	Subject to cowl sizing achieving ≥15 m/s at throat; to be verified at commissioning
Receptor sensitivity, Far / low	EMAQ+/DEFRA / IAQM	Assessed on available site information; to be confirmed at commissioning review
Grease filtration at canopy, Stage 1	EMAQ+/DEFRA / DW/172	Both canopies, confirmed
ESP 4500, grease, smoke and particulate removal	EMAQ+/DEFRA / DW/172	Installed
Mitigation assessed as appropriate and sufficient	EMAQ+/DEFRA	Assessed
EF1 commissioning duty: 1.796 m³/s @ 289 Pa	DW/172	To be set and verified at commissioning
SF1 commissioning duty: 1.527 m³/s @ 234 Pa	DW/172	To be set and verified at commissioning
Electric interlock, fan fault cuts kitchen power	Best practice / DW/172	Merlin 1250XE, installed
Fire alarm and suppression activation — kitchen power cut	Fire safety	Wired to Merlin 1250XE EM STOP input
Manual emergency stop	DW/172 / fire safety	Merlin 1250XE panel button and remote EM stop fitted
TR/19 cleaning programme	TR/19	See Section 12
Noble fire suppression system	Fire Reform Order 2005	Installed
Acoustic attenuation, silencer + AV mounts	EMAQ+/DEFRA / CIBSE	Compliant
All cooking equipment electric, no gas	Site specific	Confirmed



15. Conclusion

The commercial kitchen ventilation system at Shake Shack, 121–122 Broad Street, Reading, RG1 2BD, has been designed to comply with BESA DW/172 (2018), DW/144, TR/19 and the EMAQ+/DEFRA guidance for control of odour and noise from commercial kitchen exhaust systems, subject to installation in accordance with the approved drawings and verification at commissioning.

The EMAQ+/DEFRA inherent odour risk assessment gives a score of 19, placing the kitchen within the Low to Medium risk category. This reflects the proposed high level discharge above the roof ridge, the favourable dispersion conditions, and the lack of identified sensitive receptors in close proximity to the discharge point.

Although the inherent risk category is Low to Medium, the cooking process includes frying, griddle cooking, burgers and chicken. Enhanced mitigation has therefore been included by way of canopy grease baffle filtration, a Purified Air ESP 4500 for grease, smoke and fine particulate removal, and a high level discharge arrangement. The combination of these measures is assessed as appropriate and sufficient for the level of risk identified. This design has been prepared to meet applicable EMAQ+/DEFRA guidance for a Low to Medium risk commercial kitchen installation.

The S&S Northern Merlin 1250XE interlock system provides continuous fan monitoring and will isolate power to the cooking equipment in the event of fan failure, fire alarm activation or fire suppression activation. A TR/19 cleaning and maintenance programme is in place to maintain system performance throughout the operational life of the premises.

Subject to installation in accordance with the approved drawings, commissioning verification, and ongoing maintenance, the residual odour and noise impact is assessed as low and acceptable.

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Date	May 2026
Document Ref	RP READ VENT 2026 01 Rev E
Signature	C HAMBLIN.



Appendix A, Drawing Register

Drawing No.	Title	Scale	Rev	Status
RP SSR 910	Ground Floor HVAC Layout	1:50 @ A1	A	Current
RP SSR 911	First Floor HVAC Layout	1:50 @ A1	A	Current
RP SSR 911	External Court Yard View	1:50 @ A1	A	Current
RP SSR 912	External Elevations, External Elevation	1:50 @ A1	A	Current

All drawings prepared by Restaurant Projects Ltd, 404 Charlotte House, Queens Dock Business Centre, Liverpool, L1 0BG.



Appendix B, Equipment Schedule

Ref	Description	Manufacturer	Model	Duty	Location	Electrical
A/C1	A/C Cassette	Panasonic	S 6071PU3E	7.1 kW	Restaurant	Feed from CU1
A/C2	A/C Cassette	Panasonic	S 6071PU3E	7.1 kW	Restaurant	Feed from CU1
A/C3	Wall Mounted A/C	Panasonic	S 5010PK4E	10.0 kW	GF BOH	Feed from CU2
CU1	A/C Condensing Unit	Panasonic	U 140PZ3E5	14.0 kW	External Roof	240v 1ph 20amp
CU2	A/C Condensing Unit	Panasonic	U 100PZ3E5	10.0 kW	External Roof	240v 1ph 20amp
EF1	Kitchen Extract Fan	Systemair	MUB/T 062 630D4	1.796 m³/s	External Roof	Feed from MCP
EF2	GF BOH Extract Fan	Systemair	PRIO 315EC	0.65 m³/s	External Roof	Feed from MCP
EF3	FF BOH Extract Fan	Systemair	PRIO 200C	0.22 m³/s	FF BOH Area	Feed from MCP
EF4	FF Bin Store Extract	Systemair	PRIO 150C	0.08 m³/s	FF BOH Area	Feed from MCP
EF5	FF Bin Store Lobby	Systemair	PRIO 150C	0.04 m³/s	FF BOH Area	Feed from MCP
TEF1	Toilet Extract Fan	Systemair	PRIO 200C	0.22 m³/s	FF BOH Area	Feed from MCP
SF1	Kitchen Supply Fan	Systemair	MUB 062 560D4 MULTIBOX	1.527 m³/s	External Roof	Feed from MCP
SF2	FF BOH Supply Fan	Systemair	PRIO 315C	0.48 m³/s	FF BOH Area	Feed from MCP
ESP1	Electrostatic Precipitator	Purified Air	ESP 4500	160 Pa clean ΔP	Inline extract	Feed from MCP
MCP1	Electric Interlock Panel	S&S Northern	Merlin 1250XE	Monitors EF1+SF1	BOH wall	400v 3ph 32amp
FS1	Fire Suppression	Noble	To Noble spec	—	Above cooking equip.	—



Appendix C, Systemair Fan Data Sheets

The following Systemair product data cards are attached to this report (downloaded from Systemair online catalogue, 20/05/2026). Where the installed model is a D4 motor variant, the EC equivalent from the same frame and impeller size is provided as the nearest available specification sheet.

Project Ref	Systemair Model	Item No.	Variant	Key Technical Data
EF1	MUB CAV/VAV 062 630EC	#230505	400V 3~ 50/60Hz	EC equivalent of MUB/T 062 630D4. Max airflow 3.965 m³/s. Input power 3,150 W. Current 4.82 A. IP55. Insulation class F. 30 mm acoustic insulation. Weight 83.5 kg. Face 820×820 mm. Max air temp 55°C. ErP 2018. UKCA Declaration of Conformity.
SF1	MUB CAV/VAV 062 560EC	#230501	400V 3~ 50/60Hz	EC equivalent of MUB 062 560D4 MULTIBOX. Max airflow 3.017 m³/s. Input power 2,662 W. Current 3.91 A. IP55. Insulation class F. 30 mm acoustic insulation. Weight 83.5 kg. Face 820×820 mm. Max air temp 60°C. ErP 2018. UKCA Declaration of Conformity.
EF4/EF5	Prio ECO MAX 150 EC	#486759	230V 1~ 50/60Hz	Series reference for PRIO 150C. Input power 54 W. Current 0.48 A. 150 mm duct. IPX4. Weight 2.8 kg. Design point: 0.11 m³/s @ 189 Pa. EC motor.
EF3/TEF1	Prio ECO MAX 200 EC	#486760	230V 1~ 50/60Hz	Series reference for PRIO 200C. Input power 121 W. Current 0.95 A. 200 mm duct. IPX4. Weight 4.2 kg. Design point: 0.19 m³/s @ 272 Pa. EC motor.
EF2/SF2	Prio ECO MAX 315 EC	#486762	230V 1~ 50/60Hz	Series reference for PRIO 315EC (EF2) and PRIO 315C (SF2). Input power 330 W. Current 1.38 A. 315 mm duct. IPX4. Weight 15 kg. Design point: 0.55 m³/s @ 294 Pa. EC motor. ErP 2018.

UKCA Declarations of Conformity, commissioning reports and AMCA certificates are available from Systemair on request (see product card document list for document references).



Appendix D, EMAQ+/DEFRA Scoring Matrix Reference

Reproduced from EMAQ+ (2018)/DEFRA 'Control of Odour and Noise from Commercial Kitchen Exhaust Systems'. All scores in Section 8 are drawn directly from this matrix.

Criteria	Descriptor	Score	Details
Dispersion	Very Poor	20	Low level discharge; into courtyard; or restriction on stack
	Poor	15	Below eaves or discharge below 10 m/s
	Moderate	10	1 m above eaves at 10–15 m/s
	Good	5	1 m above ridge at ≥15 m/s
Proximity	Close	10	Closest receptor < 20 m from discharge
	Medium	5	20–100 m from discharge
	Far	1	> 100 m from discharge
Kitchen Size	Large	5	More than 100 covers or large restaurant
	Medium	3	30–100 covers or medium restaurant
	Small	1	Less than 30 covers or small restaurant
Cooking Type	Very High	10	Pub (high fried food), fried chicken, burgers, fish & chips
	High	7	Vietnamese, Thai, Indian, Japanese, Chinese, Steakhouse
	Medium	4	Cantonese, Italian, French, Pizza (gas fired)
	Low	1	Most pubs (no fried food, reheating); tea rooms



Appendix E, Supporting Documents

Document	Supplier	Status
Noble Fire Suppression, design documentation, specification, commissioning certificate and maintenance schedule	Noble Fire Suppression	To be provided by Noble upon installation and commissioning
Fan data plates, EF1 (MUB/T 062 630D4) and SF1 (MUB 062 560D4 MULTIBOX)	Systemair AB	To be provided at practical completion
Purified Air ESP 4500, technical data sheet and product literature	Purified Air Ltd	Attached Manufacturer's product data sheet
S&S Northern Merlin 1250XE, Installation, Operation & Maintenance Manual (Rev 01, 08 24)	S&S Northern Limited	Attached herewith
DW/172 Specific Extract Flow Rate Calculator, Shake Shack Reading (SSR1), dated 18/05/2026	Restaurant Projects Ltd	Attached herewith, confirms Type 08, factor 1.20, extract 1.796 m ³ /s, supply 1.527 m ³ /s
TR/19 Ductwork Cleaning Certificate, initial pre occupation clean	BESA registered contractor	To be provided prior to opening
Ventilation Commissioning and Airflow Measurement Certificate	Ventilation engineer	To be provided at practical completion, to verify EF1: 1.796 m ³ /s and SF1: 1.527 m ³ /s, and cowl exit velocity ≥15 m/s

SPECIFIC KITCHEN EXTRACT FLOW RATE CALCULATOR

JOB REF:
DRAWING REF:
DATE:
DESIGNER:
CLIENT:
CANOPY / CEILING REF
RECOMMENDED HOOD SIZE -

SHAKE SHACK - READING.
TBC
18/05/2026
Restaurant Projects Ltd
DIVERSE DINING
SSR1
Recommend - 1300mm 500mm 500/500profil

COOKING EQUIPMENT

Deep Fat Fryer, Electric *For multiple appliances see note below
Chrome Griddle, Electric
Chrome Griddle, Electric
Chrome Griddle, Electric
Deep Fat Fryer (4 No. & above), Electric
Deep Fat Fryer (4 No. & above), Electric

Electric
Electric
Electric
Electric
Electric
Electric

POWER

PLAN SIZE		AREA	TCC	FLOW RATE
X(m)	Y(m)	(m ²)	(m ³ /s/m ²)	(m ³ /s)
0.43	0.84	0.36	0.45	0.16
0.91	0.80	0.73	0.40	0.29
0.61	0.80	0.49	0.40	0.20
0.61	0.80	0.49	0.40	0.20
0.86	0.84	0.72	0.45	0.33
0.86	0.84	0.72	0.45	0.33

X FACTOR FOR CANOPY / CEILING TYPE:

THEORETICAL FLOW RATE (m ³ /s)	1.50 m ³ /s
08. Overhead Wall Type (open one end)	1.20
SPECIFIC EXTRACT FLOW RATE	1.796 m ³ /s
MAKE-UP-AIR TO EXTRACT RATE RATIO	85%
MAKE-UP-AIR FLOW RATE (m ³ /s)	1.53 m ³ /s



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(based on the THERMAL CONVECTION METHOD as recommended in **BESA Specification DW/172: 2018**)

Figures and system details are taken from the uploaded ventilation compliance report and your original drawing-note text



LEGISLATION AND COMPLIANCY	NOTES:	SERVICES SYMBOLS		REVISIONS		 Restaurant Projects Ltd 404 Charlotte House, Queens Dock Business Centre, Liverpool, L1 0BG www.restaurantprojects.co.uk Tel: 0151 601 1818 email: info@restaurantprojects.co.uk			
- All design and construction should comply with current UK law and legislation. The building act 1984. - All gas work and installation should be carried out in accordance with BS6173. - Mechanical systems should comply with DW172 specification. - All electrical work should be carried out in accordance to current IET requirements. - All diligence is to be checked and design to fall in line with current health and safety laws such as the food safety act of 2004			Switched Fused Spur	Rev	Description	Date	Client: SHAKE SHACK - READING.		
			Plug Sockets (Single or Double)				Project:		
			Commando Socket (1 or 3 Phase)				Scale: 1:50 Date: Drawing No: Status: Revision:		
			Electrical Isolator				Drawn: RP A		
			Data Supply				Approved: _____		
			Hot Water Supply						
			Cold Water Supply						
			Drain Connection						
			Gas Connection						

DEFRA / EMAQ+
Assumptions based on this design and notes
1.01 – Canopy
The stainless-steel kitchen canopy has been selected and designed in compliance with BESA DW172:2013 to suit the cooking equipment line-up. It provides suitable capture, lighting and integrated grease filtration for the cooking process. Grease baffle filters are removable and washable, with provision for grease collection trays. The canopy is connected via spigots to a 550 mm x 550 mm kitchen extract duct system operating at a design extract airflow of 1.721 m³/s. This gives an average duct velocity of approximately 5.69 m/s, which is within the DW172 recommended maximum velocity for main kitchen extract ductwork. In accordance with DW172 guidance, the canopy shall be installed at a height of approximately 2,000 mm to 2,100 mm above finished floor level to ensure safe clearance from appliances while allowing effective fume capture. This height range maintains suitable capture performance while permitting unobstructed use of the cooking equipment and compliance with normal kitchen safety requirements.

2 – Extract Ductwork
The extract ductwork comprises approximately 12 metres of 550 mm x 550 mm rectangular ductwork, with 3 no. 90° segmented bends. The calculated total extract system resistance is approximately 281.9 Pa at 1.721 m³/s, including ductwork, bends, ESP unit, silencer, terminal and associated fittings.

All ductwork is to be fabricated and installed in accordance with BESA DW/144, with airtight joints and suitable supports. The ductwork shall be suitable for kitchen grease extract use.

Access panels are to be installed at changes in direction and at suitable intervals to allow inspection and cleaning in accordance with BESA TR/19.

3 – Spigot Connections to the Canopy
Spigots are configured to connect the canopy extract plenums into the 550 mm x 550 mm main extract ductwork and maintain even airflow distribution across the canopy system.

Transitions are to be formed to minimise turbulence, grease accumulation and unnecessary pressure loss. Dampers may be included where balancing is required between multiple canopy sections.

This arrangement ensures a smooth transition from the canopy into the main extract ductwork and assists overall system efficiency.

4 – Supply Air Fan – MUB
The mechanical supply air fan is selected to deliver approximately 85% of the extract volume, in line with the DW172 design approach for commercial kitchen ventilation. Based on the extract airflow of 1.721 m³/s, the design supply airflow is 1.463 m³/s. The supply ductwork is 500 mm x 450 mm rectangular ductwork. At 1.463 m³/s, this gives an internal air velocity of approximately 6.50 m/s.

The total calculated supply system resistance is approximately 230.8 Pa, including ductwork, bends, reducer, clean F7 filter cassette, attenuator, weather louvre, air valves, diffusers and grilles.

The selected supply fan is a Systemair MUB-CAV/VAV 062 560EC, or equivalent approved, selected to deliver 1.463 m³/s at approximately 230.8 Pa. The fan is installed with anti-vibration mounts and acoustic treatment to mitigate mechanical noise, with ECInverter speed control for commissioning and adjustment.

5 – Attenuator for Supply
One 600 mm long attenuator is installed on the supply ductwork to reduce fan noise into the kitchen area. The attenuator is included within the supply system pressure calculation and shall be installed in accordance with manufacturer requirements. This setup assists in reducing fan noise within the occupied kitchen zone and contributes to staff comfort and workplace noise control.

6a – Fire Damper – Supply
A fire damper is to be provided where the supply ductwork penetrates a fire-rated compartment boundary. The fire damper shall be compliant with BS 9999 and tested to BS EN 1366. Regular inspection access and actuator testing access shall be provided to ensure compliance with fire safety inspection requirements. No fire damper is to be installed in the kitchen grease extract ductwork, in accordance with DW172 guidance.

6b – Filter Media for Supply Air
Pre-filtration is provided upstream of the supply fan to prevent particulate ingress and protect the fan and ductwork components. The supply system includes an F7 filter cassette. The clean filter resistance has been included within the calculated supply system resistance. Filtration helps maintain a cleaner supply air path, protects the fan and ductwork, and supports a hygienic kitchen environment. Filters are to be inspected and replaced as part of the planned maintenance regime.

7 – Weather Louvre – RAL to Match Existing / Anthracite
A weather louvre is included on the fresh air intake with an allowance of approximately 33 Pa resistance within the supply system calculation. The louvre shall be fabricated and finished to match the external building appearance. Finish can be RAL 7016 Anthracite Grey or alternative RAL colour to be confirmed. The louvre should include appropriate rain defence and bird mesh, and be sized to maintain acceptable face velocity, reduce pressure loss and prevent water ingress.

8 – Extract Fan – MUB
The extract fan is selected to handle the total calculated extract system resistance of approximately 281.9 Pa at a design airflow of 1.721 m³/s. The selected extract fan is a Systemair MUB-CAV/VAV 062 630EC, or equivalent approved, selected to deliver 1.721 m³/s at approximately 281.9 Pa.

The fan shall be externally mounted within the courtyard roof plant area and installed with anti-vibration mounts, flexible connections and acoustic treatment to reduce vibration and breakout noise.

9 – Extraction Fan Attenuator
An extract splitter silencer / attenuator is included downstream of the extract fan and has been allowed for within the extract system pressure calculation. The attenuator reduces fan discharge noise and assists with acoustic control. Where sensitive boundaries exist, additional attenuation may be considered subject to acoustic review or Local Authority requirements.

10 – Extract Duct – Gable / Courtyard Mounted with Anti-Vibration Fixings
The extract duct is externally routed up the courtyard wall and secured with suitable support brackets and anti-vibration fixings to reduce transmission of mechanical vibration into the building structure.

The external vertical ductwork is included within the approximate 12 metre extract duct run and contributes to the total calculated extract system resistance.

This arrangement allows clear access for inspection and maintenance while avoiding unnecessary internal routing. External ductwork is to be weatherproofed and installed where required.

11 – Extraction Weather Cowl
A weatherproof cowl or suitable terminal discharge arrangement is installed at the final extract discharge point to protect against rain ingress and wind-driven backflow.

The terminal component has been included within the calculated extract system resistance. The final discharge arrangement may be upgraded to a high-velocity discharge cowl if required by environmental, planning or commissioning requirements.

The final outlet should be arranged to support effective discharge and avoid downwash or re-entrainment.

12 – Minimum of 1 m Above Ridge / Eaves – Extraction
The final kitchen extract discharge point is to terminate above roof ridge level / minimum 1 metre above the relevant roofline, in accordance with the EMAQ+ / DEFRA best-practice approach for good dispersion.

The design assumes high-level discharge with an approximate final terminal discharge velocity of 15 m/s at the outlet/cowl, subject to final cowl selection and commissioning.

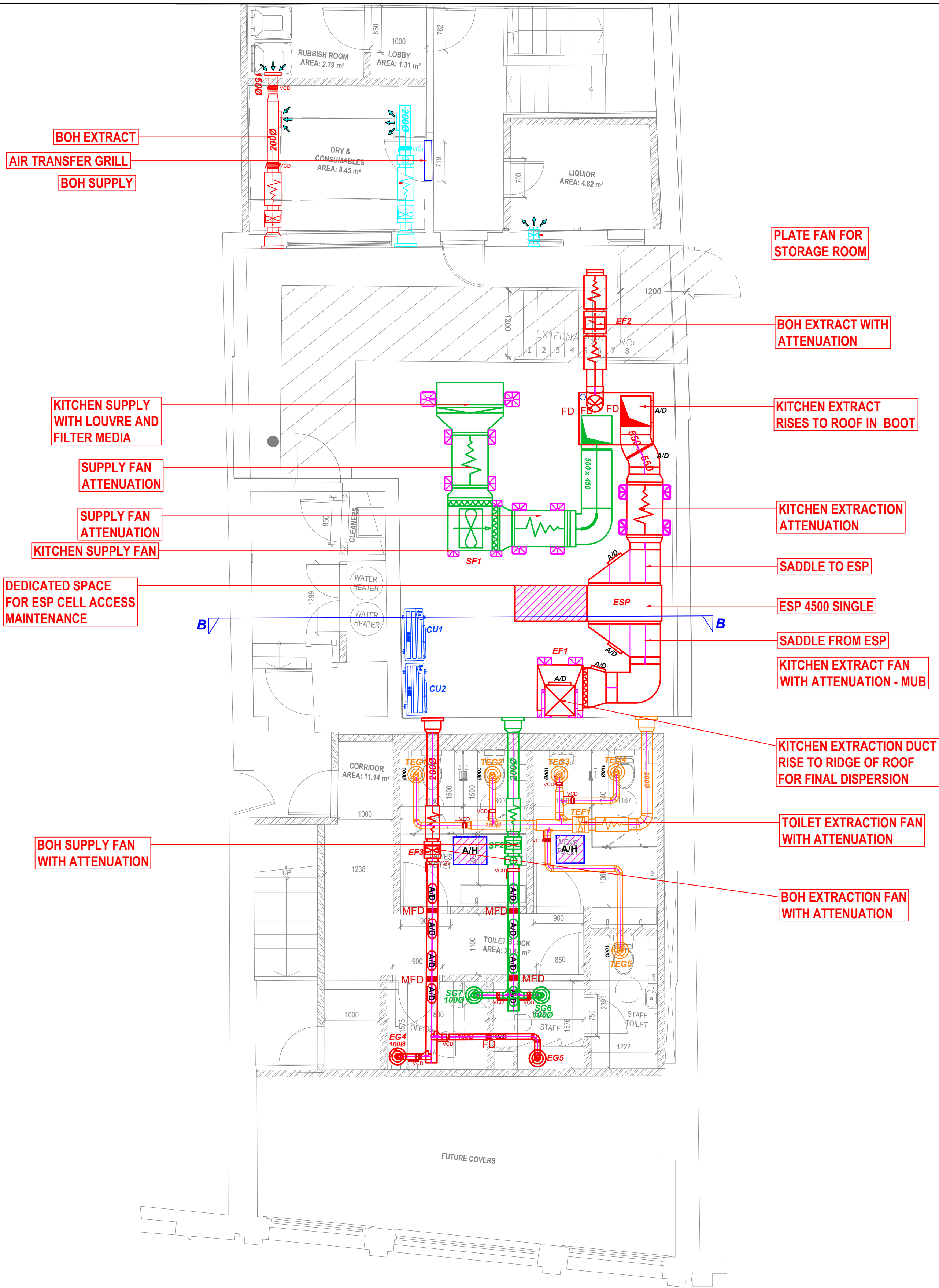
This arrangement assists dispersion of cooking effluent, reduces the risk of downdraught and limits the potential for odour impact on neighbouring properties or rooftop plant.

EMAQ+ Odour and Noise Risk Assessment
Premises: Medium commercial kitchen
Cuisine / Cooking Type: Fast food – fries, burgers, fried chicken and griddle cooking
Covers: Approximately 50
Cooking Equipment: All electric – no gas appliances
Filtration / Treatment: Grease baffle filters and Purified Air ESP 4500 for grease, smoke and fine particulate removal
Extract Design Airflow: 1.721 m³/s
Extract Duct: 550 mm x 550 mm rectangular duct
Extract Resistance: 281.9 Pa at 1.721 m³/s
Supply Airflow: 1.463 m³/s
Supply Duct: 500 mm x 450 mm rectangular duct
Supply Resistance: 230.8 Pa at 1.463 m³/s
Discharge: Above roof ridge / high-level discharge with weather cowl or suitable terminal arrangement
Finish: External louvres / ductwork RAL 7016 Anthracite Grey or RAL to be confirmed
d chicken 10
Total Inherent Risk Score 19

Risk Category: Low to Medium inherent odour risk

The ESP is treated as mitigation and is not deducted from the EMAQ+ score. The residual odour risk is considered low and acceptable, subject to correct installation, commissioning and ongoing maintenance in accordance with DW172, TR/19 and manufacturer requirements.

Figures and system details are taken from the uploaded ventilation compliance report and your original drawing-note text



DEFRA / EMAQ+
Assumptions based on this design and notes
1.01 – Canopy
The stainless-steel kitchen canopy has been selected and designed in compliance with BESA DW/172:2018 to suit the cooking equipment line-up. It provides suitable capture, lighting and integrated grease filtration for the cooking process. Grease baffle filters are removable and washable, with provision for grease collection trays. The canopy is connected via spigots to a 550 mm × 550 mm kitchen extract duct system operating at a design extract airflow of 1.721 m³/s. This gives an average duct velocity of approximately 6.69 m/s, which is within the DW/172 recommended maximum velocity for main kitchen extract ductwork. In accordance with DW/172 guidance, the canopy shall be installed at a height of approximately 2,000 mm to 2,100 mm above finished floor level to ensure safe clearance from appliances while allowing effective fume capture. This height range maintains suitable capture performance while permitting unobstructed use of the cooking equipment and compliance with normal kitchen safety requirements.

2 – Extract Ductwork
The extract ductwork comprises approximately 12 metres of 550 mm × 550 mm rectangular ductwork, with 5 no. 90° segmented bends. The calculated total extract system resistance is approximately 281.9 Pa at 1.721 m³/s, including ductwork, bends, ESP unit, silencer, terminal and associated fittings.

All ductwork is to be fabricated and installed in accordance with BESA DW/144, with airtight joints and suitable supports. The ductwork shall be suitable for kitchen grease extract use.

Access panels are to be installed at changes in direction and at suitable intervals to allow inspection and cleaning in accordance with BESA TR/19.

3 – Spigot Connections to the Canopy
Spigots are configured to connect the canopy extract plenums into the 550 mm × 550 mm main extract ductwork and maintain even airflow distribution across the canopy system.

Transitions are to be formed to minimise turbulence, grease accumulation and unnecessary pressure loss. Dampers may be included where balancing is required between multiple canopy sections.

This arrangement ensures a smooth transition from the canopy into the main extract ductwork and assists overall system efficiency.

4 – Supply Air Fan – MUB
The mechanical supply air fan is selected to deliver approximately 85% of the extract volume, in line with the DW/172 design approach for commercial kitchen ventilation. Based on the extract airflow of 1.721 m³/s, the design supply airflow is 1.463 m³/s. The supply ductwork is 500 mm × 450 mm rectangular ductwork. At 1.463 m³/s, this gives an internal air velocity of approximately 6.50 m/s.

The total calculated supply system resistance is approximately 230.8 Pa, including ductwork, bends, reducer, clean F7 filter cassette, attenuator, weather louvre, air valves, diffusers and grilles.

The selected supply fan is a Systemair MUB-CAV/AV 062 560EC, or equivalent approved, selected to deliver 1.463 m³/s at approximately 230.8 Pa. The fan is installed with anti-vibration mounts and acoustic treatment to mitigate mechanical noise, with EC/inverter speed control for commissioning and adjustment.

5 – Attenuator for Supply
One 600 mm long attenuator is installed on the supply ductwork to reduce fan noise into the kitchen area. The attenuator is included within the supply system pressure calculation and shall be installed in accordance with manufacturer requirements. This setup assists in reducing fan noise within the occupied kitchen zone and contributes to staff comfort and workplace noise control.

6a – Fire Damper — Supply
A fire damper is to be provided where the supply ductwork penetrates a fire-rated compartment boundary. The fire damper shall be compliant with BS 9999 and tested to BS EN 1366. Regular inspection access and actuator testing access shall be provided to ensure compliance with fire safety inspection requirements. No fire damper is to be installed in the kitchen grease extract ductwork, in accordance with DW/172 guidance.

6b – Filter Media for Supply Air
Pre-filtration is provided upstream of the supply fan to prevent particulate ingress and protect the fan and ductwork components. The supply system includes an F7 filter cassette. The clean filter resistance has been included within the calculated supply system resistance. Filtration helps maintain a cleaner supply air path, protects the fan and ductwork, and supports a hygienic kitchen environment. Filters are to be inspected and replaced as part of the planned maintenance regime.

7 – Weather Louvre – RAL to Match Existing / Anthracite
A weather louvre is included on the fresh air intake with an allowance of approximately 33 Pa resistance within the supply system calculation. The louvre shall be fabricated and finished to match the external building appearance. Finish can be RAL 7016 Anthracite Grey or alternative RAL colour to be confirmed. The louvre should include appropriate rain defence and bird mesh, and be sized to maintain acceptable face velocity, reduce pressure loss and prevent water ingress.

8 – Extract Fan – MUB
The extract fan is selected to handle the total calculated extract system resistance of approximately 281.9 Pa at a design airflow of 1.721 m³/s. The selected extract fan is a Systemair MUB-CAV/AV 062 630EC, or equivalent approved, selected to deliver 1.721 m³/s at approximately 281.9 Pa.

The fan shall be externally mounted within the courtyard roof plant area and installed with anti-vibration mounts, flexible connections and acoustic treatment to reduce vibration and breakout noise.

9 – Extraction Fan Attenuator
An extract splitter silencer / attenuator is included downstream of the extract fan and has been allowed for within the extract system pressure calculation. The attenuator reduces fan discharge noise and assists with acoustic control. Where sensitive boundaries exist, additional attenuation may be considered subject to acoustic review or Local Authority requirements.

10 – Extract Duct — Gable / Courtyard Mounted with Anti-Vibration Fixings
The extract duct is externally routed up the courtyard wall and secured with suitable support brackets and anti-vibration fixings to reduce transmission of mechanical vibration into the building structure.

The external vertical ductwork is included within the approximate 12 metre extract duct run and contributes to the total calculated extract system resistance.

This arrangement allows clear access for inspection and maintenance while avoiding unnecessary internal routing. External ductwork is to be weatherproofed and insulated where required.

11 – Extraction Weather Cowl
A weatherproof cowl or suitable terminal discharge arrangement is installed at the final extract discharge point to protect against rain ingress and wind-driven backflow.

The terminal component has been included within the calculated extract system resistance. The final discharge arrangement may be upgraded to a high-velocity discharge cowl if required by environmental, planning or commissioning requirements.

The final outlet should be arranged to support effective discharge and avoid downwash or re-entrainment.

12 – Minimum of 1 m Above Ridge / Eaves – Extraction
The final kitchen extract discharge point is to terminate above roof ridge level / minimum 1 metre above the relevant roofline, in accordance with the EMAQ+ / DEFRA best-practice approach for good dispersion.

The design assumes high-level discharge with an approximate final terminal discharge velocity of 15 m/s at the outlet/cowl, subject to final cowl selection and commissioning.

This arrangement assists dispersion of cooking effluent, reduces the risk of downdraught and limits the potential for odour impact on neighbouring properties or rooftop plant.

EMAQ+ Odour and Noise Risk Assessment
Premises: Medium commercial kitchen
Cuisine / Cooking Type: Fast food — fries, burgers, fried chicken and griddle cooking
Covers: Approximately 50
Cooking Equipment: All electric — no gas appliances
Filtration / Treatment: Grease baffle filters and Purified Air ESP 4500 for grease, smoke and fine particulate removal
Extract Design Airflow: 1.721 m³/s
Extract Duct: 550 mm × 550 mm rectangular duct
Extract Resistance: 281.9 Pa at 1.721 m³/s
Supply Airflow: 1.463 m³/s
Supply Duct: 500 mm × 450 mm rectangular duct
Supply Resistance: 230.8 Pa at 1.463 m³/s
Discharge: Above roof ridge / high-level discharge with weather cowl or suitable terminal arrangement
Finish: External louvres / ductwork RAL 7016 Anthracite Grey or RAL to be confirmed
d chicken 10
Total Inherent Risk Score 19

Risk Category: Low to Medium inherent odour risk

The ESP is treated as mitigation and is not deducted from the EMAQ+ score. The residual odour risk is considered low and acceptable, subject to correct installation, commissioning and ongoing maintenance in accordance with DW/172, TR/19 and manufacturer requirements.

Figures and system details are taken from the uploaded ventilation compliance report and your original drawing-note text.

KITCHEN EXTRACTION
TERMINATION POINT, COWEL

BOH SUPPLY
WEATHER LOUVRE

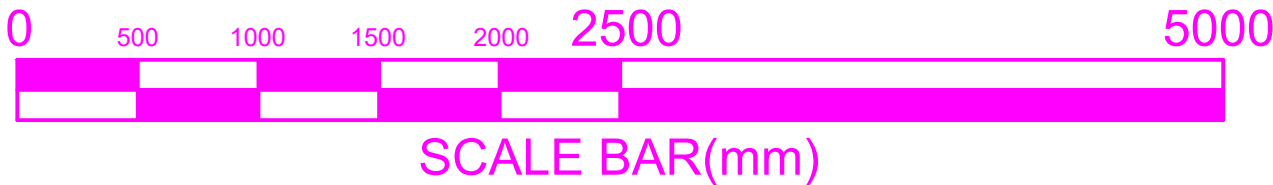
TOILET EXTRACTION
WEATHER LOUVRE

KITCHEN EXTRACTION
ACOUSTIC MUB FAN

BOH EXTRACT
WEATHER LOUVRE

A/C COMPRESSORS FOR
RESTAURANT & BOH A/C

ELEVATION BB - SCALE 1:50



LEGISLATION AND COMPLIANCY	NOTES:	SERVICES SYMBOLS		REVISIONS		 Restaurant Projects Ltd 404 Charlotte House, Queens Dock Business Centre, Liverpool, L1 0BG www.restaurantprojects.co.uk Tel: 0151 601 1818 email: info@restaurantprojects.co.uk					
• All design and construction should comply with current UK law and legislation. The building act 1984. • All gas work and installation should be carried out in accordance with BS6173. • Mechanical systems should comply with DW172 specification. • All electrical work should be carried out in accordance to current IET requirements. • All diligence is to be checked and design to fall in line with current health and safety laws such as the food safety act of 2004			Switched Fused Spur	Rev	Description	Date					
			Plug Sockets (Single or Double)								
			Commando Socket (1 or 3 Phase)								
			Electrical Isolator								
			Data Supply								
			Hot Water Supply								
			Cold Water Supply								
			Drain Connection								
			Gas Connection								
						Client: SHAKE SHACK - READING					
						Project:					
						Scale: 1:50		Date:	Drawing No:	Status:	Revision
						Drawn: RP		RP-SSR-912			
						Approved: _____					

KITCHEN EXTRACT

ESP RANGE

1500 | 3000 | 4500 | 6000

purifiedair®

COMMERCIAL KITCHEN FILTRATION EXPERTS

Purified Air Ltd. has been manufacturing and servicing market-leading technology to filter and control oil, smoke, fat and odour produced by commercial kitchens and residential installation and service since 1984.

CONTENTS

02

TECHNICAL OVERVIEW

Key Features	02
ESP Technology	03
How It Works	04
Benefits of ESP	05
Technical Specification	06

08

ABOUT US

An Overview
Our Coverage

09

GET IN TOUCH

Contact Details

KITCHEN EXTRACT

ESP RANGE

1500 | 3000 | 4500 | 6000



Our ESP's have been specifically designed for kitchen extract systems; they have integral sumps to collect the oil, grease and smoke particles filtered out of the exhaust.

This not only simplifies servicing but eradicates potentially dangerous spillage from the bottom of the units and greatly cuts down on build-ups of grease within the ducting.

The ionisation voltage has been designed to run at a negative potential which enhances the ionisation of particles and also produces more ozone which is helpful in reducing cooking odours.

KEY FEATURES

- Eliminates up to 98% of oil, grease and smoke particles
- Filters particles down to sub-micron levels
- Produces Ozone to help reduce malodours
- Designed with an integral sump
- Modular in design
- Specifically designed for commercial kitchen application
- Energy efficient: - uses no more than 50W
- Greatly reduces grease build-up within the duct run
- IP65 rated for outside location

FILTERS REMOVE



Smoke



Steam

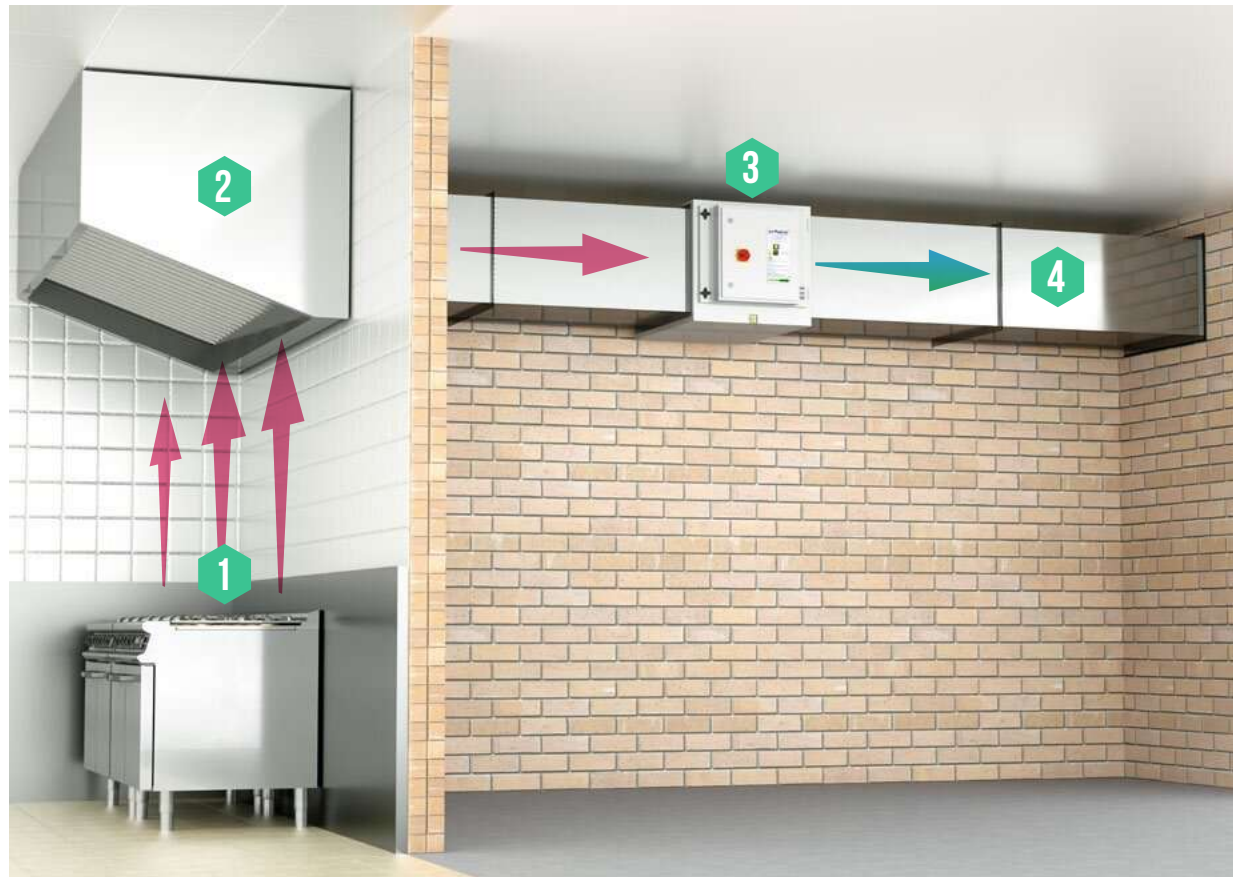


Oil



Grease

HOW IT WORKS



Our ESP units fit in-line with the kitchen ducting and can be configured modularly to cope with all extract volume requirements.

- 01** Cooking particulates and odours
- 02** Canopy Grease Filter

- 03** ESP - Particulate Control Unit
- 04** Airflow

OUR SERVICES



Design

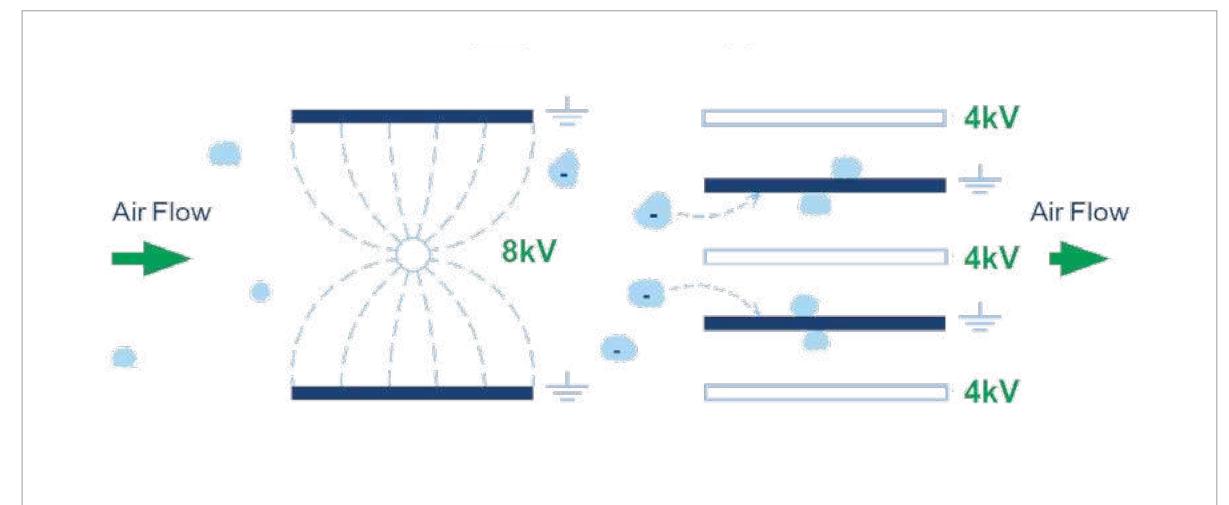


Manufacture



Maintain

THE ELECTROSTATIC PROCESS



The above diagram shows, in a basic visual, how an electrostatic precipitator works. As air passes into the combined ioniser / collector cell, the particulates in the air stream are polarised. As they continue through the ioniser and

between the collector cell plates, the polarised particulates are repelled away from the positively charged plates and attracted to the earthed plates where they stick and so are filtered out of the air flow.

THE BENEFITS OF ELECTROSTATIC TECHNOLOGY



Eliminates up to 99% of particles



Filters particles down to sub-micron levels



Modular design



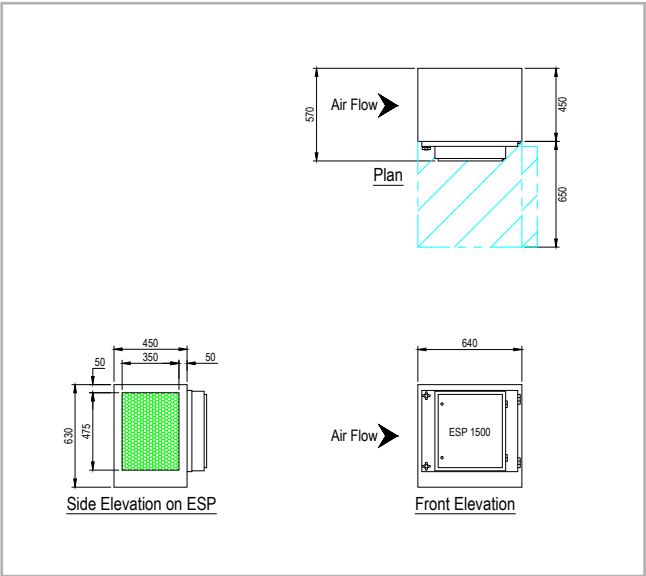
Energy efficient

TECHNICAL SPECIFICATION

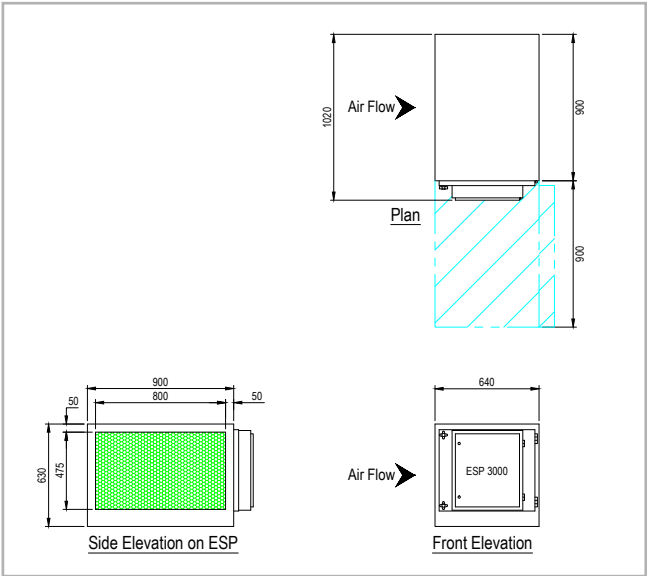
	ESP 1500	ESP 3000	ESP 4500	ESP 6000
Supply	220-240 _{V 50HZ}	220-240 _{V 50HZ}	220-240 _{V 50HZ}	220-240 _{V 50HZ}
Power Consumption	20 _W	30 _W	40 _W	50 _W
Maximum Airflow	0.7 _{M³/SEC (UP TO)}	1.4 _{M³/SEC (UP TO)}	2.1 _{M³/SEC (UP TO)}	2.8 _{M³/SEC (UP TO)}
Dimensions (mm)	W 450 H 630 D 640	W 900 H 630 D 640	W 1350 H 630 D 640	W 1800 H 630 D 640
Weight	55 _{KG}	85 _{KG}	118 _{KG}	153 _{KG}

DRAWINGS

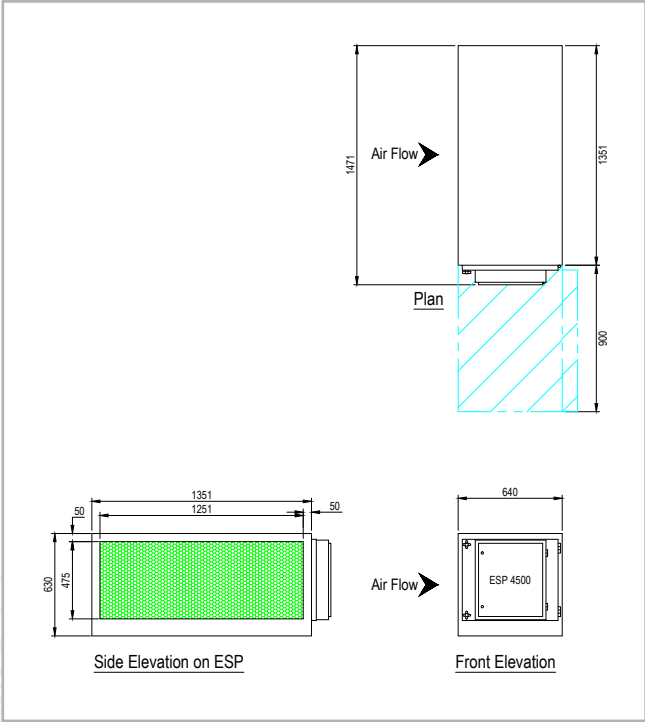
ESP 1500



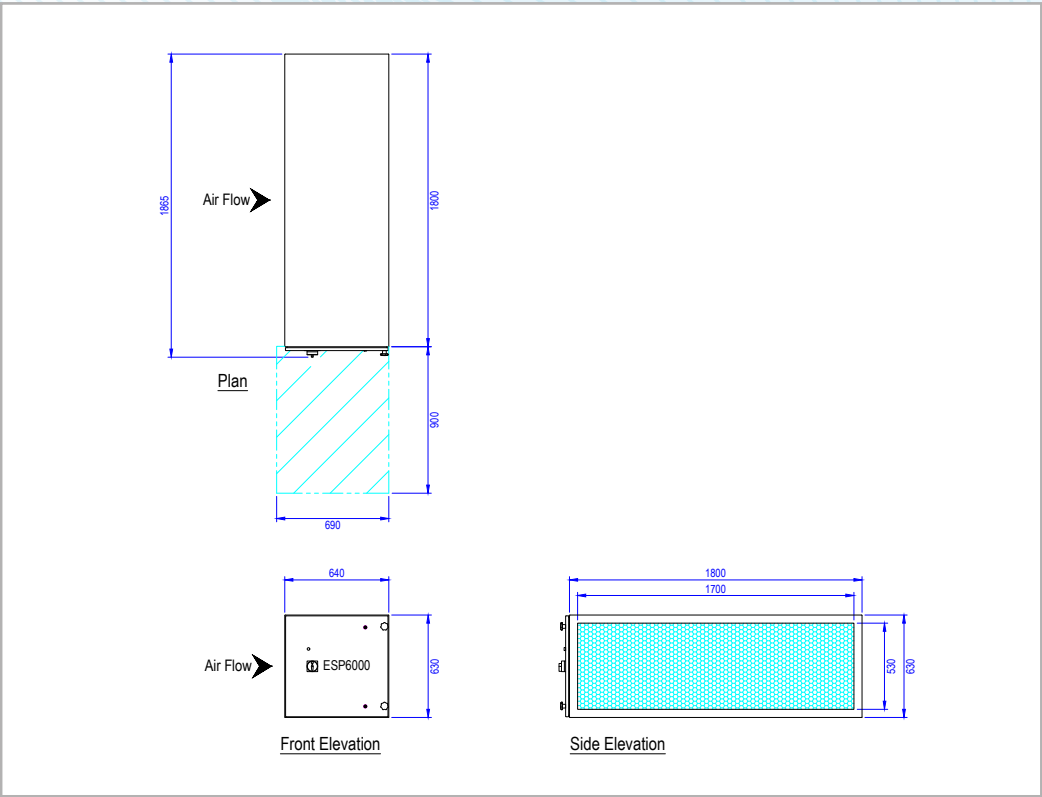
ESP 3000



ESP 4500



ESP 6000





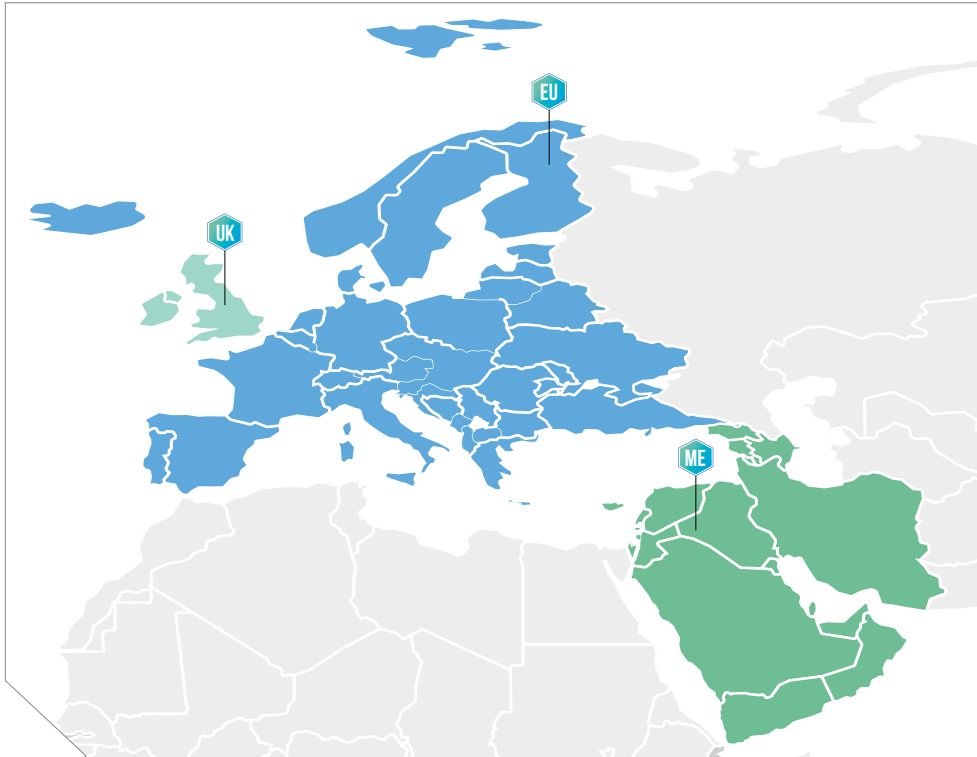
ABOUT US

Purified Air Ltd. has been striving to find the best and most cost-effective way to filter and control oil, smoke, fat and odour produced by commercial kitchens and residential installation and service since 1984.

Purified Air manufactures filtration and odour control products for stock and bespoke systems, supplying systems to many sectoral brands. The design of each solution is based on the type of food cooked, the cooking process used, and the extracted air volume providing tried and tested purified kitchen exhaust air for Fast Food, Casual Dining and Luxury Concept Restaurant (Fine Dining) markets. By working with these variables, we can design and supply some of the world's best commercial kitchen filtration and odour control systems.

WORLDWIDE COVERAGE

- United Kingdom
- Middle East
- Europe



GET IN TOUCH

0800 018 4000
enq@purifiedair.com
Purified Air Limited, Lyon House
Lyon Road, Romford,
Essex RM1 2BG

purifiedair.com



purifiedair®

purifiedair.com



MUB-CAV/VAV 062 630EC

Item number: #230505

Operating mode: 400V 3~ 50/60Hz - 90° air flow

Powerful centrifugal fans with integrated CAV/VAV sensor-control module

- **Integrated** sensor-control module
- **Easy adjustment** of the operation mode if needed
- **All sizes** pre-wired, pre-adjusted and factory tested
- **Acoustic and thermal insulation 30 mm**
- **Flexible airflow direction** due to removable panels
- **Indoor and outdoor** installation
- **Modular system** of accessories
- Available with **EC motors** for **50** and **60Hz**
- **C5 corrosion resistance**

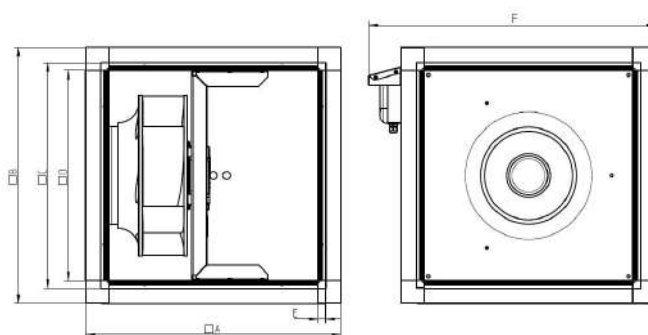
[Find more details in our online catalogue](#)

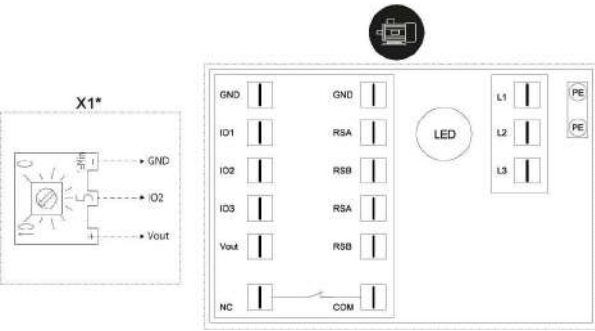
Technical parameters

Nominal data	
Voltage (nominal)	400 V
Frequency	50;60 Hz
Phases	3~
Input power	3150 W
Input power kW	3.15 kW
Input current	4.82 A
Impeller speed	1650 rpm
Air flow	max. 3.965 m³/s
Temperature of transported air	max. 55 °C
Max temperature of transported air, when speed controlled	55 °C
Protection/Classification	
Enclosure class, motor	IP55
Insulation class	F
Data according to ErP	
ErP ready	ErP 2018
Dimensions and weights	
Weight	83.5 kg
Others	
Motor type	EC

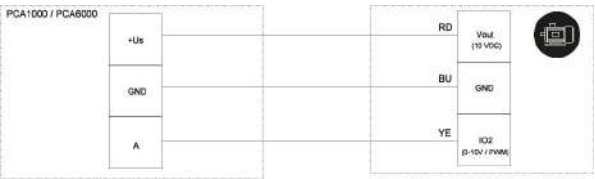
Dimension

MUB-CAV/VAV 062	□A	□B	□C	□D	E	F
560/630	820	820	720	678	21	906



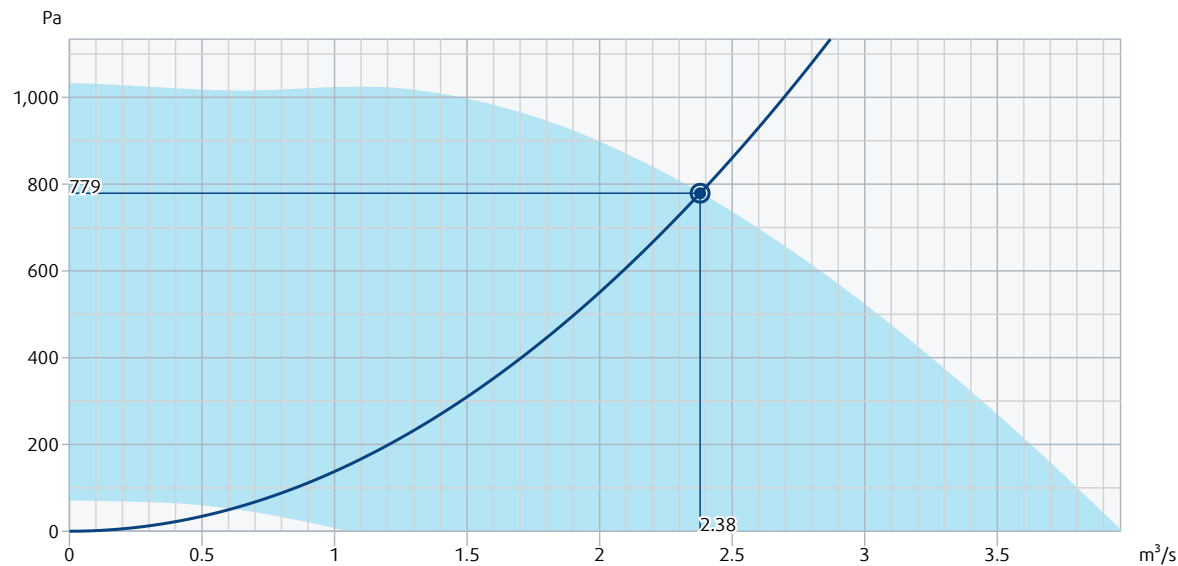


.	Function / assignment
L1, L2, L3	Power, supply, see name plate
PE	Protective earth
RSA	RS485 interface for MODBUS, RSA
RSB	RS485 interface for MODBUS, RSB
GND	Reference ground for control interface
IO1	Function: Disable-Input Digital Input - Inactive: Pin open or applied voltage < 1,5 VDC -> fan runs according to the set 0-10 V-setpoint (IO2) - Active: applied voltage 3,5-50 VDC -> fan stops - Reset- Function: Error - reset when the status changes from "inactive" to "active"
IO2	Function: Setpoint Analog input 0-10 V / PWM, Ri = 100kΩ
IO3	Function: Actual speed Analog output 0-10 V, max.5 mA Output is a speed proportional voltage. - 10 V corresponds max. rpm - 5 V corresponds max. rpm / 2 (n = 1.02 * nMax)
Vout	Function: Voltage output 10 VDC, short-circuit-proof (Pmax = 800 mW)
COM	Function: Status relay Status relay, floating status contact, contact rating 250 VAC / 2 A; min. 10mA
NC	Function: Status relay Status relay, floating status contact, open in the event of an error and in the de-energized state
LED	Function: Status reports - green = operational readiness - orange = warning - red = error
X1	Terminal box with connected potentiometer * Included in the scope of delivery for fans with EC motor without external control.



.	.
RD	Red
BU	Blue
YE	Yellow

Performance curve



Hydraulic data											
Required air flow		2.38 m³/s									
Required static pressure		779 Pa									
Working air flow		2.38 m³/s									
Working static pressure		779 Pa									
Air density		1.204 kg/m³									
Power		3,154.4 W									
Fan control - RPM		1,652 rpm									
Current		4.82 A									
SFP		1.326 kW/m³/s									
Control voltage		10.0 V									
Supply voltage		400 V									
Sound power level			63	125	250	500	1k	2k	4k	8k	Total
Inlet		dB(A)	52	71	72	76	78	75	73	70	83
Outlet		dB(A)	54	73	74	77	79	77	74	71	84
Surrounding		dB(A)	32	55	45	44	48	47	40	35	57
Sound pressure level at 3m (20m² Sabine)		dB(A)	-	-	-	-	-	-	-	-	50
Sound pressure level at 3m free field		dB(A)	-	-	-	-	-	-	-	-	36

AHU Accessories

CCM inlet MUB062 d560 (311782)
CCM outlet MUB062 d560 (311684)
CCMI outlet 062 d560 KIT 30mm (239095)
EC-Basic-CO2 and temperature (24808)
EC-Basic-T temperature (24805)
FGV 062/716-716 flex. conn. (4198)
HR1 Room Humidistat (215150)
KKC-DX-R 062 cooling section (277266)
KKC-W-R 062 cooling section (277274)
KKH-HW 062 heater-section (93340)
MicroREX D21 Plus Time Switch (17822)
REV-5POL/05-7,5kW B/G (281745)
RT 0-30 Room Thermostat (5151)
SDM Service Door MUB 062 30mm (273935)
WSD 062 (860x860x70) complete (31482)

CCM inlet MUB062 d630 (311783)
CCM outlet MUB062 d630 (311681)
CCMI outlet 062 d630 KIT 30mm (239096)
EC-Basic-H humidity (24807)
EC-Basic-U universal 0-10V (24806)
GRU 062-820/100 (276662)
KKC-DX-L 062 cooling section (277262)
KKC-W-L 062 cooling section (277270)
KKF 30 062-filter-section (93312)
KKS 062 silencer-section (276852)
Presence detector/IR24-P (6995)
REV-5POL/05-7,5kW R/Y (35757)
SD-MUB Vibration pad set (37324)
UGS 062/630 adapter flex. (4358)
WSG 062 MUB complete (31486)

Documents

Commissioning Report
EBM MODBUS Version 6.3 EN
EPD_467754_Systemair_MUB_CAV_VAV_EC_json
EPD_467754_Systemair_MUB_CAV_VAV_EC_pdf
Installation, Operation and Maintenance instruction_003
L-BAL-E263-GB.PDF
MUB_EC_AMCA_CERTIFICATE.PDF
QUICK GUIDE_MUB CAVVAV CHANGE_[002]_314498_EN-DE.PDF
UKCA DECLARATION OF CONFORMITY_MUB_EN_002.PDF



MUB-CAV/VAV 062 560EC

Item number: #230501

Operating mode: 400V 3~ 50/60Hz - 90° air flow

Powerful centrifugal fans with integrated CAV/VAV sensor-control module

- **Integrated** sensor-control module
- **Easy adjustment** of the operation mode if needed
- **All sizes** pre-wired, pre-adjusted and factory tested
- **Acoustic and thermal insulation 30 mm**
- **Flexible airflow direction** due to removable panels
- **Indoor and outdoor** installation
- **Modular system** of accessories
- Available with **EC motors** for **50** and **60Hz**
- **C5 corrosion resistance**

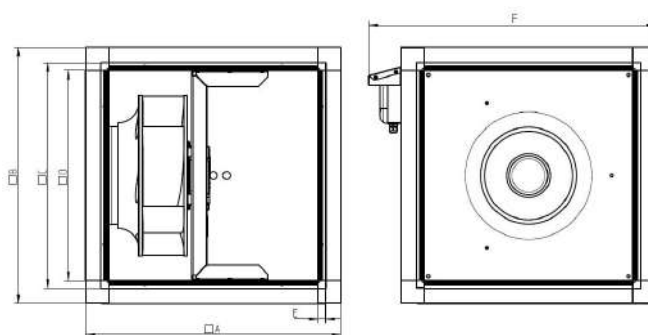
[Find more details in our online catalogue](#)

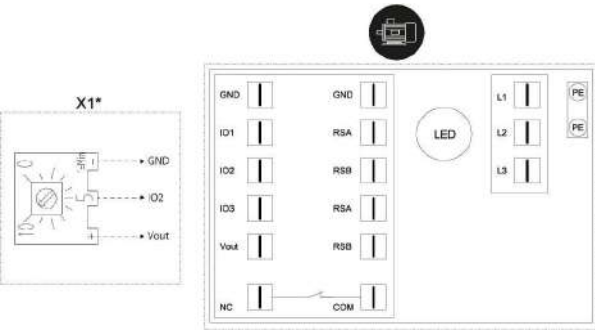
Technical parameters

Nominal data	
Voltage (nominal)	400 V
Frequency	50;60 Hz
Phases	3~
Input power	2662 W
Input power kW	2.662 kW
Input current	3.91 A
Impeller speed	1708 rpm
Air flow	max. 3.0169 m ³ /s
Temperature of transported air	max. 60 °C
Max temperature of transported air, when speed controlled	60 °C
Protection/Classification	
Enclosure class, motor	IP55
Insulation class	F
Data according to ErP	
ErP ready	ErP 2018
Dimensions and weights	
Weight	83.5 kg
Others	
Motor type	EC

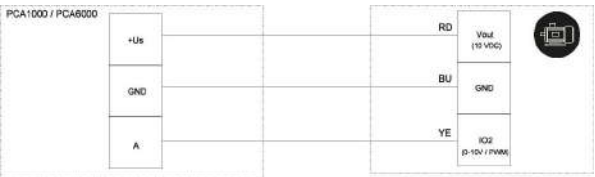
Dimension

MUB-CAV/VAV 062	□A	□B	□C	□D	E	F
560/630	820	820	720	678	21	906



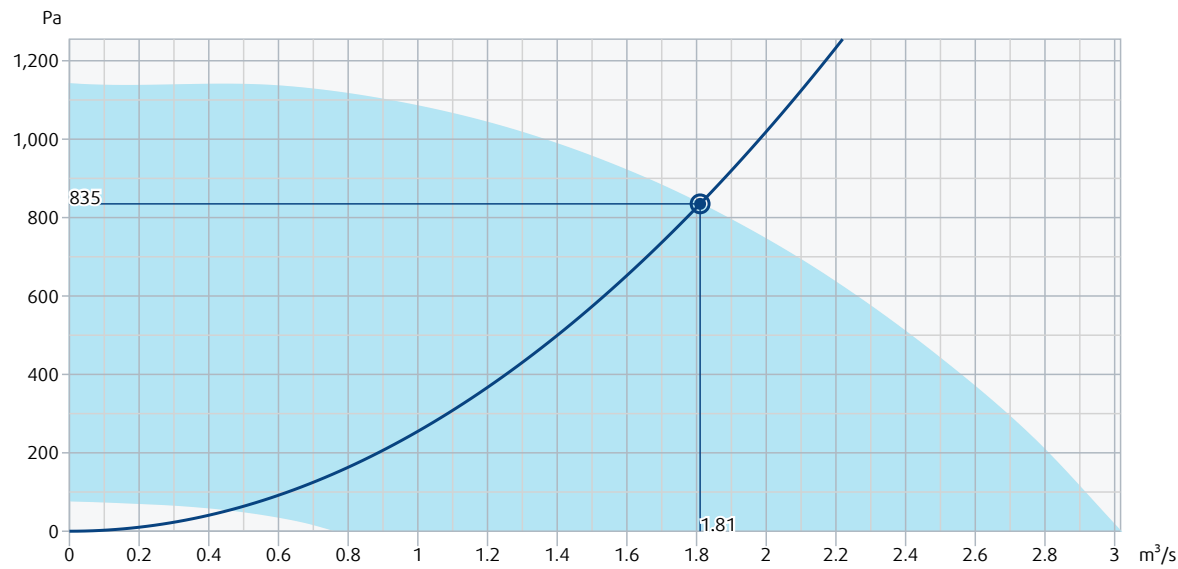


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COM	Function: Status relay Status relay, floating status contact, contact rating 250 VAC / 2 A; min. 10mA
NC	Function: Status relay Status relay, floating status contact, open in the event of an error and in the de-energized state
LED	Function: Status reports - green = operational readiness - orange = warning - red = error
X1	Terminal box with connected potentiometer * Included in the scope of delivery for fans with EC motor without external control.



RD	Red
BU	Blue
YE	Yellow

Performance curve



Hydraulic data											
Required air flow		1.81 m³/s									
Required static pressure		835 Pa									
Working air flow		1.81 m³/s									
Working static pressure		835 Pa									
Air density		1.204 kg/m³									
Power		2,656.8 W									
Fan control - RPM		1,708 rpm									
Current		3.91 A									
SFP		1.468 kW/m³/s									
Control voltage		10.0 V									
Supply voltage		400 V									
Sound power level			63	125	250	500	1k	2k	4k	8k	Total
Inlet		dB(A)	55	62	74	78	79	76	73	68	84
Outlet		dB(A)	56	64	76	79	81	78	75	69	85
Surrounding		dB(A)	38	52	64	50	53	52	46	36	65
Sound pressure level at 3m (20m² Sabine)		dB(A)	-	-	-	-	-	-	-	-	58
Sound pressure level at 3m free field		dB(A)	-	-	-	-	-	-	-	-	44

AHU Accessories

- CCM inlet MUB062 d560 (311782)
- CCM outlet MUB062 d560 (311684)
- CCMI outlet 062 d560 KIT 30mm (239095)
- EC-Basic-CO2 and temperature (24808)
- EC-Basic-T temperature (24805)
- FGV 062/716-716 flex. conn. (4198)
- HR1 Room Humidistat (215150)
- KKC-DX-R 062 cooling section (277266)
- KKC-W-R 062 cooling section (277274)
- KKH-HW 062 heater-section (93340)
- MicroREX D21 Plus Time Switch (17822)
- REV-5POL/05-7,5kW B/G (281745)
- RT 0-30 Room Thermostat (5151)
- SDM Service Door MUB 062 30mm (273935)
- WSD 062 (860x860x70) complete (31482)

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- CCM outlet MUB062 d630 (311681)
- CCMI outlet 062 d630 KIT 30mm (239096)
- EC-Basic-H humidity (24807)
- EC-Basic-U universal 0-10V (24806)
- GRU 062-820/100 (276662)
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- KKF 30 062-filter-section (93312)
- KKS 062 silencer-section (276852)
- Presence detector/IR24-P (6995)
- REV-5POL/05-7,5kW R/Y (35757)
- SD-MUB Vibration pad set (37324)
- UGS 062/630 adapter flex. (4358)
- WSG 062 MUB complete (31486)

Documents

- Commissioning Report
- EBM MODBUS Version 6.3 EN
- EPD_467754_Systemair_MUB_CAV_VAV_EC_json
- EPD_467754_Systemair_MUB_CAV_VAV_EC_pdf
- Installation, Operation and Maintenance instruction_003
- L-BAL-E263-GB.PDF
- MUB_EC_AMCA_CERTIFICATE.PDF
- QUICK GUIDE_MUB CAVVAV CHANGE_[002]_314498_EN-DE.PDF
- UKCA DECLARATION OF CONFORMITY_MUB_EN_002.PDF



SPLITTER SILENCER

SPLITTER SILENCER

Overview

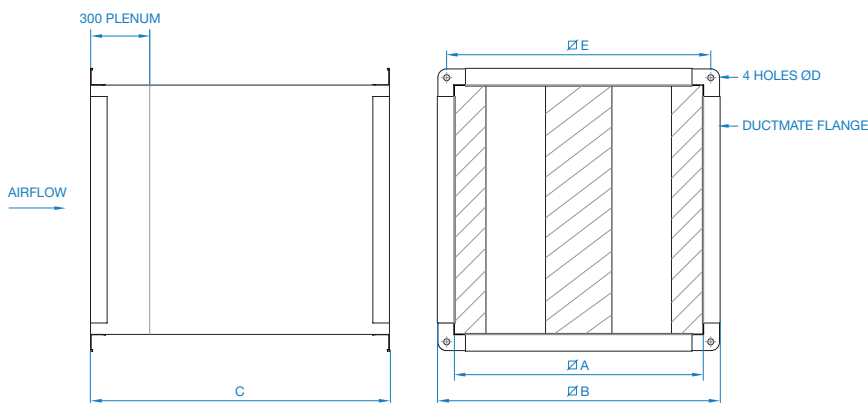


- Baffle type silencers
- Galvanised steel casing with perforated steel lining and baffles
- Infill is glass tissue faced high density mineral wool

Product Code	Insertion Loss @ Octave band							
	63	125	250	500	1K	2K	4K	8K
068-0350-MFB	-4	-6	-14	-23	-30	-29	-20	-14
068-0400-MFB	-4	-6	-14	-23	-30	-29	-20	-14
068-0450-MFB	-4	-9	-13	-25	-31	-30	-22	-15
068-0500-MFB	-4	-9	-14	-24	-30	-30	-23	-16
068-0550-MFB	-4	-6	-11	-22	-28	-27	-18	-14
068-0650-MFB	-4	-7	-13	-24	-26	-25	-17	-12
068-0700-MFB	-4	-7	-13	-24	-26	-25	-17	-12
068-0800-MFB	-5	-8	-16	-27	-30	-30	-21	-16
068-1000-MFB	-5	-9	-12	-22	-26	-23	-16	-12

Dimensional Data

Product Code	A	B	C	D	E	Ductmate Flange	Weight kg
068-0350-MFB	350	400	1200	9	375	25	24
068-0400-MFB	400	450	1200	9	425	25	31
068-0450-MFB	450	500	1200	9	475	25	38
068-0500-MFB	500	550	1200	9	525	25	42
068-0550-MFB	550	620	1200	11	585	35	49
068-0650-MFB	650	720	1500	11	685	35	74
068-0700-MFB	700	770	1500	11	735	35	81
068-0800-MFB	800	870	1800	11	835	35	117
068-1000-MFB	1000	1070	1800	11	1035	35	164



Dimensions are in mm.

SPLITTER SILENCER

Notes

[illegible]

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Fax **+44 (0) 1384 275810**
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46 Third Avenue, Pensnett Trading Estate, Kingswinford,
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BS EN ISO 9001:2015 FM 556465



A MEMBER OF  ELTA GROUP



MERLIN 1250XE

Electric Controller & Ventilation Interlock System



INSTALLATION & OPERATION INSTRUCTIONS

Please read these instructions carefully and retain for future use.

These instructions can be downloaded in electronic form on the product website.

S&S Northern Limited

snsnorthern.com

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Safety Information

-  Before any installation, use or maintenance read this manual carefully.
 -  The information contained within this manual should be referenced for typical installation and operation only.
 -  For site specific requirements that may deviate from the information in this guide – contact your supplier.
 -  If this product is used in a manner not specified by the manufacturer, the safety provided by the product may be impaired.
 -  This product is designed for indoor operation only.
 -  Cables must be protected against mechanical damage.
 -  The internal fuse should be replaced only with the same type. Anti-surge fuse 3.15A 250Vac 5x20.
 -  This product is not designed to detect smoke, fire or other gases and should NOT be used as such.
 -  This device requires a continual supply of electrical power – it will not work without power.
 -  This device should not be used to substitute proper installation, use and / or maintenance of fuel burning appliances including appropriate ventilation and exhaust systems.
 -  Your product should reach you in perfect condition, if you suspect it is damaged, contact your supplier.
-

Warranty Statement

Warranty Coverage: The manufacturer warrants to the original consumer purchaser, that this product will be free of defects in material and workmanship for a period of two (2) years from date of purchase.

The manufacturer's liability hereunder is limited to replacement of the product with repaired product at the discretion of the manufacturer. This warranty is void if the product has been damaged by accident, unreasonable use, neglect, tampering or other causes not arising from defects in material or workmanship. This warranty extends to the original consumer purchaser of the product only. Disclaimers: Any implied warranties arising out of this sale, including but not limited to the implied warranties of description, merchantability and intended operational purpose, are limited in duration to the above warranty period. In no event shall the manufacturer be liable for loss of use of this product or for any indirect, special, incidental or consequential damages, or costs, or expenses incurred by the consumer or any other user of this product, whether due to a breach of contract, negligence, strict liability in tort or otherwise. The manufacturer shall have no liability for any personal injury, property damage or any special, incidental, contingent or consequential damage of any kind resulting from gas leakage, fire or explosion. This warranty does not affect your statutory rights. Performance: During the above warranty period, your product will be replaced with a comparable product if the defective product is returned together with proof of purchase date. The replacement product will be in warranty for the remainder of the original warranty period or for six months – whichever is the greatest.

Information on waste disposal for consumers of electrical & electronic equipment.



When this product reaches the end of its life it must be treated as Waste Electrical & Electronics Equipment (WEEE).

WEEE marked products must not be mixed with general household waste, but kept separate for the treatment, recovery and recycling of the materials used. Please contact your supplier or local authority for details of recycling schemes in your area.

Installation

Typical Application & Location

-  Installation must be in accordance with the recognised standards of the appropriate authority in the country concerned!
-  Access to the interior of the device, when carrying out any work, must only be conducted by trained personnel!
-  Before carrying out any work ensure local regulations and site procedures are followed!
-  Easy access is recommended for both status observation and alarm purposes and must be located out of reach of the public!
-  Isolate the equipment from all hazardous live power sources before opening the cover!

The Merlin 1250XE is a ventilation interlock panel for up to two (2) fans. The panel has built-in current monitoring, designed for use with fans up to 18A running current (0.1A minimum). It also can receive connections from external current monitors or air pressure differential switches.

For ease of setting up, the Merlin 1250XE has an internal display to facilitate calibration of the current monitors, setting thresholds and diagnostics. To meet the latest guidance, the Merlin 1250XE includes connections for a CO2 monitor along with remote emergency stop connections.

Selectable panel features include Dual fan current monitoring from 0.1 to 18A; Connections to remote emergency shut off and Fan calibration and current monitoring including diagnostics.

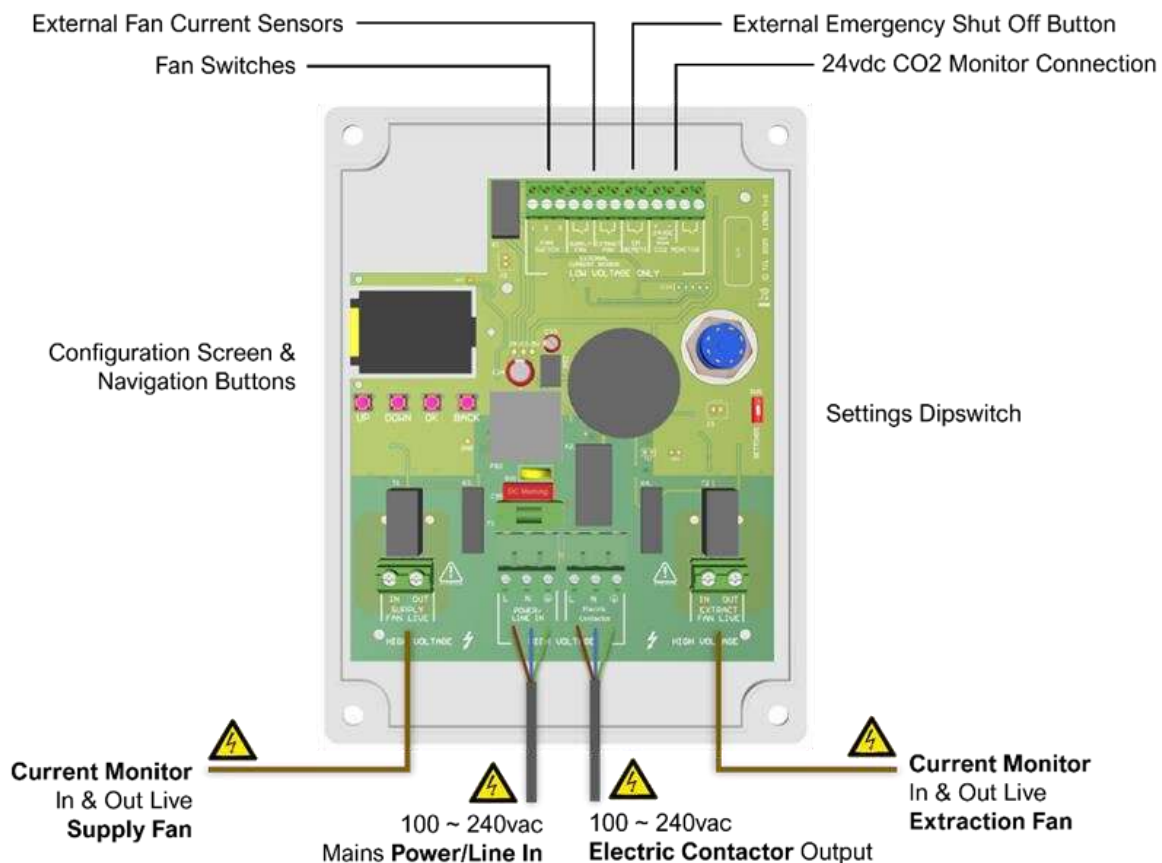
Mounting & Cabling

- ⚠ If mounting direct to wall - ensure the wall surface is flat to prevent base distortion!
- ⚠ Avoid installation near high energy equipment (Inverters, Fan Speed Controllers etc.)
- ⚠ Where cable glands/conduits are used for wire entry, use 20mm (3/4 inch) max separated by at least 20mm!
- ⚠ Damage to PCBs when creating cable entry points or attempting to remove the circuit board may void any warranty!
- ⚠ Restrain the hazardous live wiring from accidental loosening to prevent wires from moving after installation and touching parts of opposite polarity or at low voltages!
- ⚠ Isolate the equipment from all hazardous live power sources before opening the cover!

1. Carefully remove the front cover from the unit by using the socket wrench provided.
2. Using the rear base - mark mounting holes to the wall or align with an appropriate gang/patress box.
3. After executing the connections – secure the front cover with all bolts and insert security caps provided.

Circuit Board & Connections Overview

- ⚠ Damage to PCBs when creating cable entry points may void any warranty!
- ⚠ Take care when making connections to high voltage connectors!
- ⚠ Any damage attempting to remove the circuit board may void any warranty!
- ⚠ All Class 2 wiring is to be installed within flexible tubing to maintain segregation between circuits!
- ⚠ Wiring of different circuits shall be separated by means of routing, clamping or barrier!
- ⚠ For field connections use wires suitable for at least 167°F (75°C)



POWER / LINE IN.

230vac mains power is connected to the [POWER/LINE IN] terminal using a 3-core cable fused at 3A.

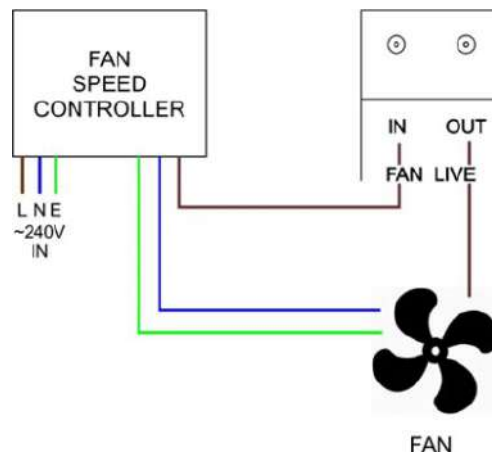
ELECTRIC CONTACTOR OUT.

230Vac power output supplied from the [ELECTRIC CONTACTOR] terminal using a 3-core cable and connected to an Electric Contactor. The Contactor will open upon an error condition.

CURRENT MONITORS

The LIVE feed from the fan controller is wired to the supply or extract side depending on which fan/s being monitored. Each terminal will monitor its own independent fan.

From a fan speed controller, the live feed should be taken to the [IN] terminal and the [OUT] terminal should wire to the fan motor controller. Max 18A.

**FAN SWITCH 1 2 3**

These terminals switch when the control panel switches on and off.

Linked to a fan switch (sold separately) which can provide power to the fans when the control panel is switched on.

EXTERNAL CURRENT SENSORS

These terminals are to receive an input signal from external air pressure switches or external current monitors. Linked out as a factory setting to represent a closed circuit.

If only one fan is being used, the terminal not in use should be left closed!

EM REMOTE.

Open/Close circuit connections for external devices is marked as [EM STOP] and can shut off the electric supply when activated. This is fitted with a factory link to represent a closed circuit.

CO2 MONITOR

This is a permanent 24vdc power output and open/close switch for a CO₂ Monitor (sold separately). A Merlin CO₂ monitor can shut off the electric supply if high concentrations are reached. Max output: 90mA

Access & Navigate System Settings



Provide power and turn the SETTINGS dip-switch on before turning the panel on via the key switch. The screen will display a menu – you can now configure your panel.

To view, change and save settings, you must provide mains power. There are four buttons to navigate through the settings and configure the system.

To select functions and change options.

- navigate by pressing [UP] or [DOWN]
- press [OK] to select options
- press [UP] or [DOWN] to change option setting
- press [OK] to save option or [BACK] to return to function



Settings List

FUNCTION	OPTION	Explanation
FANS CM.	- OFF - ON - SUP ONLY - EXT ONLY	Combination of fan current monitoring. Select [OFF] , current monitoring for both Supply and Extract [ON] or Supply [SUP] or Extract [EXT] only .
FANS CALIB.	- - OK	If fans are calibrated this will be set as [OK] . Select Fan Calibration to calibrate fans.
FANS THRESHOLD %	- 10 - 20 - 30 - 40	Dropout threshold for Min and Max current values of both supply and extraction fans. It is possible to select between a 10% to a 40% dropout threshold if required. You will need to recalibrate fans after changing dropout thresholds. See section: Fan Dropout Threshold Values.
FANS CALIB. RESET	- NO - YES	Remove and reset any saved fan calibration settings [YES] . See Section: Factory Set Condition
EM SEL.	- FS OFF - FS ON	When Emergency Shut Off button is pressed: [FS OFF] the Fan Switch (FS123) relay will switch [FS ON] the Fan Switch (FS123) relay will remain on.

Factory Set Condition

FAN'S CM.	OFF
FAN'S CALIB.	-
FAN'S THRESHOLD	
FAN'S CALIB. RESET	
EM SEL.	FS OFF

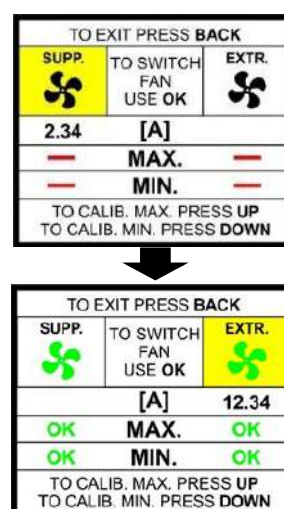
THRESHOLD	[%]
SUPPLY MIN.	10
SUPPLY MAX.	10
EXTRACT MIN.	10
EXTRACT MAX.	10

Fan Calibration

Select [**FANS CALIB.**] In the settings menu.

- ✓ Press [OK] to switch to supply (SUPP.) or extraction (EXTR.) fan.
Fan selection highlighted yellow.
- ✓ Wait for the current value to appear (A).
Press [UP] button to calibrate highest fan current.
If successful, 'OK' appears on screen (MAX.)
- ✓ Press [DOWN] button to calibrate low fan current.
If successful, 'OK' appears on screen (MIN.)
Fan icons switch from black to green.

If unsuccessful, alter dropout thresholds in the settings menu and repeat.



Fan Dropout Threshold Values

When [FANS THRESHOLD] has been selected in the settings menu, the user can adjust the minimum and maximum current values by 10, 20, 30 or 40%. Fans with a current between 0.1 to 0.2A we recommend a dropout threshold $\geq 30\%$.

Threshold max. Value (%)	10	20	30	40
Running current (max.)	18A	16.5A	15A	14A

If calibration is successful, it is possible to change the fan threshold without recalibration. Fans new threshold automatically recalculates min and max current fan fault values.

The 1250XE can display fan currents (amp) in the diagnostic screen. See section: *Diagnostics*

Operation

Initial Power Up

1. Supply 100-250vac power - the 'Power' LED on the front of the panel will illuminate green.
2. Turn external fans on.
3. Turn the panel key switch on to start the system.
4. Turn the key switch off to turn off the system.

Pressing the 'Mute' button on the panel will silence the internal buzzer upon alarm condition.

LED Indication Status

- **POWER** LED illuminates when mains power supplied and live.
- **ELECTRIC** When fans are running at the correct speed and no error conditions are present, the Electric LED will remain illuminated to indicate power is supplied to the contactor. If the LED switches off the contactor opens isolating electric following an alarm or error condition.
- **EM STOP** If an emergency shut off button (either remote or on the panel) is pressed, the LED will illuminate, and the contactor opens/electric supply will be isolated. Any shut-off buttons must be reset before restarting the system.
- **CO₂ HIGH** If the concentration of CO₂ in the air is at alarm level (relevant detector required), the LED will illuminate, and the contactor opens/electric supply is isolated.
- **SUPPLY FAN** - Under normal working conditions, this LED is on.
If a supply fan external current sensor fault is detected, the LED will flash.
After ~ 20 seconds: the LED will remain on, and Fan Fault LED will illuminate.
If a supply fan internal current monitor fault is detected, the LED will flash.
After ~ 20 seconds, the LED will flash twice a second and Fan Fault LED will illuminate.
- **EXTRACT FAN** - Under normal working conditions, this LED is on.
If an extract fan external current sensor fault is detected, the LED will flash.
After ~ 20 seconds: the LED will remain on, and Fan Fault LED will illuminate.
If an extract fan internal current monitor fault is detected, the LED will flash.
After ~ 20 seconds, the LED will flash twice a second and Fan Fault LED will illuminate.
- **FAN FAULT** If a fan fault occurs for longer than 20 seconds the LED will illuminate red.

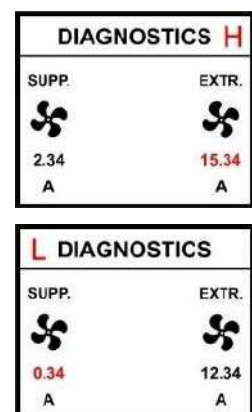
System Diagnostics

The panel can display fan current (Amps).

To view these diagnostics, carefully remove the front fascia of the panel, to activate screen diagnostics, press either the [OK], [UP] or [DOWN] button.

The diagnostic screen is available during; proving status; normal operation; fan fault and pressure low status.

The screen will automatically enter sleep mode after 10 minutes of inactivity or when the [BACK] button pressed.



L = Fan current is less than the minimum calibrated value.

H = Fan current exceeds the maximum calibrated value.

Maintenance

Cleaning

Keep your gas detector in good working order - follow these basic principles.

- Remove any dust/debris from the outer enclosure regularly using a slightly damp cloth.
- Never use detergents or solvents to clean your device.
- Never spray air fresheners, hair spray, paint or other aerosols near the device.
- Never paint the device. Paint will seal vents and interfere with the device.

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Specification

General	
Model:	1250XE
Size: (H x W x D)	180 x 255 x 77 mm/ 7.08 x 10.03 x 3"
Housing Material:	ABS PA765 (Flame Rating UL94 V-1)
Mounting:	Safe Zone - Indoor use - Wall Mounted
User Interface	
Display:	1.8" TFT (INTERNAL)
Visual Indicators:	LED
Audible Alarm:	85dB
Buttons:	Alarm Mute
Language:	English
Power Supply	
Power Consumption:	5W max
AC Power:	100-240V~ 50/60Hz
Internal Fuse:	Anti-Surge 3.15A 250Vac
Single Phase AC Current monitoring range	0.1 - 18A
Single phase AC current monitor display	0 - 22A
Equipment	
Overvoltage Category:	II
Pollution Degree:	2
IO	
Volt Free relay output:	2 x 240vac 5A (Latching Switch)
Electric Contactor Output:	100-240V~ 50/60Hz
Environmental	
Ingress Protection:	Not Formally Evaluated
Operating:	-10 ~ 50°C / 14 ~ 122°F 30 ~ 80% RH (non-condensing)
Storage:	-25 ~ 50°C / -13~122°F up to 95% RH (non-condensing)
Altitude Rating:	2000m
Wiring	
Typical	Min. 18AWG / 75°C min / Tinned copper.
Approvals	
Electrical Safety and Electromagnetic Compatibility	CE

Installation Details

Please pass this manual to the system owner / user.

Date of Installation:	
Installation Location:	
Organisation:	
Stamp/Signature of the installer:	

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Catering Fire Protection

Saving lives, assets and the environment

Nobel Fire Systems has built on over 30 years of reliable, proven technology to develop fire suppression technologies aimed at special risk environments.

Underpinning the product development programme is a certain conviction that early fire detection and fast effective suppression saves lives, assets and the environment. The Company offers a complete range of services from risk based analysis, consultation and design through to distribution and installation.

As no single suppression medium or application method covers all fire risk scenarios, our range of fire suppression systems covers all class of fires, and systems can be tailored to meet individual needs.

Approved and Certified to LPS 1223

Nobel K-Series

The UK's premier wet chemical kitchen fire suppression systems

The Nobel Fire Systems K-Series is now in many of the UK's and European leading commercial kitchens, underlining its ability to provide the right fire suppression answers to the most challenging situations.



Nobel K-Series benefits:

- **A tailored protection package to meet individual needs**
- **The greatest fire protection possible, with extended ductwork protection**
- **Seamless integration and flexibility**
- **Reliability and control**
- **Clean and hygienic components**
- **Longevity and serviceability**
- **Value for money**
- **Potential insurance savings**

K-Series offers unrivalled capabilities and service, providing full protection to all relevant cooking appliances and extract canopies, as well as uniquely enabling extended duct work protection from canopy through to the building extraction unit. The systems are electronically controlled with no mechanical moving parts. Installations comprise of one or a number of stainless steel cylinders, each containing a highly effective F class wet chemical liquid designed specifically for fast flame knock down and fire suppression.

The low, near neutral pH value of the liquids ensures that there is no damage to the commercial kitchen appliances, and as a direct consequence of the efficiency of K-Series in limiting the volume of liquid required to control the situation, there is minimal clean-up requirements following discharge.

Maintaining the individuality of the premises is often a critical part of a restaurant's brand identity. Often this requirement is based on the practicalities of the site and on the 'look' required. Manufactured in stainless steel the Nobel K-Series systems are designed to meet all the aesthetic qualities required as well as being fitted quickly and efficiently by Nobel Fire Systems installation teams. Aesthetic appearances play a key role in the design of all pipework and nozzles.





We also consider the strict hygiene requirements of commercial kitchens as well as the key functionality needs. That's why major names in the industry such as Spirit Group, Nando's, Jamie Oliver, and Gordon Ramsay have had Nobel K-Series installed in their kitchens.

It's also why the leading UK insurance company, Allianz has chosen Nobel Fire Systems as its preferred systems provider for kitchen fire suppression systems.

Every system is designed following a comprehensive risk assessment taking into account the requirement of successful fire suppression and a client's interruption potential.

The K-Series is approved and certified to LPS 1223. It's designed to British and European standards and is manufactured to ISO 9001:2008. It also meets the requirements of BS 5839 EN54; BS 7273; NFPA 17a and is CE marked.

The system has been tested and approved by LPCB to ISO 15371:2000 and is type approved by M.C.A, ABS, DNV, Lloyds, BV, GL, RINA and Korean Register.



catering marine industrial property data protection transport



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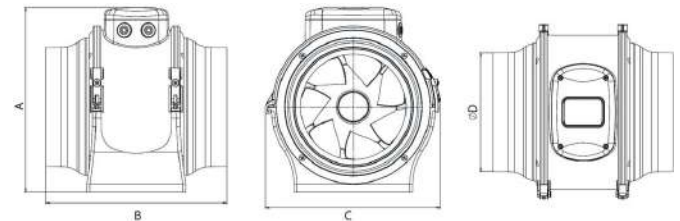


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Technical parameters

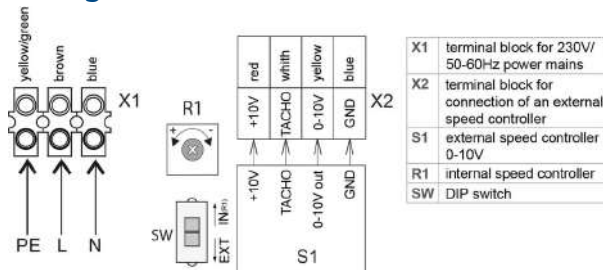
Nominal data	
Voltage (nominal)	230 V
Frequency	50 Hz
Phases	1~
Input power	54 W
Input power kW	0.054 kW
Input current	0.48 A
Impeller speed	3396 rpm
Temperature of transported air	max. 55 °C
Max temperature of transported air, when speed controlled	55 °C
Protection/Classification	
Enclosure class, motor	IPX4
Insulation class	B
Data according to ErP	
ErP ready	Not ErP relevant
Dimensions and weights	
Duct dimension; Circular, inlet	150 mm
Weight	2.8 kg
Others	
Motor type	EC

Dimension

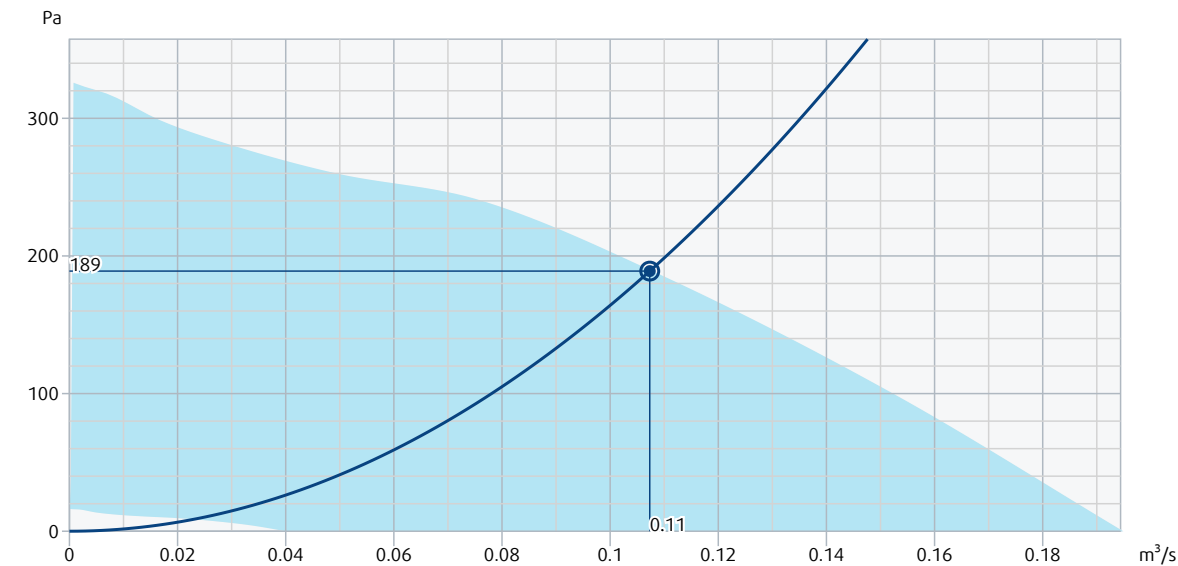


mm	A	B	C	ØD
Prio ECO MAX 150 AC/EC	268	301	251	148
Prio ECO MAX 200 AC/EC	308	302	292	198,5
Prio ECO MAX 250 AC/EC	326	237	342	248,5

Wiring



Performance curve



Hydraulic data												
Required air flow										0.11 m³/s		
Required static pressure										189 Pa		
Working air flow										0.11 m³/s		
Working static pressure										189 Pa		
Air density										1.204 kg/m³		
Power										54.0 W		
Fan control - RPM										3,516 rpm		
Current										0.48 A		
SFP										0.503 kW/m³/s		
Control voltage										10.0 V		
Supply voltage										230 V		
Sound power level			63	125	250	500	1k	2k	4k	8k	Total	
Inlet			dB(A)	33	45	57	62	65	64	59	51	69
Outlet			dB(A)	39	52	63	64	61	60	57	51	69
Surrounding			dB(A)	21	32	42	48	50	50	43	34	55
Sound pressure level at 3m (20m² Sabine)			dB(A)	-	-	-	-	-	-	-	-	48
Sound pressure level at 3m free field			dB(A)	-	-	-	-	-	-	-	-	34

AHU Accessories

CB 150-1,2 230V/1 Duct heater (5378)
CB 150-2,7 230V/1 Duct heater (5380)
EC-Basic-CO2 and temperature (24808)
EC-Basic-T temperature (24805)
EC-Selector (9908)
FGR 150 Filter cassette (1807)
IGK-160 Wall Grid (1632)
LDC 150-600 Silencer (5199)
MTP 10, 10K, Speed control (32731)
Potentiometer MTP 20, 0-10V (310220)
RSK-150 Back draft damper (5599)
SG 150 Protection guard (5555)
X-CBM 150-2,1 230V/1 Duct heat (5481)

CB 150-2,1 230V/1 Duct heater (5379)
CB 150-5,0 400V/2 Duct heater (5381)
EC-Basic-H humidity (24807)
EC-Basic-U universal 0-10V (24806)
FFR 150 Filter cassette (1769)
FK 150 Fast clamp (1609)
LDC 150-300 Silencer (53723)
MicroREX D21 Plus Time Switch (17822)
MTV-1/010 Controller 0..10V+ (30650)
Room thermostat TM 10 (2703)
RT 0-30 Room Thermostat (5151)
Step switch S-5EC-2, 0-10V (449084)
X-CBMF 150-2,1 230V/1 Duct hea (12243)

Documents

Commissioning Report
Manual & CE prio 004

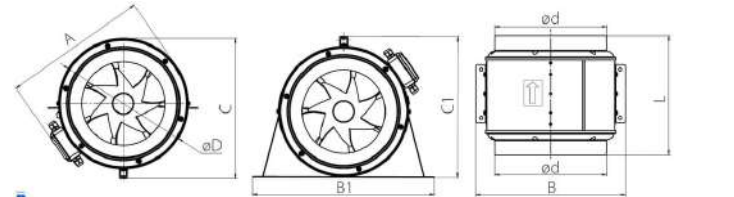


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Technical parameters

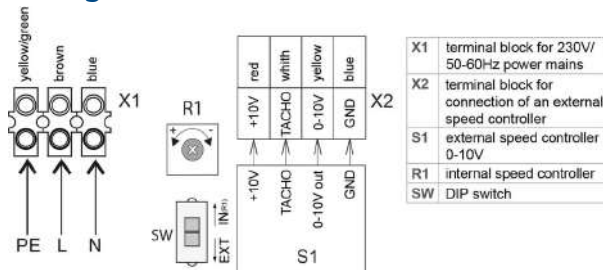
Nominal data	
Voltage (nominal)	230 V
Frequency	50 Hz
Phases	1~
Input power	330 W
Input power kW	0.33 kW
Input current	1.38 A
Impeller speed	2441 rpm
Temperature of transported air	max. 55 °C
Max temperature of transported air, when speed controlled	55 °C
Protection/Classification	
Enclosure class, motor	IPX4
Insulation class	B
Data according to ErP	
ErP ready	ErP 2018
Dimensions and weights	
Duct dimension; Circular, inlet	315 mm
Weight	15 kg
Others	
Motor type	EC

Dimension

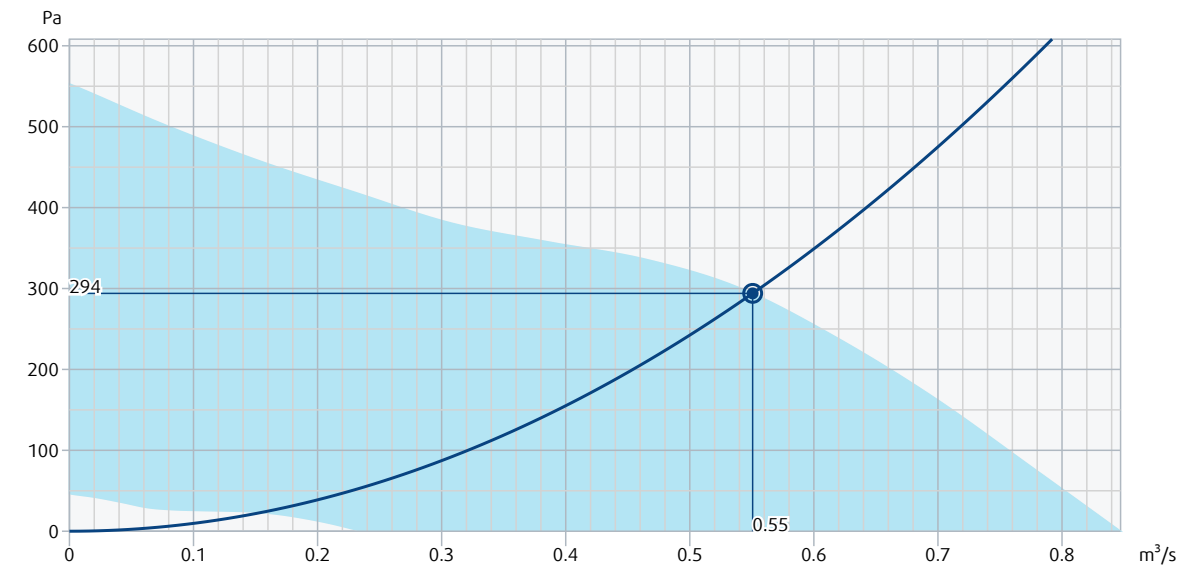


mm	ØD	Ød	A	L	B	B1	C	C1
Prio ECO MAX EC 315	406	310	456	468	468	566	437	439
Prio ECO MAX AC/EC 355	406	349	456	372	468	566	437	439
Prio ECO MAX EC 355-L	406	349	456	372	468	566	437	439
Prio ECO MAX AC/EC 400	451	394	501	415	513	623	481	484

Wiring



Performance curve



Hydraulic data												
Required air flow			0.55 m³/s									
Required static pressure			294 Pa									
Working air flow			0.55 m³/s									
Working static pressure			294 Pa									
Air density			1.204 kg/m³									
Power			327.4 W									
Fan control - RPM			2,534 rpm									
Current			1.37 A									
SFP			0.595 kW/m³/s									
Control voltage			10.0 V									
Supply voltage			230 V									
Sound power level			63	125	250	500	1k	2k	4k	8k	Total	
Inlet			dB(A)	47	59	67	70	72	69	63	57	76
Outlet			dB(A)	53	66	73	71	74	71	66	60	79
Surrounding			dB(A)	35	47	52	55	59	55	49	39	63
Sound pressure level at 3m (20m² Sabine)			dB(A)	-	-	-	-	-	-	-	-	56
Sound pressure level at 3m free field			dB(A)	-	-	-	-	-	-	-	-	42

AHU Accessories

CB 315-12,0 400V/3 Duct heater (5387)
CB 315-6,0 400V/2 Duct heater (5374)
CBM 315-9,0 400V/3 Duct heater (5485)
EC-Basic-CO2 and temperature (24808)
EC-Basic-T temperature (24805)
EC-Selector (9908)
FGR 315 Filter cassette (1818)
IGC-315 Intake grille (76879)
LDC 315-900 Silencer (5197)
MicroREX D21 Plus Time Switch (17822)
MTV-1/010 Controller 0..10V+ (30650)
Room thermostat TM 10 (2703)
RT 0-30 Room Thermostat (5151)
Step switch S-SEC-2, 0-10V (449084)
VBC 315-3 Water heating batt (9844)
VK-30 Louvre shutter (5641)
X-CBMF 315-9,0 400V/3 Duct hea (12354)

CB 315-3,0 230V/1 Duct heater (5386)
CB 315-9,0 400V/3 Duct heater (5375)
CWK 315-3-2,5 Duct cooler,circ (30025)
EC-Basic-H humidity (24807)
EC-Basic-U universal 0-10V (24806)
FFR 315 Filter cassette (1779)
FK 315 Fast clamp (1613)
LDC 315-600 Silencer (5949)
LDC-B 315-1200 Silencer baffle (9068)
MTP 10, 10K, Speed control (32731)
Potentiometer MTP 20, 0-10V (310220)
RSK-315 Back draft damper (5604)
SG 315 Protection guard (5611)
VBC 315-2 Water heating batt (5461)
VBF 315 Water heating battery (1734)
VKK-315 Back draft damper (1628)

Documents

Commissioning Report
Manual & CE prio 004



[Find more details in our online catalogue](#)

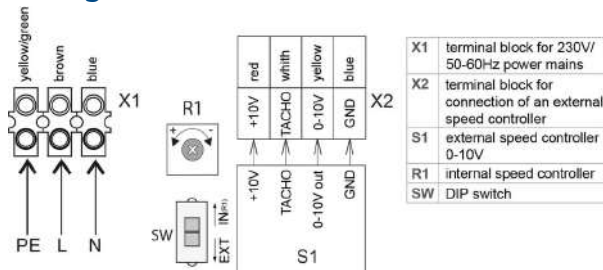
Technical parameters

Nominal data	
Voltage (nominal)	230 V
Frequency	50 Hz
Phases	1~
Input power	121 W
Input power kW	0.121 kW
Input current	0.95 A
Impeller speed	3152 rpm
Temperature of transported air	max. 55 °C
Max temperature of transported air, when speed controlled	55 °C
Protection/Classification	
Enclosure class, motor	IPX4
Insulation class	B
Data according to ErP	
ErP ready	Not ErP relevant
Dimensions and weights	
Duct dimension; Circular, inlet	200 mm
Weight	4.2 kg
Others	
Motor type	EC

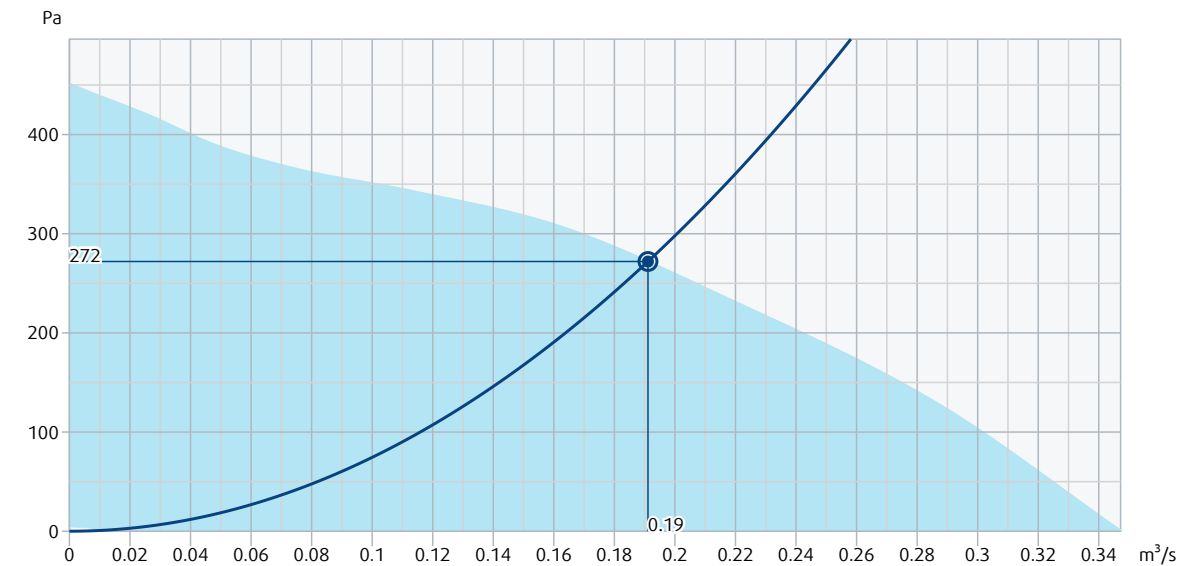
Dimension

	A	B	C	ØD
Prio ECO MAX 150 AC/EC	268	301	251	148
Prio ECO MAX 200 AC/EC	308	302	292	198,5
Prio ECO MAX 250 AC/EC	326	237	342	248,5

Wiring



Performance curve



Hydraulic data											
Required air flow		0.19 m³/s									
Required static pressure		272 Pa									
Working air flow		0.19 m³/s									
Working static pressure		272 Pa									
Air density		1.204 kg/m³									
Power		121.0 W									
Fan control - RPM		3,232 rpm									
Current		0.96 A									
SFP		0.633 kW/m³/s									
Control voltage		10.0 V									
Supply voltage		230 V									
Sound power level			63	125	250	500	1k	2k	4k	8k	Total
Inlet		dB(A)	46	58	64	64	62	65	62	56	71
Outlet		dB(A)	49	59	66	69	63	67	64	57	74
Surrounding		dB(A)	32	43	49	52	54	55	50	44	60
Sound pressure level at 3m (20m² Sabine)		dB(A)	-	-	-	-	-	-	-	-	53
Sound pressure level at 3m free field		dB(A)	-	-	-	-	-	-	-	-	39

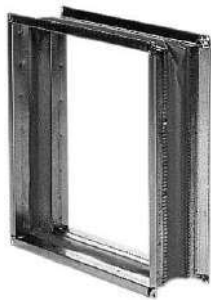
AHU Accessories

CB 200-2,1 230V/1 Duct heater (5384)
CB 200-3,0 400V/2 Duct heater (5294)
CBM 200-5,0 400V/2 Duct heater (5483)
EC-Basic-CO2 and temperature (24808)
EC-Basic-T temperature (24805)
EC-Selector (9908)
FGR 200 Filter cassette (1812)
IGC-200 Intake grille (76877)
LDC 200-300 Silencer (53369)
LDC 200-900 Silencer (5195)
MTP 10, 10K, Speed control (32731)
Potentiometer MTP 20, 0-10V (310220)
RSK-200 Back draft damper (5602)
SG 200 Protection guard (5609)
VBC 200-2 Water heating batt (5459)
VBF 200 Water heating battery (1732)
X-CBMF 200-5,0 400V/2 Duct hea (12246)

CB 200-3,0 230V/1 Duct heater (5370)
CB 200-5,0 400V/2 Duct heater (5371)
CWK 200-3-2,5 Duct cooler,circ (30023)
EC-Basic-H humidity (24807)
EC-Basic-U universal 0-10V (24806)
FFR 200 Filter cassette (1773)
FK 200 Fast clamp (1611)
IGK-200 Wall Grid (1633)
LDC 200-600 Silencer (5194)
MicroREX D21 Plus Time Switch (17822)
MTV-1/010 Controller 0..10V+ (30650)
Room thermostat TM 10 (2703)
RT 0-30 Room Thermostat (5151)
Step switch S-5EC-2, 0-10V (449084)
VBC 200-3 Water heating batt (9841)
VKK-200 Back draft damper (1626)

Documents

Commissioning Report
Manual & CE prio 004

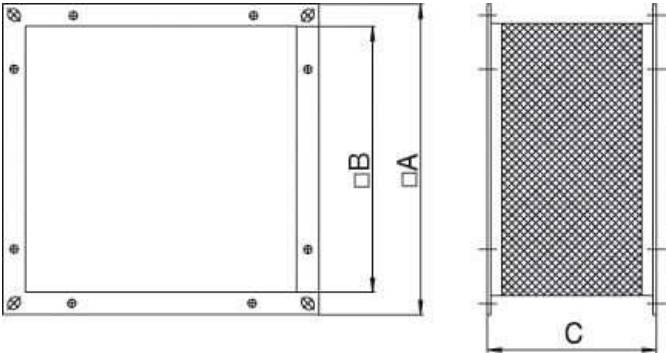


[Find more details in our online catalogue](#)

Technical parameters

Dimensions and weights		
Weight	2.2	kg

Dimension



	A	B	C
DSK 45	492	447	120
DSK 50	547	502	120
DSK 55	595	550	120
DSK 65	707	661	120
DSK 70	742	696	120



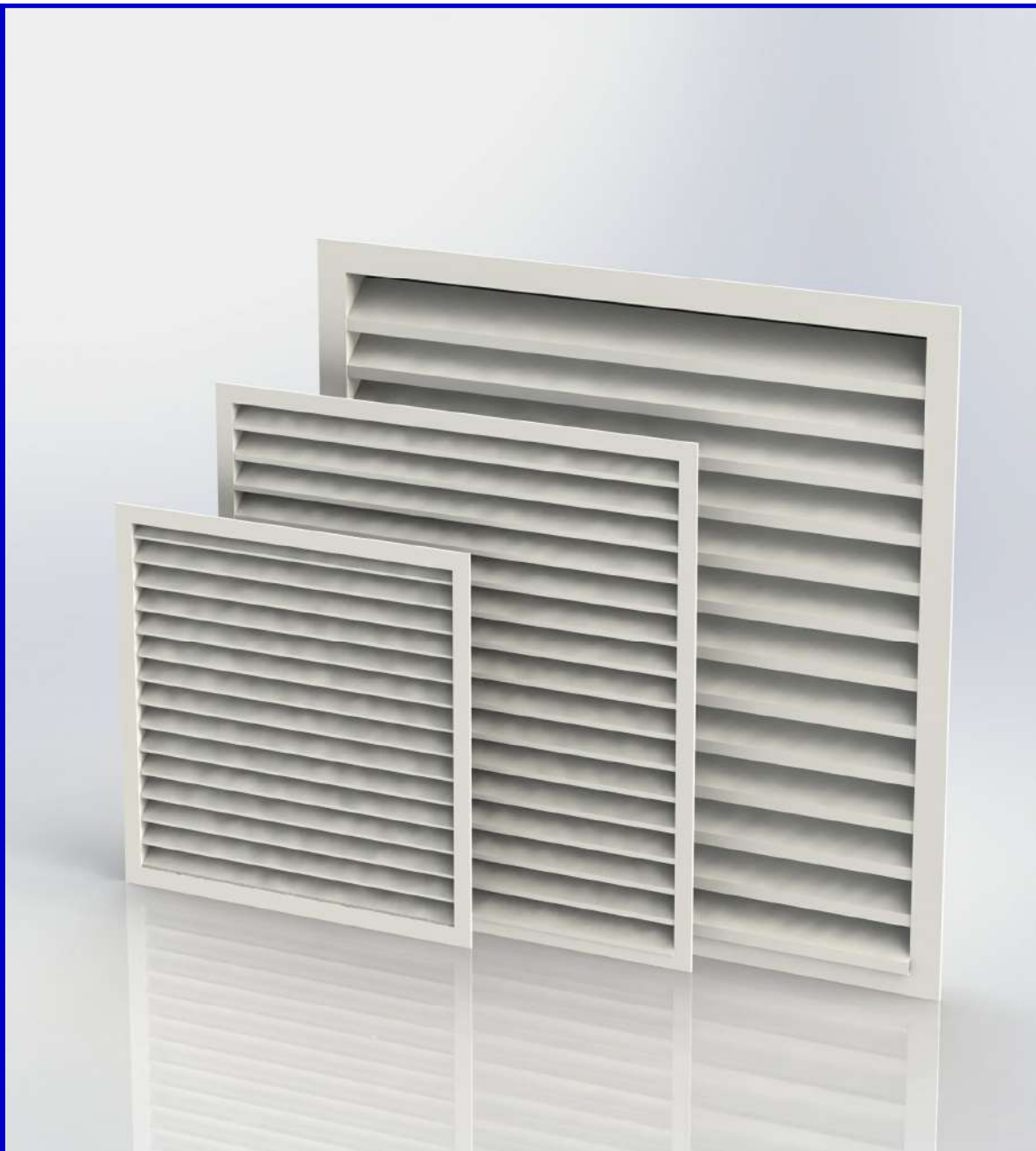
Incorporating



Louvre systems

Series WL Standard weather louvres

- Standard range of single bank louvres as used in countless installations worldwide
- Good resistance to water ingress, with low resistance to airflow
- Approximately 50% free area on all models
- Polyester powder coating to the full range of RAL and BS colours
- WL38's in popular square sizes held in stock for immediate despatch
- Now available with burglar/security bars



Index

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3 - Product overview and features

Testing and certification

4 - Product testing

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5 - Technical drawings - Flanged and recessed frame louvres

6 - Technical drawings - Reversed and concealed frame louvres

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8 - Fixings

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9 - Additional options

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Rear mounted drip tray

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Weather louvre and volume control damper combination units

Security bars

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11-13 - Selection data

14 - Feature: New Series HPL80 ultra high performance weather louvre
Class A2 rain rejection up to 4 m/s

16 - Finish details and ordering codes

Quality assurance

HVC Supplies (Stourbridge) Ltd is an ISO 9001 certified company.



Assessed to ISO 9001
Cert/Ref No. 1186

Series WL

Series WL standard weather louvres are the standard weather louvre used in countless installations throughout the world.

Available in three formats to suit any size installation, all WL types have a single bank of blades with a 45° face for good levels of rain resistance in the majority of conditions. Minimal resistance to airflow is assured with an approximate free area of 50% on all series.

Break points for switching between series (WL50 and WL75 are advised only):

WL38: Up to 1m nominal size (either width or height)

WL50: Up to 2m²

WL75: Anything above 2m²



Design features

Material	Extruded aluminium BZP steel screws or aluminium pop rivets
Sizes	Minimum heights (flanged units, nominal): WL38: 105mm WL50: 125mm WL75: 185mm
Blade	Various pitches (WL38 - 40mm, WL50 - 50mm, WL75 - 75mm) All with 45° face slope
Core	Fixed
Frame	Standard: Flanged Optional: Recessed and reversed
Fixings	Standard: None Optional: See page 8
Finish	Standard: Mill aluminium Optional: See page 14
Mass/m² face area	WL38: 12 kg WL50: 12 kg WL75: 15 kg
Free area	Approx. 50% (varies with size)

Important note:

Free area is not a reliable guide to performance.

It is possible to have two louvres with identical geometric free areas but different airflow characteristics.

Wherever possible use a tested airflow coefficient, as stated on the following page or available in the test certificate WL75 louvres which is available on request.

BSRIA Testing

WL75 standard weather louvres have been tested against:

BS EN 13030:2001

The testing was carried out in April 2013 by BSRIA in Bracknell, Berkshire, England.

Copies of the test reports are available on request.



Performance

Louvres are subjected to simulated rainfall of 75mm per hour, with a wind speed of 13m/s (29mph).

Rain ingress is then measured at various draw speeds through the louvre, this is in addition to the constant 13m/s simulated wind speed.

WL75 louvres were tested with an optional rear mounted drip tray, this will have had negligible impact on airflow but a large impact on rain resistance.

Headline figures are shown here, a copy of the full test report is available on request.

WL75 - DT: (WL75 complete with rear mounted drip tray)

Mean airflow coefficient: 0.252 (Class 3)

Rain rejection: Class C up to approx. 1.4 m/s draw velocity
Class D above approx. 1.4 m/s draw velocity

Stocked sizes

The following sizes of Series WL38 standard weather louvres are held in stock, fitted with bird mesh and in mill aluminium finish available for immediate despatch.

150mm²
200mm²
250mm²
300mm²
350mm²
400mm²
450mm²
500mm²
550mm²
600mm²
700mm²
800mm²
900mm²
1000mm²

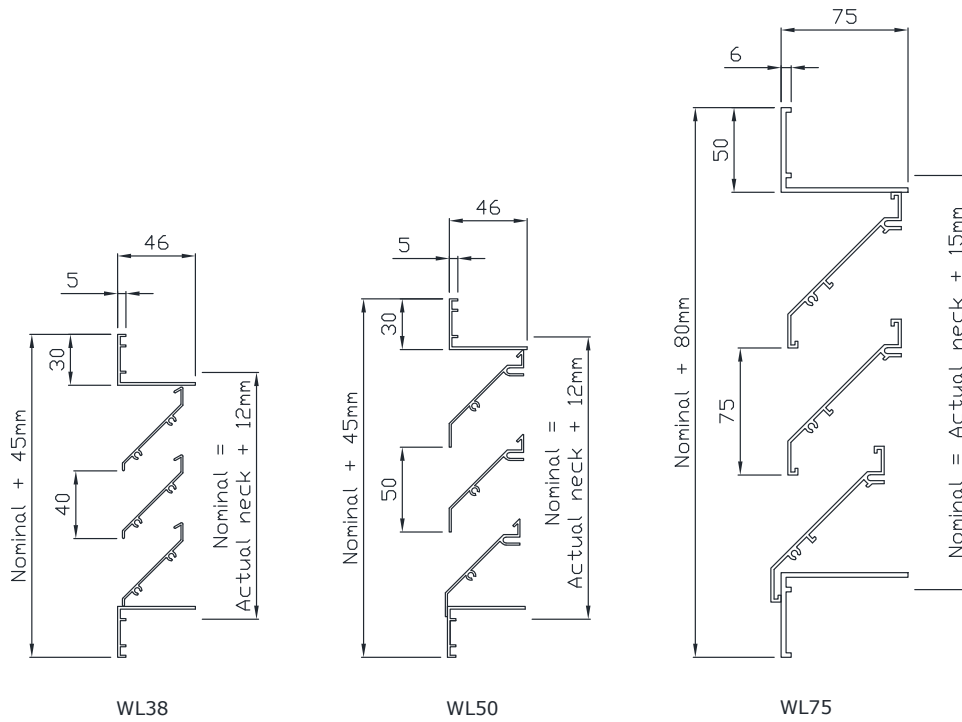
All sizes are nominal (hole size)

Units can be powder coated if a painted finish is required.

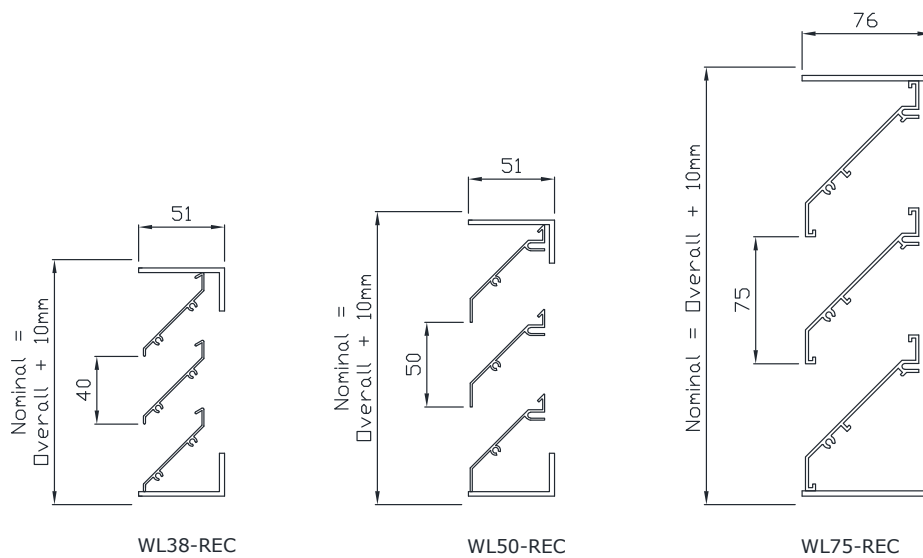
Product codes: WL38 - BM - Mill

Technical drawings

Flanged (standard)

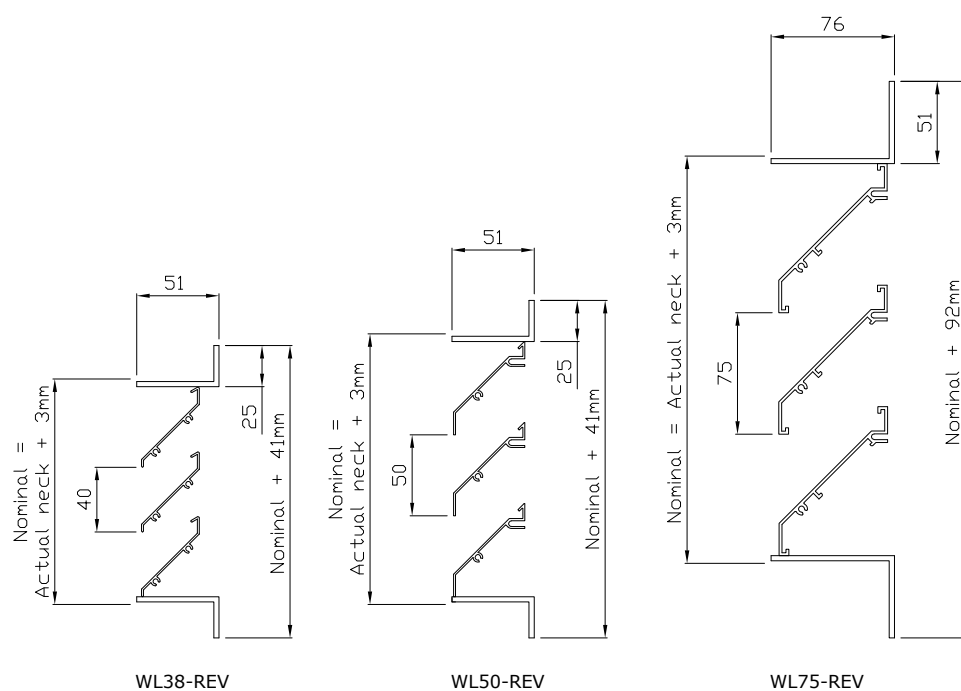


Recessed frame - REC (optional)



Technical drawings

Reversed frame - REV (optional)



Technical notes

Stop gaps

Louvre blades are laid out starting with the bottom blade and then working upwards.

Should a whole number of blades not be possible to fit into the required height, the top-most blade will either be cut down, or a stop gap will be fitted.

The maximum heights of stop gaps, based on louvre series are:

WL38: 25mm

WL50: 40mm

WL75: 60mm

Stop gaps are visible only as flat aluminium sections, and are fitted prior to powder coating (if required).

Frame types

The below table shows the standard and optional frames available for each louvre series, along with ordering codes and dimensions.

These are only standard frame types. If you have a special requirement not shown here, please contact us.

WL Series	Frame code	Description	Standard or optional	Nominal to overall size	Overall depth
WL38 and WL50	30FW	30mm flat	Standard	+ 45mm	46mm
	25F	25mm flat	Optional	+ 30mm	46mm
	50FS	50mm flat (shallow)	Optional	+ 80mm	50mm
	3" x 2" x 1/8"	3 inch (76.2mm) flat	Optional	+ 130mm	2 inches (50.8mm)
	4" x 2" x 1/8"	4 inch (101.6mm) flat	Optional	+ 180mm	2 inches (50.8mm)
WL75	50FD	50mm flat (deep)	Standard	+ 80mm	75mm
	3" x 3" x 1/8"	3 inch (76.2mm) flat	Optional	+ 130mm	3 inches (76.2mm)
	4" x 4" x 1/8"	4 inch (101.6mm) flat	Optional	+ 180mm	4 inches (101.6mm)

Large units

Large louvres may need to be produced in sections. The number of sections can be stated in your ordering code, or will be decided by HVC and stated on your order acknowledgement.

Side-by-side sections

Continuous appearance with concealed bolting points for joining adjacent sections. This will increase louvre depth by approximately 25mm.

Joining strips are supplied to ensure blade alignment with WL75's.

Vertically stacked sections

Units will be manufactured in sections of equal height, to be stacked together upon installation.



WL75 in side-by-side sections showing concealed angle with bolting points.

Fixings

None (Standard)

Most weather louvres are supplied with no fixings.

In this instance we recommend drilling through either the louvre flange or the neck, and screwing directly into the supporting structure with an appropriate fixing.



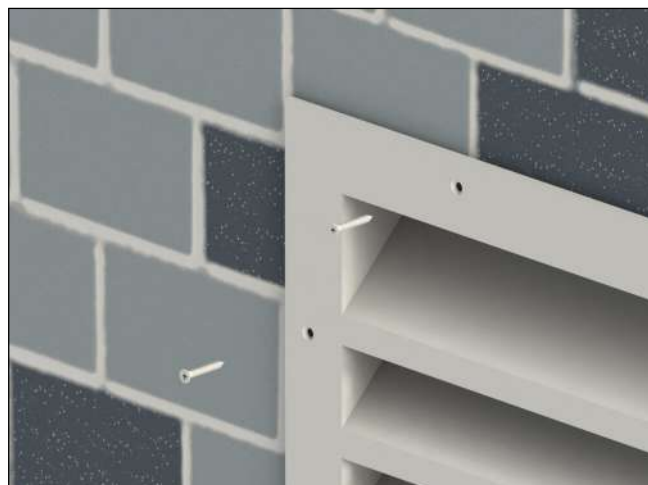
Pre-punched face fixing holes - Ordering code FH

5.7mm countersunk fixing holes will be punched into the louvre frame before powder coating, allowing quick and easy fitting on site.

Number and layout of fixing holes will be appropriate to louvre size. Arrangements can be specified.

Supplied with pozidrive self tapping screws in the same finish as the louvre.

Only available with flanged and reversed flange louvres.



Glazing bar - Ordering code GZ (Required depth needed)

An additional frame can be fixed to the louvre neck to create a glazing bar frame suitable for installation into uPVC channels in place of glass window panes.

Only available with flanged and reversed flange louvres.

Please note - Series GL50 glazing louvres are now available, designed from the ground up to suit glazing systems. Please refer to our website for more information.



Rear mounted concealed fixing lugs - Ordering code RFL

3mm thick, 25mm wide aluminium lugs, protruding 50mm from the back of the louvre neck can be factory fitted to your louvre.

Lugs are supplied undrilled to accept whatever fixing is required on site, and are either welded or double riveted to the louvre.

An appropriate amount of lugs will be fitted to suit the louvre size.

Only available with flanged and recessed louvres.



Additional options

Face mounted drip cill - Ordering code DC

By fitting an extended cill beneath the bottom blade, any water caught by the louvre is ejected away from the wall, instead of the bottom section of frame.

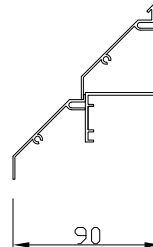
This can help prevent streak marks where water has run down a wall over time.

Not available with WL38.

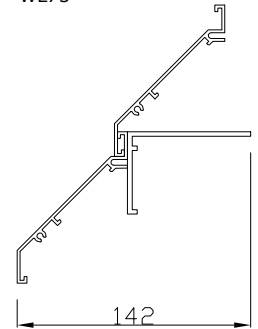
Please note: Recessed and reversed flange louvres will have a folded sheet metal drip cill with a profile appropriate to the selected blade type.



WL50



WL75



Rear mounted drip tray - Ordering code DT

Drip trays can be fitted to any series weather louvre, however on WL75's they are required if Class C rain rejection performance is needed.

Drip trays act to catch any water which penetrates through the louvre.

Trays protrude 65mm past the rear of the frame.

Please note: If specified on a reversed flange weather louvre, the drip tray will protrude into the aperture.



Further options

Combination units

Combining two essential components in any ventilation system, combination units integrate a standard weather louvre with a volume control damper. A fully welded, black powder coated galvanised steel backbox joins the two components.

This ready made solution means installation time and costs are reduced and ordering is made simple as you only need supply us with one size; we do the rest.

Volume control dampers can be supplied with a plastic handle or locking quadrant for manual operation, or with a factory fitted electric or pneumatic actuator.

For more information on combination units please refer to the combination unit PDF available for download from our website.

Suitable weather louvres:

Series WL50 and WL75

Suitable volume control dampers:

Series LF uPVC VCD high performance plastic
Series HVC-VCD aluminium



Burglar bars - Ordering code BB

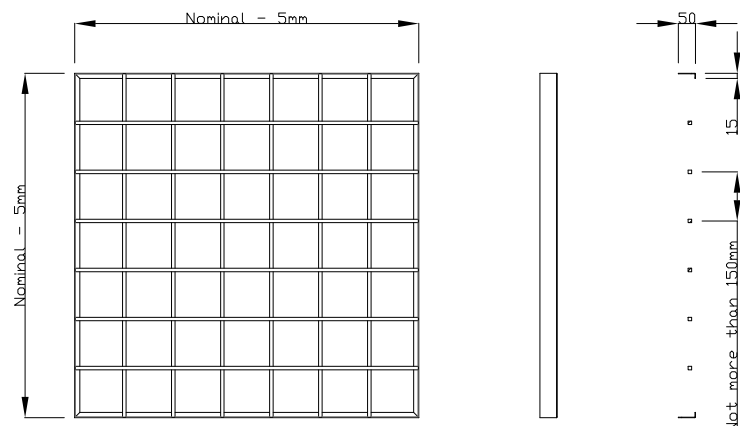
A wall mounted aluminium weather louvre can be a security risk, potentially providing an un-alarmed entry point to a building for any determined would be intruder.

Proving an extremely robust barrier to entry, burglar bars can be fitted to mitigate this risk.

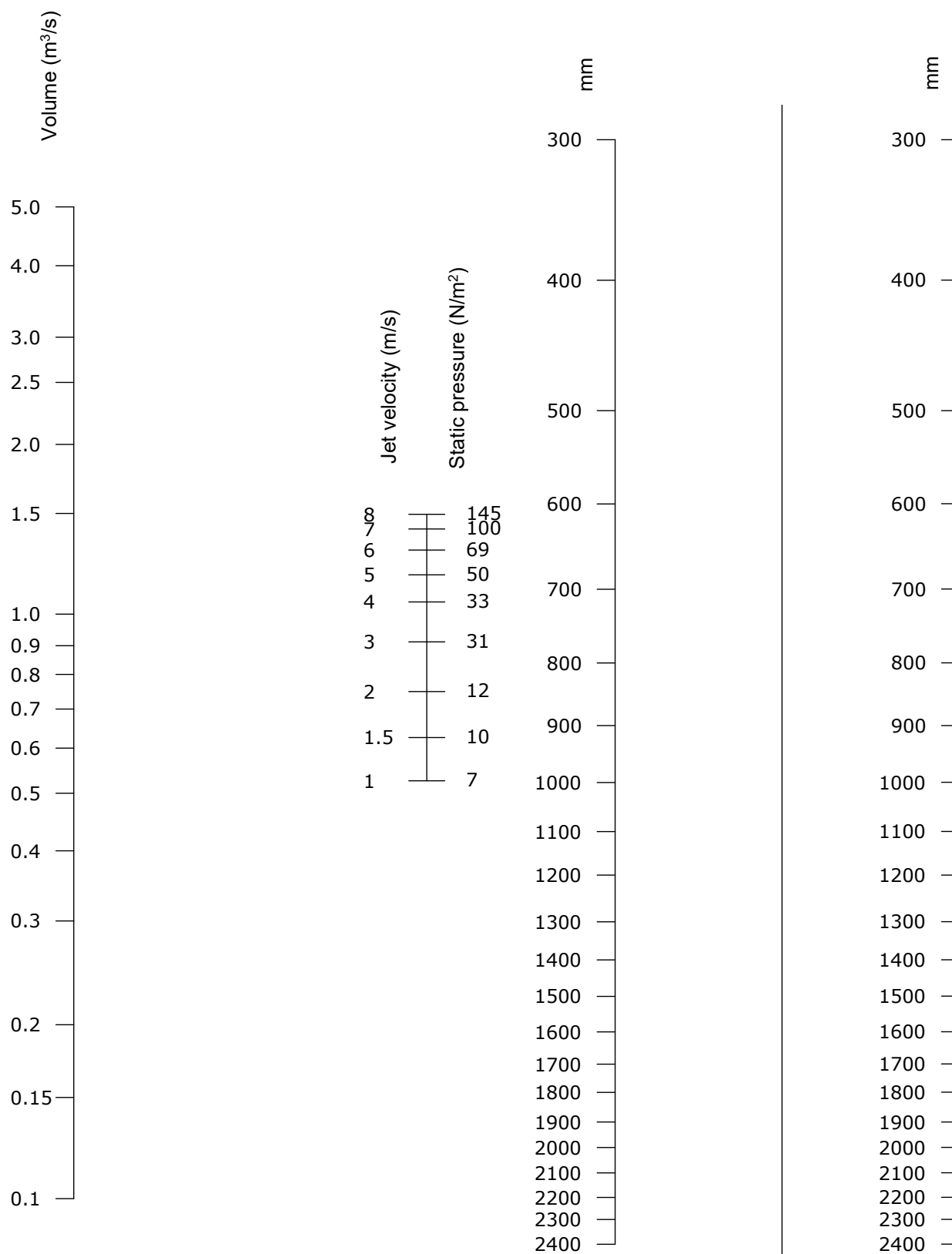
Designed to be fitted directly behind a louvre, burglar bars are constructed with a 1.2mm thick galvanised steel outer frame and a grid of 10mm fully welded steel bars, leaving spaces of not more than 150mm square.

Frames are supplied undrilled to accept whatever fixings are required on site.

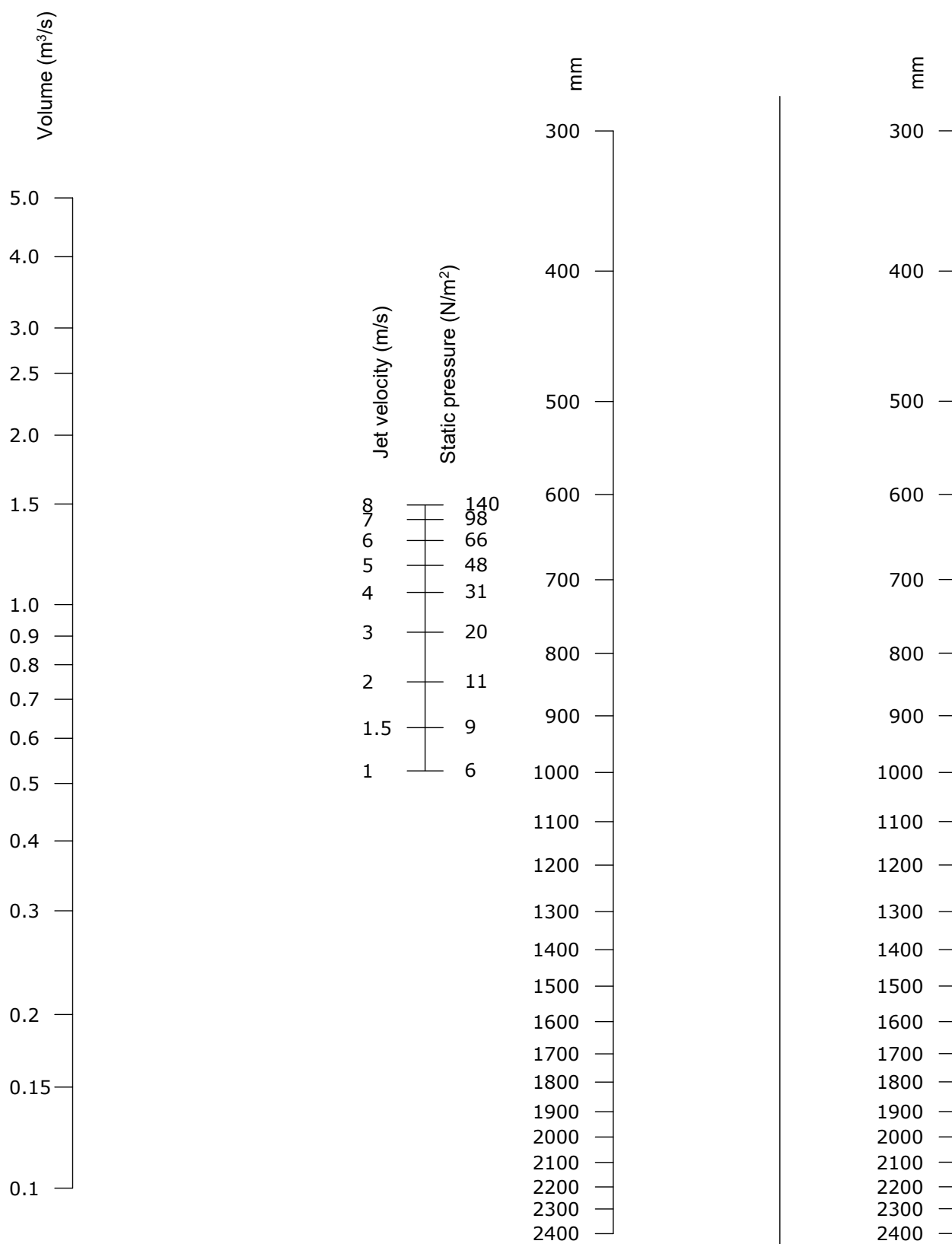
Supplied in a powder coated black finish as standard.



Selection data: WL38 and WL50



Selection data: WL75



Feature: Series HPL80 ultra high performance weather louvres

Should high performance rain rejection be required for your application, the new HPL80 may be more suitable than a Series WL standard weather louvre.

The new HPL80 louvre is an extremely high performance weather louvre, intended for installations demanding unimpeded ventilation, without the risk of water ingress.

Through its use of the new '*Air-Bypass*' blade design (UK patent application pending), never-before-seen levels of performance for a horizontally bladed weather louvre are achieved when tested against BS EN 13030:2001, the most widely used weather louvre test standard in Europe:

HPL80 with insect mesh: Class A2 up to 4.0 m/s

HPL80 with bird mesh: Class A2 up to 2.5 m/s

For more details on the HPL80, please search for the HPL80 on our website.



Finish

Mill aluminium (standard)

Satin anodised (AA5) - Only with WL50-25F/30FW

Polyester powder coating to any RAL or BS colour



Ordering codes

Example

1 - 1000 x 1000 - WL50 - BM - FH - 30FW - DC - RAL9010 - 1S - BB

Codes

1)	Quantity		
2)	Size (mm)	(Width x height)	
3)	Series	WL38 WL50 WL75	38mm pitch weather louvre 50mm pitch weather louvre 75mm pitch weather louvre
4)	Frame design	(nothing) REC REV	Flanged Recessed frame Reversed frame
5)	Debris screens	BM IM VM	Bird mesh (12.7mm x 12.7mm weave, galvanised steel) Insect mesh (1.6mm x 1.6mm weave, G304 stainless steel) Vermin mesh (6mm x 6mm weave, G304 stainless steel)
6)	Fixings	FH RFL GZ	Pre-punched face fixing holes Rear mounted fixing lugs Glazing bar. State depth required.
7)	Flanges	30FW 25F 50FS 3" x 2" x 1/8" 4" x 2" x 1/8" 50FD 3" x 3" x 1/8" 4" x 4" x 1/8"	WL38 and WL50: 30mm flat flange (standard) 25mm flat flange (optional) 50mm flat flange - shallow (optional) 3" (76.2mm) flat flange (optional) 4" (101.6mm) flat flange (optional) WL75: 50mm flat flange - deep (standard) 3" (76.2mm) flat flange (optional) 4" (101.6mm) flat flange (optional)
8)	Additional options	DC DT	Face mounted drip cill (not available with WL38) Rear mounted drip tray (required for Class C performance with WL75)
9)	Finish	Mill SAA RAL... BS...	Mill aluminium (standard) Satin anodised - AA5 (only available with WL50-25F/30FW) Polyester powder coated to RAL... Polyester powder coated to BS...
10)	Sections	_S	Number of sections required. If left blank this will be confirmed on order acknowledgement
11)	Burglar/security bars	BB	Burglar bars required

Important: Size will be taken to be nominal (hole internal) unless stated otherwise.

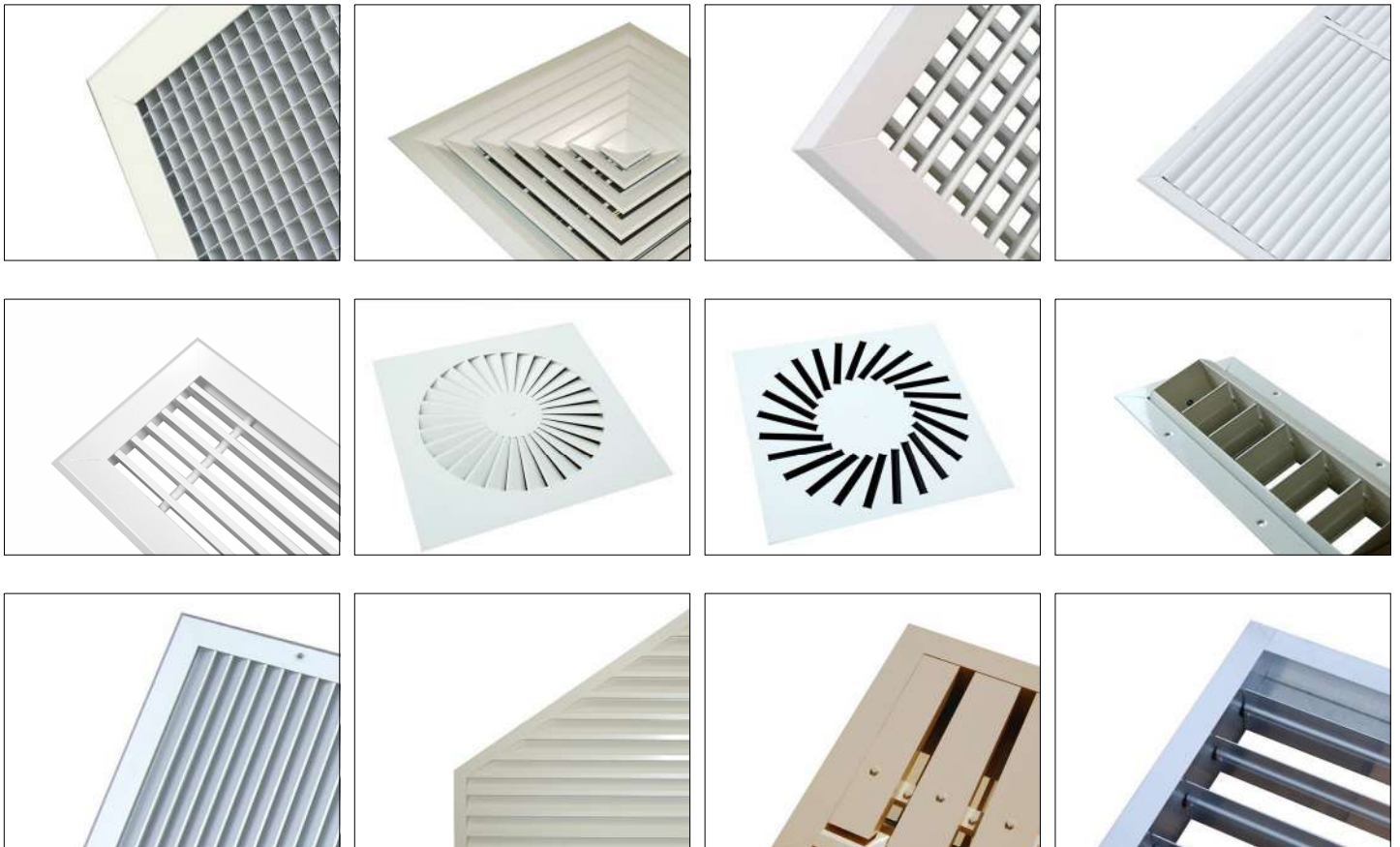
Leave code section blank if no option is required.

HVC & NCA products

HVC offer the significant advantage of manufacturing both in duct and duct terminal equipment, making us a one stop shop for all your HVAC needs.

The products shown below are a selection, not an exhaustive list. Go to www.h-v-c.com for details on all HVC and NCA products.

HVC: Grilles, Diffusers, Louvres and Volume Control Dampers



NCA: Fire and Volume Control Dampers





Assessed to ISO 9001
Cert/Ref No. 1186

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