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Project: J 05090R1
Noise Impact Assessment:
6 St John's Wood Park NW8 6QS

Consultants: Sound Planning Ltd
25a Vicarage Hill
Lower Bourne
Farnham
Surrey
GU10 3QS

[

Client: 6 St John's Wood Park NW8 6QS

Prepared by: D. M. Thomas

Signed:

D. M. Thomas MSc M.I.O.A
Acoustic Consultant

Dated: Wednesday 21st June 2023

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CONTENTS

1.0 BACKGROUND

1.1 Planning permission is sought for the installation of an air conditioning system at 6 St John's Wood Park NW8 6QS; the system will have 1 external condenser unit located to the corner of the rear garden area.

See APPENDIX 2 – Site Location/Plans

1.2 The proposed location for the external condenser unit is 6 metres away from the nearest noise sensitive window (ground floor / screened) and 7 metres away from the nearest noise sensitive window with direct line of sight (5 St John's Park Wood).

See APPENDIX 2 – Site Location/Plans & APPENDIX 3 – Site Photographs

1.3 The location falls under the jurisdiction of the London Borough of Camden; a noise impact assessment should be carried out in accordance with the Camden Local Plan 2017.

1.4 Sound Planning has been retained to evaluate potential noise impact on the nearest noise sensitive receivers using appropriate methodologies and assessment criteria and design a suitable noise mitigation strategy if required.

1.4.1 Participating Acoustic Consultant

Dan Thomas is a Member of the Institute of Acoustics (M.I.O.A) having attained appropriate qualifications in acoustics and experience within the workplace.

1.4.2 Qualifications

Dan has been working within the noise and vibration industry for fifteen years and has attained the following qualifications within the field of acoustics:

- Institute of Acoustics (IOA) Diploma
- Post Graduate Diploma in Applied Acoustics and Noise Control (University of Surrey)
- Masters Degree in Applied Acoustics and Noise Control (University of Surrey)

2.0 ASSESSMENT CRITERIA

2.1 Noise emissions from mechanical plant should be assessed in accordance with the requirements of the Local Planning Authority and relevant national standards:

2.2 Camden Local Plan 2017 - Policy A4 - Noise and Vibration

2.2.1 The council will seek to ensure that noise and vibration is controlled and managed.

2.2.2 Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

a. Developments likely to generate unacceptable noise and vibration impact; or

b. Developments sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

2.2.3 We will only grant planning permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of the development.

2.3 Camden Local Plan 2017 - APPENDIX 3 - Noise Thresholds

2.3.1 A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142: 2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating level' of 10 dB below background (15 dB if tonal components are present) should be considered as the design criteria.

2.3.2 Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise Sensitive Receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SAOEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10 dB below background	'Rating level' between 9 dB below and 5 dB above background	'Rating level' greater than 5 dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10 dB below background and no events exceeding 57 dB L_{Amax}	'Rating level' between 9 dB below and 5 dB above background or noise events between 57 dB and 88 dB L_{Amax}	'Rating level' greater than 5 dB above background and/or events exceeding 88 dB L_{Amax}

* 10 dB should be increased to 15 dB if the noise contains audible tonal elements (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

* Levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 07:00 hours to 23:00 hours for the day and 23:00 to 07:00 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amending according to the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS 4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependent on the room (based upon measured or predicted $L_{eq,\ 5mins}$ noise levels in octave bands) 1 metre from the facade of the noise sensitive premises is located in a quiet background area.

2.4 Noise emissions from mechanical plant should be assessed in accordance with the requirements of British Standard 4142: 2014+A1: 2019[1]

2.4.1 This British Standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

a) sound from industrial and manufacturing processes;

b) sound from fixed installations which comprise mechanical and electrical plant and equipment;

c) sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and

d) sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

2.4.2 This standard is applicable to the determination of the following levels at outdoor locations:

a) rating levels for sources of sound of an industrial and/or commercial nature and

[1] British Standard 4142: 2014+A1: 2019 – Methods for rating and assessing industrial and commercial sound.

b) ambient, background and residual sound levels, for the purposes of:

- investigating complaints;
- assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and
- assessing sound at proposed new dwellings or premises used for residential purposes.

2.5 Noise Measurement Protocol - British Standard 7445-1: 2003[2]

2.5.1 The methods and procedures described in BS 7445 are intended to be applicable to sounds from all sources, individually and in combination, which contribute to the total noise at a site.

2.5.2 The aim of the BS 7445 series is to provide authorities with material for the description of noise in community environments. Based on the principles described in this standard, acceptable limits of noise can be specified and compliance with these limits can be controlled.

2.5.3 BS 7445 does not specify limits for environmental noise.

3.0 METHODOLOGY

3.1 Existing Noise Climate

6 St John's Wood Park NW8 6QS is situated on a residential street with low traffic flow; the dominant source of noise is from road traffic on St John's Wood Park.

See APPENDIX 2 – Site Location/Plans

3.2 Background Noise Measurements

3.2.1 Extended background noise measurements were carried out over the period: 12:30 hours, Thursday 1st June – 12:15 hours, Tuesday 6th June, 2023.

[2] Description and measurement of environmental noise. Part 1 – Guide to quantities and procedures.

3.2.2 The air conditioning system is for residential purposes and will therefore be potentially operational at any time during a given 24 hour period.

3.2.3 The microphone was located away from any vertical reflective surfaces within the rear garden; the monitoring position should be deemed representative of the nearest noise sensitive receiver i.e. rear elevation of 5 St John's Wood Park.

See APPENDIX 3 – Site Photographs

3.2.4 Measurements were undertaken in accordance with BS 7445[3] and BS 4142[4].

3.2.5 The Sound Level Meter (SLM) used for the assessment is Class 1 with real time octave band measurement capability and compliant to IEC 61672[5].

3.2.6 The A-weighted L_{90}, L_{eq} and L_{max} descriptors were measured every 15 minutes using the Fast (F) setting and logged periodically over the extended measurement period.

3.3 Instrumentation/Equipment

3.3.1 Equipment

Equipment	Make	Model	Type	Serial Number	UKAS Calibration
SLM	Norsonic	Nor 140	1	1406176	U44212 (11/523)
Field Calibrator	Casella	CEL 110/1	1	077948	U44208 (11/5/23)
Environmental Tripod					
Wind/Weather Shield					
Laser Measurer	Leica	Disto A5		1073750838	
Digital Camera	Samsung				

[3] British Standard 7445-1: 2003 – *Description and measurement of environmental noise.*
[4] British Standard 4142: 2014+A1: 2019 – *Methods for rating and assessing industrial and commercial sound.*
[5] International Standard IEC 61672-1: 2002. Electroacoustics – Sound level meters – Part 1: Specifications.

3.3.2 Field Calibration

A field calibration was conducted for the SLM microphone; no deviation was detected (1kHz). UKAS calibration certificates are available on request.

4.0 RESULTS

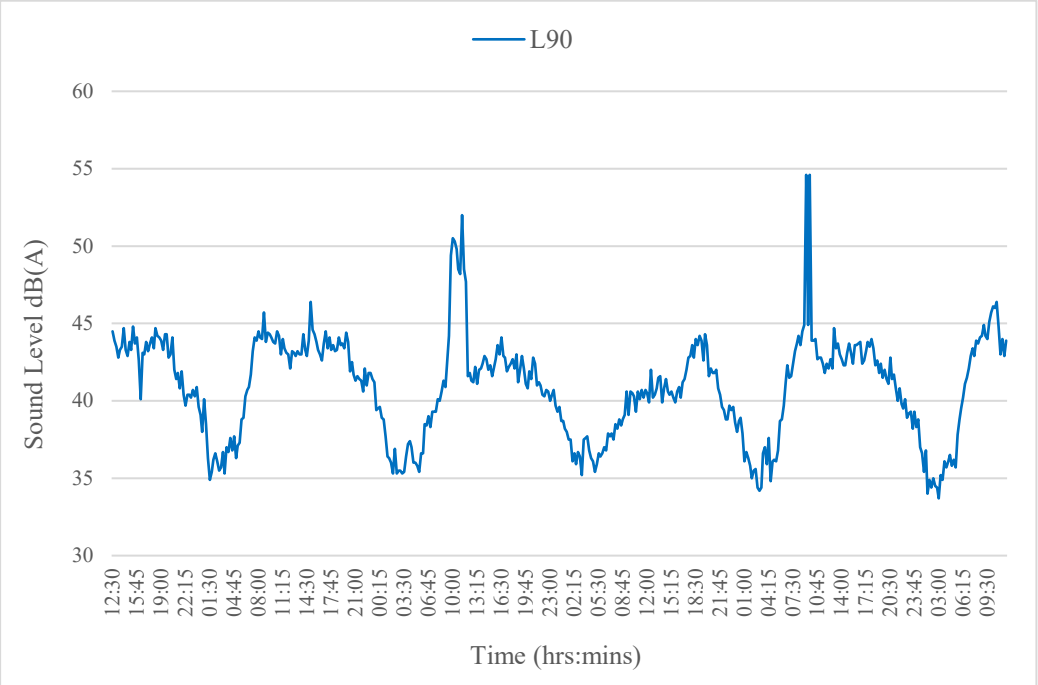
4.1 Background Noise Levels

4.1.1 Table – Lowest Background Noise Levels

Time Period (hours)	Description	Typical Lowest Background Noise Level dB $L_{A90, 15mins}$
07:00 - 23:00	Daytime	40
23:00 - 07:00	Night Time	35

See APPENDIX 5 – Background Noise Levels for full results.

4.1.2 Graph – Existing Noise Levels (Background)



4.2 External Condenser Unit - Sound Pressure Level (SPL)

Equipment	Make	Model	Sound Pressure Level @ 1m dB L_{PA}
External Condenser Unit	Daikin	RXYSCQ6TV1	53

4.3 Meteorological Conditions[6]

Weather conditions were generally dry with light winds in accordance with the requirements of BS 4142: 2014+A1:2019 and BS 7445:2003.

See APPENDIX 8 – Meteorological Conditions

4.4 Levels of Uncertainty

Category	Notes
Complexity of Sound Source	Compressor, Fan
Complexity of Acoustic Environment (Residual)	Road Traffic/Residential Noise
Level of Residual Sound (including Specific)	n/a
Measurement Locations	Representative of nearest noise sensitive receivers
Distance Between Sound Source & Measurement Position	n/a
Number of Measurements Taken	5 Days (15 min periods)
Measurement Time Intervals	Continuous
Range of Times	Representative of quietest likely times of proposed operation
Range of Suitable Weather Conditions	1 measurement period – Suitable weather conditions
Measurement Method/Practitioners	1 measurement period (Dan Thomas)
Level of Rounding	Rounded to nearest DP; 0.5 rounded up
Instrumentation	Class 1 SLM (suitable)

[6] Source: www.wunderground.com

5.0 CRITERIA EVALUATION

5.1 Noise Impact at Nearest Noise Sensitive Window

5.1.1 Target Noise Level (Camden)

Period	Reference Background Noise Level dB $L_{A90, 15mins}$	Target Noise Level at NSR (dBA)
Daytime	40	30
Night Time	35	25

5.1.2 Daytime Residential Living Room – Ground Floor 5 St John's Wood Park

Daikin RXYSCQ6TV1 @ 1m	53 dB L_{Aeq}
Directivity Index	+6 dB (Q = 4)
Distance to NSR	6 metres
Direct Line of Sight	No (-5 dB screening correction)
Sound Level @ NSR (-1m)	53 - 20 log (5/1) + 6 - 5
	= 40 dB(A)
Noise Impact Evaluation – Camden	
SPL @ NSR	40 dB L_{Aeq}
Camden Target Level (see para 5.1.1)	30 dB(A)
Excess	10 dB(A)
Noise Mitigation Required	10 dB(A)

5.1.3 Night Time Residential Bedroom – 1st Floor 5 St John's Wood Park

Daikin RXYSCQ6TV1 @ 1m	53 dB L_{Aeq}
Directivity Index	+6 dB (Q = 4)
Distance to NSR	7 metres
Direct Line of Sight	Yes (no screening correction)
Sound Level @ NSR (-1m)	53 - 20 log (6/1) + 6
	= 43 dB(A)
Noise Impact Evaluation – Camden	
SPL @ NSR	43 dB L_{Aeq}
Camden Target Level (see para 5.1.1)	25 dB(A)
Excess	18 dB(A)
Noise Mitigation Required	18 dB(A)

6.0 NOISE MITIGATION STRATEGY

6.1 Noise Mitigation Measures

6.1.1 The noise impact evaluation (para 5.1.3) shows that the predicted external unit noise emission level at the worst affected noise sensitive window is 18 dB(A) over Camden's target noise level (achieving LOAEL – Green).

6.1.2 Acoustic Enclosures

To achieve a sound reduction of 18 dB(A) the external condenser unit should be housed within an acoustic enclosure.

The acoustic enclosure should reduce sound levels by 18 dB(A), facilitate adequate air flow and provide service access.

See APPENDIX 6 – Noise Mitigation Options

6.2 Vibration Isolation

6.2.1 Sound Planning would recommend mounting the external condenser unit on a suitable isolation system to reduce vibration transmission to noise sensitive buildings in close proximity; suitable systems include the Kinetics Model AC (supplied by CMS Acoustics) and Mini Split Kits (supplied by Big Foot Systems).

6.2.2 Supplier Contacts Details

CMS Acoustics TEL: 01925 577711
Big Foot Systems TEL: 01323 844355

7.0 CONCLUSIONS

7.1 Sound Planning has carried out an environmental noise impact assessment in accordance with BS 7445: 2003 and BS 4142: 2014+A1: 2019.

See Section 3.0 - METHODOLOGY

7.2 Reference Background Levels / Camden Target Noise Levels

Time Period (hours)	Description	Lowest Background Noise Level dB $L_{A90, 15mins}$	Target Noise Levels Camden dB(A)
07:00 - 23:00	Daytime	40	30
23:00 - 07:00	Night Time	35	25

See Section 4.0 - RESULTS

7.3 Noise Impact Evaluation

The noise impact evaluation (para 5.1.3) shows that the predicted external condenser unit level at the nearest noise sensitive window is 18 dB(A) over Camden's target noise level.

7.4 Noise Mitigation Strategy

A suitable acoustic enclosure is required to reduce external condenser unit levels down to meet Camden's target noise levels.

See Section 6.0 - NOISE MITIGATION STRATEGY

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APPENDIX 1

Glossary of Acoustic Terms

The Decibel, dB

The unit used to describe the magnitude of sound is the decibel (dB) and the quantity measured is the sound pressure level. The decibel scale is logarithmic and it ascribes equal values to proportional changes in sound pressure, which is a characteristic of the ear. Use of a logarithmic scale has the added advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers. The threshold of hearing occurs at approximately 0 dB (which corresponds to a reference sound pressure of 2×10^{-5} pascals) and the threshold of pain is around 120 dB. The sound energy radiated by a source can also be expressed in decibels. The sound power is a measure of the total sound energy radiated by a source per second, in watts. The sound power level, L_w is expressed in decibels, referenced to 10^{-12} watts.

Frequency, Hz

Frequency is analogous to musical pitch. It depends upon the rate of vibration of the air molecules that transmit the sound and is measure as the number of cycles per second or Hertz (Hz). The human ear is sensitive to sound in the range 20 Hz to 20,000 Hz (20 kHz). For acoustic engineering purposes, the frequency range is normally divided up into discrete bands. The most commonly used bands are octave bands, in which the upper limiting frequency for any band is twice the lower limiting frequency, and one-third octave bands, in which each octave band is divided into three. The bands are described by their centre frequency value and the ranges which are typically used for building acoustics purposes are 63 Hz to 4 kHz (octave bands) and 100 Hz to 3150 Hz (one-third octave bands).

Noise Rating

The Noise Rating (NR) system is a set of octave band sound pressure level curves used for specifying limiting values for building services noise. The Noise Criteria (NC) and Preferred Noise Criteria (PNC) systems are similar.

A-weighting

The sensitivity of the ear is frequency dependent. Sound level meters are fitted with a weighting network which approximates to this response and allows sound levels to be expressed as an overall single figure value, in dB(A).

Noise Descriptors

Where noise levels vary with time, it is necessary to express the results of a measurement over a period of time in statistical terms. Some commonly used descriptors follow.

$L_{Aeq, T}$ *The most widely applicable unit is the equivalent continuous A-weighted sound pressure level ($L_{Aeq, T}$). It is an energy average and is defined as the level of a notional sound which (over a defined period of time, T) would deliver the same A-weighted sound energy as the actual fluctuating sound.*

L_{AE} *Where the overall noise level over a given period is made up of individual noise events, the $L_{Aeq, T}$ can be predicted by measuring the noise of the individual noise events using the sound exposure level, L_{AE} (or SEL or L_{AX}). It is defined as the level that, if maintained constant for a period of one second, would deliver the same A-weighted sound energy as the actual noise event.*

L_{A1} *The level exceeded for 1% of the time is sometimes used to represent typical noise maxima.*

L_{A10} *The level exceeded for 10% of the time is often used to describe road traffic noise.*

L_{A90} *The level exceeded for 90% of the time is normally used to describe background noise.*

Sound Transmission Descriptors

D_{nT} Standardised level difference

$D_{nT, w}$ Weighted standardised level difference

L_1 The average sound pressure level in the source room

L_2 The average sound pressure level in the receiving room

T Reverberation time (receiving room)

T_0 Reference reverberation time = 0.5s

C_{tr} Adaption spectrum which takes account for low to medium speed road/rail/air traffic; disco music; and factory noise (medium to low frequency noise).

C Adaptation spectrum which takes account of domestic activities including speech, music, radio and television.

Frequency Analysis

Octave Band	*A band of frequencies the upper limit of which is twice the lower limit. They are known by their centre frequency, e.g., 63, 125, 250, 500, 1000, 2000 Hz…*
One Third Octave	*The logarithmic frequency interval between a lower frequency f_2, when f_2/f_1 equals $2^{1/3}$ apart. Frequencies include: 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000Hz.*

Sound Transmission in the Open Air

Most sources of sound can be characterised as a single point in space. The sound energy radiated is proportional to the surface area of a sphere centred on the point. The area of a sphere is proportional to the square of the radius, so the sound energy is inversely proportional to the square of the radius. This is the inverse square law.

In decibel terms, every time the distance from a point source is doubled, the sound pressure level is reduced by 6 dB. Road traffic noise is a notable exception to this rule, as it approximates to a line source, which is represented by the line of the road. The sound energy radiated is inversely proportional to the area of a cylinder centred on the line. In decibel terms, every time the distance from a line source is doubled, the sound pressure level is reduced by 3 dB.

Factors Affecting Sound Transmission in the Open Air

Reflection

When sound waves encounter a hard surface, such as concrete, brickwork, glass, timber or plasterboard, it is reflected from it. As a result, the sound pressure level measured immediately in front of a building façade is approximately 3 dB higher than it would be in the absence of the façade.

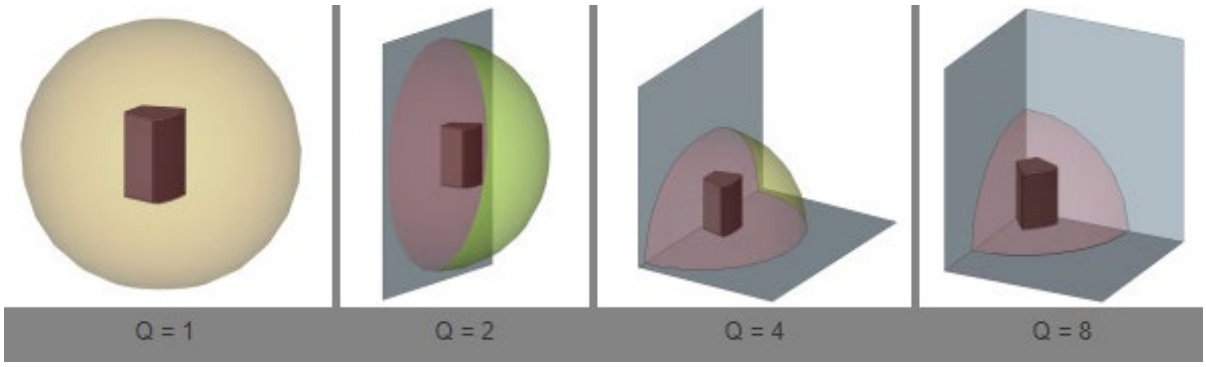
Screening and Diffraction

If a solid screen is introduced between a source and receiver, interrupting the sound path, a reduction in sound level is experienced. This reduction is limited, however, by diffraction of the sound energy at the edges of the screen. Screens can provide valuable noise attenuation however. For example, a timber boarded fence built next to a motorway can reduce noise levels on the land beyond, typically by around 10 dB(A). The best results are obtained when a screen is situated close to the source or close to the receiver.

Meteorological Effects

Temperature and wind gradients affect noise transmission, especially over large distances. The wind effects range from increasing the level by typically 2 dB downwind, to reducing it by typically 10 dB upwind – or even more in extreme conditions. Temperature and wind gradient are variable and difficult to predict.

Directivity Index



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APPENDIX 2

Site Location/Plans

6 St John's Wood Park NW8

Key

Microphone position (background noise measurements)

Proposed External Condenser Position (AC)

Site Location/Plans

6 St John's Wood Park NW8

Distance to Nearest Noise Sensitive Receiver

Notes:

- 6m to ground floor window
- 7m to 1st floor window (3.5m off ground)

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APPENDIX 3

Site Photographs

Background Monitoring Position

Background Monitoring Position

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APPENDIX 4

AC Equipment

Daikin RXYSCQ6TV1

DAIKIN

RXYSCQ

Unseen in all the right places

Planning requirements in built up areas require increasingly more innovative products to aid restrictions, especially on visibility of plant.

The Compact Mini VRV range allows VRV to be installed behind parapet walls, or hidden from view on a roof. Even with condenser feet fitted, the unit is less than 1m high.

Mini VRV systems deliver VRV performance in a small, convenient package by offering a compact, horizontal blow, air conditioning solution for projects with lower capacity requirements or where discretion is required due to the planning or aesthetic requirements of the application.

Daikin are pleased to announce that our Mini VRV systems have received a complete redesign, and include the lowest height 4, 5 & 6 Horsepower Mini VRV condenser available on the market.

Features and benefits:

- New low height Mini VRV, making complying with planning restrictions in towns and cities easier
- Compact – Only 823mm high
- Lightweight – for simple installation
- Variable Refrigerant temperature – Enhanced efficiency
- In addition to VRV fan coils, low height Mini VRV is connectable to Split type indoor units such as Stylish or Emura, or even using a Biddle Air Curtain

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AC Equipment

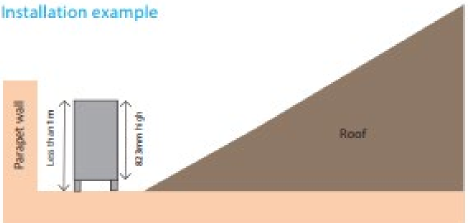
Daikin RXYSCQ6TV1

Mini VRV Compact

RXYSCQ

Outdoor Units			RXYSCQ4TV1	RXYSCQ5TV1	RXYSCQ6TV1
Capacity	Nominal Cooling	kW	12.1	14.0	15.5
	Nominal Heating	kW	12.1	14.0	15.5
$\eta_{s,c}$	Seasonal Efficiency Cooling	%	322.8	303.4	281.3
$\eta_{s,h}$	Seasonal Efficiency Heating	%	182.3	185.1	186
Dimensions	Height x Width x Depth	mm	823 x 940 x 460	823 x 940 x 460	823 x 940 x 460
Weight		kg	89	89	89
Refrigerant Circuit	Refrigerant Type		R410A	R410A	R410A
Sound Pressure (Nom)	Cooling	dBA	51.0	52.0	53.00
Sound Power (Nom)	Cooling	dBA	68.0	69.0	70.00
Maximum No of Connectable Units			8	10	13
Electrical Details	Power Supply	Phase / Hz / V		1 / 50 / 230	
	Running Current	amps	19.6	19.6	23.2
	Fuse Rating	amps	32	32	data book
Piping Limits	Total Piping length	m	300	300	300
	Maximum Length	m	70 (90 equivalent)	70 (90 equivalent)	70 (90 equivalent)
	Maximum Vertical Rise	m	30	30	30
Piping Connections	Liquid	inch (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Gas	inch (mm)	5/8 (15.9)	5/8 (15.9)	3/4 (19)
Capacity Index Limit			50~130	62.5~162.5	70~182

Installation example



The VRV IV-S family

10/12 HP | 8 HP | Standard 4/5/6 HP | 4, 5 & 6 HP compact

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CERTIFIED ISO 9001 · ISO 14001

FSC

Daikin Airconditioning UK Limited The Heights Brooklands Weybridge Surrey KT13 0NY Tel 01932 879000 Fax 01932 879009 daikin.co.uk

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APPENDIX 5

Background Noise Measurements

Table

Date	Time	L_{Aeq}	L_{AFmax}	L_{AFmin}	L_{AF50}	L_{AF90}
d/m/yy	(hrs:mins)	(dB)	(dB)	(dB)	(dB)	(dB)
1/6/23	12:30	51.1	71.1	41.5	47.5	44.5
1/6/23	12:45	48.1	74.2	40.5	46.4	43.9
1/6/23	13:00	48.2	62.5	38.5	46.2	43.5
1/6/23	13:15	48.2	58.6	39.9	46.1	42.8
1/6/23	13:30	56.1	79.1	39.3	46.8	43.3
1/6/23	13:45	47.9	62.2	39.7	46	43.5
1/6/23	14:00	49.3	62.8	41.6	47.8	44.7
1/6/23	14:15	46.8	62.8	40.1	46	43.3
1/6/23	14:30	47.5	62.6	39.4	45.7	42.9
1/6/23	14:45	48.7	61.2	40.1	47.7	43.8
1/6/23	15:00	47.4	61.3	40.8	46.1	43.3
1/6/23	15:15	48.7	59	41.8	47.3	44.8
1/6/23	15:30	52.1	77.6	40.9	47	43.7
1/6/23	15:45	49.5	66.5	18.4	48.4	44.1
1/6/23	16:00	48.2	74.1	-10.7	47.1	42.6
1/6/23	16:15	48.7	72	8.5	44.7	40.1
1/6/23	16:30	48.7	66.9	40.1	46.4	43.1
1/6/23	16:45	49.2	62.6	32.7	46.8	43
1/6/23	17:00	49.5	64.6	37.6	47.3	43.8
1/6/23	17:15	47.8	62.5	40.7	46.7	43.2
1/6/23	17:30	47.4	55.8	41.2	46.8	43.7
1/6/23	17:45	49.9	63.6	41.3	47.7	44.1
1/6/23	18:00	49.6	70.2	40.5	46.4	43.4
1/6/23	18:15	48.9	65.8	39.8	47.8	44.7
1/6/23	18:30	49.5	64.2	41.3	47.9	44.2
1/6/23	18:45	48.1	65	41.1	47.2	44.1
1/6/23	19:00	47.6	65.3	41.5	46.5	43.9
1/6/23	19:15	48.1	62.7	40.7	46.6	43.3
1/6/23	19:30	48.2	63.3	41.3	46.9	44.3
1/6/23	19:45	48.1	59.4	42	46.8	44.3
1/6/23	20:00	47.2	72	40.3	45.8	42.8
1/6/23	20:15	46.9	60.1	40.5	45.2	43
1/6/23	20:30	54.4	72.9	40.8	46.9	44.1
1/6/23	20:45	46.7	64.9	39.4	44.7	42
1/6/23	21:00	46.8	68.5	39.4	43.5	41.4
1/6/23	21:15	46.8	64.3	39.6	44.3	41.8
1/6/23	21:30	44.3	57.6	38.7	43	40.8
1/6/23	21:45	47.4	62.8	39.7	44.8	41.9
1/6/23	22:00	45.4	66.7	38.5	42.7	40.4
1/6/23	22:15	44.5	62.9	36.9	42.3	39.7
1/6/23	22:30	47.9	68.9	37.9	42.4	40.4
1/6/23	22:45	44.8	63.5	37.8	42.6	40.4

1/6/23	23:00	45.4	61.7	36.8	42.9	40.2
1/6/23	23:15	44.7	58.8	38.6	42.8	40.7
1/6/23	23:30	52.9	76.6	38	42.7	40.3
1/6/23	23:45	44.1	55.7	37.7	43	40.9
2/6/23	00:00	43.2	57.4	37.4	41.8	39.6
2/6/23	00:15	44	70.2	36.3	41.7	39.1
2/6/23	00:30	43.2	54.9	35.4	41.3	38
2/6/23	00:45	46	59.8	37.9	43.4	40.1
2/6/23	01:00	43.5	57.6	35.1	41.5	38.5
2/6/23	01:15	40.8	54.4	33.7	39.3	36.3
2/6/23	01:30	40.3	56.3	31.9	38.2	34.9
2/6/23	01:45	40.4	56	32	39.1	35.4
2/6/23	02:00	40.4	53.8	33.5	38.9	36.2
2/6/23	02:15	41.1	58.4	33.6	39.7	36.6
2/6/23	02:30	41.8	55.5	33.6	39.6	36.1
2/6/23	02:45	39.9	51.2	32.7	38.5	35.5
2/6/23	03:00	41.9	59.3	33.2	38.7	35.7
2/6/23	03:15	42.1	56.9	34.7	39.8	36.7
2/6/23	03:30	40.5	56.1	32.7	38.2	35.3
2/6/23	03:45	41	56.5	34.1	39.4	37
2/6/23	04:00	42.3	56.9	33.8	40.4	36.7
2/6/23	04:15	43.5	60.8	34.9	41.2	37.6
2/6/23	04:30	41.3	58.4	33.9	39.6	36.8
2/6/23	04:45	41.3	54.2	35.1	40	37.7
2/6/23	05:00	43	62.7	34.1	39.8	36.3
2/6/23	05:15	41.9	60.6	34.4	40.4	37.1
2/6/23	05:30	41.2	53.7	34.8	40	37.3
2/6/23	05:45	42.4	58	36.8	41.1	38.8
2/6/23	06:00	42.6	54	36.8	41.4	38.9
2/6/23	06:15	42.8	51.7	37.3	42.3	40.3
2/6/23	06:30	43.4	52	37.8	42.7	40.7
2/6/23	06:45	44	55.7	39.1	42.9	40.9
2/6/23	07:00	44.8	63.6	39.8	43.8	41.7
2/6/23	07:15	47.8	64.4	40.7	45.9	43.2
2/6/23	07:30	48.7	68.8	41.7	46.8	44.1
2/6/23	07:45	48.5	62.2	40.7	47.1	43.9
2/6/23	08:00	49.3	61.5	42	47.5	44.5
2/6/23	08:15	52.8	66.7	42	47.5	44.1
2/6/23	08:30	51.6	65.7	41	48.7	44
2/6/23	08:45	51.5	66.4	41.4	49.5	45.7
2/6/23	09:00	48.3	60.4	41.2	46.9	43.8
2/6/23	09:15	48.7	59.8	40.9	47.1	44.4
2/6/23	09:30	49.3	60.8	42.1	47.2	44.3
2/6/23	09:45	49.2	59.3	41.8	47.5	44.1
2/6/23	10:00	48.8	74.3	6.2	46	43.8
2/6/23	10:15	47.1	65.3	41.7	46.2	43.7
2/6/23	10:30	50.2	69.4	42.1	47.5	44.5
2/6/23	10:45	50.8	69	40.7	47.2	44.2
2/6/23	11:00	47.6	65.1	41.2	45.5	43
2/6/23	11:15	48.5	65.3	41.2	46.9	44
2/6/23	11:30	47.3	63.6	40	45.8	43.4
2/6/23	11:45	47.8	62.3	41.1	46.2	43.1
2/6/23	12:00	47.3	61	40.7	46	43
2/6/23	12:15	45.8	59	39.1	44.6	42.1

2/6/23	12:30	48.3	61.3	39.9	46.4	43.2
2/6/23	12:45	47.7	62.5	40.6	46.1	43.1
2/6/23	13:00	47.8	59.5	40.5	46.3	42.9
2/6/23	13:15	49.4	66.3	41.3	46.6	43.2
2/6/23	13:30	48	61.6	39.6	46	43
2/6/23	13:45	47	60.2	39.4	45.5	43
2/6/23	14:00	49.9	68.7	40.9	47.5	44.3
2/6/23	14:15	48.6	59.7	39.5	47.1	43.3
2/6/23	14:30	49.3	66.2	40.6	47.1	42.9
2/6/23	14:45	48.2	66	41.7	47.2	43.9
2/6/23	15:00	51.3	70.5	42.2	49.7	46.4
2/6/23	15:15	50.8	68.5	41.8	48.2	44.6
2/6/23	15:30	51.2	70.7	41.3	48.3	44.3
2/6/23	15:45	48.5	63.8	41.2	47	43.8
2/6/23	16:00	47.9	62.3	40.3	46.6	43.3
2/6/23	16:15	50.2	73.2	40.3	46.3	43
2/6/23	16:30	47.9	64	40.7	46	42.6
2/6/23	16:45	47.9	70.9	41.5	46.3	43.7
2/6/23	17:00	49.2	62	41.5	47.5	44.5
2/6/23	17:15	48.2	59	40.6	47.1	43.4
2/6/23	17:30	48.8	70.1	41.4	47.7	44.1
2/6/23	17:45	49	63.1	40.5	47.1	43.3
2/6/23	18:00	47.9	63.2	41.2	46.3	43.6
2/6/23	18:15	50.2	68.4	40.4	46.9	43.2
2/6/23	18:30	48.3	63.3	40.9	46.6	43.3
2/6/23	18:45	49.3	66.9	41.1	47.3	44.1
2/6/23	19:00	47.9	61	40.6	46.8	43.6
2/6/23	19:15	48.5	67.4	40.9	47.4	43.7
2/6/23	19:30	49.6	70.1	40.1	46.8	43.4
2/6/23	19:45	50.4	66.6	40.8	48.1	44.4
2/6/23	20:00	48.4	61.8	41	46.6	43.8
2/6/23	20:15	47.3	61.2	38.6	45.5	41.9
2/6/23	20:30	47.6	60	38.8	45.8	42.5
2/6/23	20:45	46.5	62	39.6	44	41.7
2/6/23	21:00	44.9	59.1	38.7	43.4	41.3
2/6/23	21:15	47	66	38.8	44.1	41.6
2/6/23	21:30	47.9	63.4	39.3	44.5	41.4
2/6/23	21:45	45.4	59.4	39.4	44.2	41.3
2/6/23	22:00	44.8	57.7	37.8	43.2	40.6
2/6/23	22:15	47.5	60.5	39.3	44.9	42.1
2/6/23	22:30	50.3	69	38.4	44.4	41
2/6/23	22:45	46.6	59.5	39.7	45.2	41.8
2/6/23	23:00	50.2	67	38.8	45.1	41.8
2/6/23	23:15	45	56.1	38.7	43.8	41.4
2/6/23	23:30	44.3	59.2	38.6	43.1	41.2
2/6/23	23:45	42.3	54.8	37.2	41.2	39.4
3/6/23	00:00	43.3	54.2	37.8	41.8	39.5
3/6/23	00:15	44.1	59.6	37.1	42.3	39.6
3/6/23	00:30	42.5	57.4	36.5	41.2	38.9
3/6/23	00:45	42.6	56.4	36.9	41.2	38.8
3/6/23	01:00	40.9	56.8	34.5	39.8	37.7
3/6/23	01:15	41.3	59.5	34.3	39.7	36.4
3/6/23	01:30	41.3	58.9	33.5	38.8	36.3
3/6/23	01:45	39.3	47	33.1	38.4	36

3/6/23	02:00	39.1	54.3	33.3	37.9	35.3
3/6/23	02:15	40.8	52.5	34	39.1	36.9
3/6/23	02:30	39.3	53.4	32.9	37.7	35.3
3/6/23	02:45	38.9	50.1	32.5	37.8	35.5
3/6/23	03:00	40.3	58.4	33	38.2	35.5
3/6/23	03:15	38.3	53.4	33.3	37.6	35.3
3/6/23	03:30	40.6	54	33.4	38.4	35.4
3/6/23	03:45	40.8	54.2	33.5	39.2	36.4
3/6/23	04:00	42.2	58.2	34	40.3	37.2
3/6/23	04:15	42.2	53.4	34.6	40.7	37.4
3/6/23	04:30	40.8	54.1	34.1	39.6	37
3/6/23	04:45	40.8	58.9	33.5	39.4	36
3/6/23	05:00	40	61.8	33.9	38.6	36
3/6/23	05:15	41.4	61.7	33.9	38.1	35.8
3/6/23	05:30	39.8	62.7	32.7	38.1	35.4
3/6/23	05:45	41.3	54.6	34.2	39.2	36.6
3/6/23	06:00	41	53	34.6	39.5	36.6
3/6/23	06:15	41.1	49.6	35.4	40.5	38.5
3/6/23	06:30	41.3	57.7	35.6	40.7	38.4
3/6/23	06:45	42.7	56.9	36.5	41.1	39
3/6/23	07:00	44.6	68.7	36	41.3	38.3
3/6/23	07:15	42.6	54.7	36.6	41.4	39.3
3/6/23	07:30	42	55.6	36.5	41.3	39.3
3/6/23	07:45	43.5	60.7	36.4	42.1	39.3
3/6/23	08:00	43.9	56.1	38	42.4	40.1
3/6/23	08:15	44.1	62.5	36	42.2	40
3/6/23	08:30	44.4	62.7	37.7	43	40.6
3/6/23	08:45	45	57.1	38.9	43.7	41.3
3/6/23	09:00	45.3	55.9	38.4	43.6	40.9
3/6/23	09:15	49.7	62.8	38.6	45.1	42.4
3/6/23	09:30	50.1	63.9	42.6	49	44.2
3/6/23	09:45	51.3	69.6	48.4	50.2	49.4
3/6/23	10:00	55.8	69.7	49.2	55.6	50.5
3/6/23	10:15	55.4	71.6	49.1	54.4	50.3
3/6/23	10:30	52.7	68.3	46.1	51.6	49.8
3/6/23	10:45	54.9	73.6	46.4	53.2	48.5
3/6/23	11:00	55.9	82.2	46.1	53.4	48.2
3/6/23	11:15	59.8	83.2	46.3	53.6	52
3/6/23	11:30	54.9	73	46.1	53.6	48.5
3/6/23	11:45	53.4	77	44.4	49.8	47.7
3/6/23	12:00	45.3	61.2	39.3	43.8	41.6
3/6/23	12:15	46.7	67.2	38.3	44.8	41.8
3/6/23	12:30	46.4	58	39.2	45	41.3
3/6/23	12:45	45.8	60	38.7	44.7	41.2
3/6/23	13:00	47.6	67.9	38.8	45.9	42.2
3/6/23	13:15	45.9	61.5	38.4	43.9	41.1
3/6/23	13:30	49.6	68.1	38.9	44.9	42
3/6/23	13:45	46.3	59.6	39.8	45	42.1
3/6/23	14:00	48.5	71	39	45.6	42.4
3/6/23	14:15	47.6	63.6	40.1	45.8	42.9
3/6/23	14:30	47.9	69.6	39.6	45.7	42.7
3/6/23	14:45	49.1	65.8	38.7	46	42
3/6/23	15:00	46.7	62.5	39.8	45.1	42.3
3/6/23	15:15	45.9	61.5	38.9	44.2	41.6

3/6/23	15:30	53.2	75.7	39.8	45.8	42.1
3/6/23	15:45	47.5	66.5	39.2	45	42.7
3/6/23	16:00	47.3	60.8	40	45.9	43.6
3/6/23	16:15	49.8	70.5	39.3	48.4	43
3/6/23	16:30	49.3	70.5	39.8	47.1	44.1
3/6/23	16:45	47.1	67	40.1	45.6	42.9
3/6/23	17:00	47.8	66.3	39.1	45.6	42.8
3/6/23	17:15	49.2	67	39.5	45.5	41.9
3/6/23	17:30	46.9	61.3	39.1	45.6	42.2
3/6/23	17:45	47.2	61.3	40.3	45.7	42.4
3/6/23	18:00	47.2	61	39.8	46.2	42.7
3/6/23	18:15	46.4	57.5	39.9	44.8	42.1
3/6/23	18:30	53.6	73.2	39.7	46.3	43
3/6/23	18:45	52.6	77.7	37.5	44.4	41.2
3/6/23	19:00	47.4	65.5	39	44.6	42
3/6/23	19:15	47.7	61.9	40.7	46	42.9
3/6/23	19:30	46.9	60.3	40.1	45.3	42.1
3/6/23	19:45	45.7	61.3	39.1	44.3	41.1
3/6/23	20:00	45.9	62.4	38.4	43.6	40.8
3/6/23	20:15	50	72.3	40	44.5	41.9
3/6/23	20:30	47	70.2	38.6	44.7	41.4
3/6/23	20:45	52.2	81.5	40.5	46.3	42.8
3/6/23	21:00	47.2	64.6	40.3	45.3	42.4
3/6/23	21:15	47.9	73.9	37.7	43.9	41
3/6/23	21:30	46.4	60.7	38.7	43.9	41.2
3/6/23	21:45	46.9	70.1	38.4	43.4	41
3/6/23	22:00	44.6	57.5	38.3	42.9	40.4
3/6/23	22:15	49.4	68.4	37.8	43.1	40.3
3/6/23	22:30	49.4	65.7	38.2	44.7	40.7
3/6/23	22:45	45.8	67.7	38.4	43.3	40.6
3/6/23	23:00	44.7	64.5	37.9	42.5	40
3/6/23	23:15	53.5	77.5	37.7	43.1	40.4
3/6/23	23:30	43.5	55.3	39	42.4	40.7
3/6/23	23:45	42.6	53.8	38.3	41.8	39.7
4/6/23	00:00	46.1	63.9	37.1	41.8	39.3
4/6/23	00:15	43.2	55.5	37.3	41.6	39.6
4/6/23	00:30	41.7	58.2	36.5	40.3	38.7
4/6/23	00:45	41.9	57.5	36.1	40.6	38.7
4/6/23	01:00	44.4	62.9	35.5	40.5	38.2
4/6/23	01:15	40.9	56.1	35.5	39.8	38
4/6/23	01:30	41.3	57	35.1	39.9	37.5
4/6/23	01:45	41.4	55.8	35.2	40	37.5
4/6/23	02:00	39.4	48.7	34.3	38	36.1
4/6/23	02:15	39.3	53.5	34.9	38.8	36.6
4/6/23	02:30	40	59.8	34	38.5	35.9
4/6/23	02:45	43.5	63.5	33.8	38.7	36.7
4/6/23	03:00	39.4	50.7	34	38.8	36.4
4/6/23	03:15	39.5	51.2	32.8	38.3	35.2
4/6/23	03:30	44.2	55	34.1	40.9	37.5
4/6/23	03:45	42.4	54.9	35.4	40.4	37.6
4/6/23	04:00	43.2	56.6	34.8	41	37.7
4/6/23	04:15	43	54.7	33.5	40.9	36.8
4/6/23	04:30	41.4	52.7	33.3	40.1	36.3
4/6/23	04:45	39.9	53.6	33.2	39	36.1

4/6/23	05:00	38.2	47.2	33.2	37.4	35.4
4/6/23	05:15	39.9	47.2	33.1	38	35.9
4/6/23	05:30	40.3	57.1	34.5	39	36.6
4/6/23	05:45	39.7	61.6	33.7	38.8	36.4
4/6/23	06:00	40	55.3	34.3	38.5	36.6
4/6/23	06:15	41	51.8	35.2	39.2	37
4/6/23	06:30	40.6	56.8	34.6	39.2	36.8
4/6/23	06:45	42.8	59.6	35.4	40.2	37.9
4/6/23	07:00	44.2	60.9	35	40.1	37.7
4/6/23	07:15	43.8	62.9	35.7	40	37.9
4/6/23	07:30	41.4	53.4	34.3	39.8	37.5
4/6/23	07:45	42.2	56.1	36.1	40.6	38.5
4/6/23	08:00	42.5	64.5	35.1	40.5	38.2
4/6/23	08:15	43.1	59.6	36.1	41.4	38.8
4/6/23	08:30	44.6	59.5	35.9	41.3	38.4
4/6/23	08:45	43	62.1	36.5	41	38.8
4/6/23	09:00	46.6	66.2	36.8	41.5	39.1
4/6/23	09:15	46.6	59.9	37.9	43.3	40.6
4/6/23	09:30	45	59.9	36.4	42.4	39.1
4/6/23	09:45	44.1	57.6	37.8	42.8	40.6
4/6/23	10:00	45.8	62.9	37.8	43.5	40.5
4/6/23	10:15	45.4	61	38.1	43.4	40.3
4/6/23	10:30	47	65	36.4	42.7	39.3
4/6/23	10:45	48.3	67.1	37.7	43.7	40.6
4/6/23	11:00	45.1	60.7	37.5	43.3	40.1
4/6/23	11:15	46.1	63	38.3	43.8	40.7
4/6/23	11:30	45.6	60.4	37.9	43.4	40.2
4/6/23	11:45	45.8	58.7	38.3	44.3	40.7
4/6/23	12:00	48.4	67.2	37.7	44	40.5
4/6/23	12:15	44.3	61.9	36.9	42.7	39.9
4/6/23	12:30	47.3	60	39.1	45.2	42
4/6/23	12:45	44.8	57.7	38	42.7	40.2
4/6/23	13:00	46	67.3	37.1	43.5	40.4
4/6/23	13:15	45.7	64.4	38	43.9	40.8
4/6/23	13:30	50.2	70.1	38.9	44.6	41.5
4/6/23	13:45	47.5	65.9	39.7	44.2	41.6
4/6/23	14:00	44.7	58.2	36.9	43	39.9
4/6/23	14:15	45.5	58	37.7	43.6	40.8
4/6/23	14:30	51.3	65.5	38.5	45.1	41.4
4/6/23	14:45	46.1	62.8	38.7	43.7	40.6
4/6/23	15:00	46	65.2	37.1	43.4	40.4
4/6/23	15:15	46.7	62.3	37.6	43.3	40.6
4/6/23	15:30	46.7	69.5	37.5	43.3	40.2
4/6/23	15:45	46.7	68.3	37.4	42.7	39.9
4/6/23	16:00	46.5	67.5	37.9	43.2	40.6
4/6/23	16:15	44.9	55.7	38.3	43.9	40.9
4/6/23	16:30	47.5	63	37.4	44	40.2
4/6/23	16:45	46.8	70	38.2	44.7	41.2
4/6/23	17:00	47.4	66.1	38.7	44	41.4
4/6/23	17:15	46.1	69.5	39.3	44.5	42
4/6/23	17:30	46.5	63.1	40.3	45.4	42.8
4/6/23	17:45	47.2	62.6	40.2	45.6	42.9
4/6/23	18:00	47.7	62.9	39.8	46.4	43.6
4/6/23	18:15	46.3	61.5	39.7	45.1	42.8

4/6/23	18:30	49.6	70.8	40.9	46.8	44
4/6/23	18:45	47.3	59.9	40.2	46.3	43.6
4/6/23	19:00	47.5	62.1	40.7	46.5	44.2
4/6/23	19:15	48.2	64.8	39.6	46.2	43.9
4/6/23	19:30	46.4	61.3	39.7	45.2	42.6
4/6/23	19:45	48.6	61.1	41	47.3	44.3
4/6/23	20:00	47.1	62.8	40.4	46	43.6
4/6/23	20:15	49.2	66.5	38.4	44.8	41.6
4/6/23	20:30	45.7	59.5	39.5	44.5	42.1
4/6/23	20:45	47.7	66.5	39	44.9	41.8
4/6/23	21:00	45.6	62	38.9	44.2	41.8
4/6/23	21:15	46.2	62.8	39.1	44.8	42
4/6/23	21:30	47.7	63.6	37.2	43.7	40.8
4/6/23	21:45	44.7	58.3	37.8	42.8	40.4
4/6/23	22:00	43	58.3	37.2	41.8	39.6
4/6/23	22:15	47.3	66.9	37.2	41.3	39.4
4/6/23	22:30	44	62.8	37.1	41.3	38.8
4/6/23	22:45	48.3	67.5	35.8	42.4	38.8
4/6/23	23:00	43.4	56.5	37.2	42.1	39.7
4/6/23	23:15	46.5	65.4	37	42.1	39.4
4/6/23	23:30	44.5	59.2	37.2	42.2	39.6
4/6/23	23:45	42.5	57.8	36.6	40.6	38.6
5/6/23	00:00	42.1	58.8	35.3	40	38
5/6/23	00:15	43.4	58.3	36.2	40.9	38.7
5/6/23	00:30	42.9	57.1	36.9	41.1	38.9
5/6/23	00:45	42.7	63.2	34.9	40.3	37.9
5/6/23	01:00	41.9	54.7	32.6	39.4	36.1
5/6/23	01:15	49	72.2	33.1	41.2	36.7
5/6/23	01:30	43.3	64.7	33.3	40.2	36.3
5/6/23	01:45	40.8	55.3	32.9	39.1	35.8
5/6/23	02:00	39.4	53.8	33.2	37.4	35
5/6/23	02:15	41.4	57	32.9	39.3	35.5
5/6/23	02:30	40.8	58.1	32.9	38	35.6
5/6/23	02:45	38.6	55.2	32.3	37.3	34.4
5/6/23	03:00	38.5	54.2	32.6	36.8	34.2
5/6/23	03:15	40.8	56.1	31.1	38.3	34.4
5/6/23	03:30	51.6	70.9	33.2	41.7	36.6
5/6/23	03:45	51.8	68.5	33.1	41.6	37
5/6/23	04:00	44.1	56.5	32.7	41.1	35.9
5/6/23	04:15	43.2	61.5	34.5	41	37.6
5/6/23	04:30	39.1	49.5	31.7	37.8	34.8
5/6/23	04:45	41.3	57.2	33.3	39.2	36.1
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5/6/23	05:15	45.8	64.5	33.7	39.4	36.1
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5/6/23	06:45	45.8	59.6	39.6	44.5	42.3
5/6/23	07:00	45	55.5	39.5	43.6	41.5
5/6/23	07:15	45	55.9	38.9	43.8	41.6
5/6/23	07:30	46	57.2	39.5	44.6	42.4
5/6/23	07:45	47.3	65.6	40	45.8	43.2

5/6/23	08:00	48.6	59.8	41	46.5	43.7
5/6/23	08:15	49.7	61.3	41.7	47.3	44.2
5/6/23	08:30	50.6	65.2	41	47.3	43.6
5/6/23	08:45	53.2	67.2	41.8	48.2	44.5
5/6/23	09:00	54.8	70.6	41.6	54.8	44.9
5/6/23	09:15	57.8	76.8	53.5	55.7	54.6
5/6/23	09:30	56.7	78.9	41.1	54.9	44.9
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5/6/23	10:45	48.3	62.6	40.2	45.4	42.7
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5/6/23	11:45	45.8	57.6	39.5	43.7	41.8
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5/6/23	12:15	46.7	58.7	38.8	45	42.1
5/6/23	12:30	46.9	58.6	39.8	45.3	42.7
5/6/23	12:45	46.8	66.8	40	45.1	42.1
5/6/23	13:00	49.3	67.3	41	47	44.7
5/6/23	13:15	48	65.3	41.2	45.5	43.4
5/6/23	13:30	47.8	58.1	41.2	46.5	43.7
5/6/23	13:45	47.1	57.9	41.1	45.6	43
5/6/23	14:00	47.2	60.5	40.5	45.9	42.7
5/6/23	14:15	47.8	70.4	39.8	45	42.3
5/6/23	14:30	48.2	60.2	38.9	46	42.3
5/6/23	14:45	49.5	70.4	40.5	46.4	43.1
5/6/23	15:00	53	72.1	40.2	47.1	43.7
5/6/23	15:15	48	62	40	46.3	43.1
5/6/23	15:30	49.7	63.4	39.8	46	42.4
5/6/23	15:45	50.1	70.7	40.1	46.5	43.6
5/6/23	16:00	47.5	62.2	41.3	45.9	43.6
5/6/23	16:15	47.8	60.4	41.7	46.1	43.7
5/6/23	16:30	49.7	68.3	40.6	46.8	43.8
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5/6/23	17:15	47.6	67.4	39.7	46.5	43.2
5/6/23	17:30	48.4	62.9	42	47.2	43.8
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5/6/23	18:00	47.7	60.7	41.6	46.4	44
5/6/23	18:15	47.5	60.1	40.7	45.9	43.4
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5/6/23	19:45	47.5	63.4	38.9	45	42
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5/6/23	20:30	49.2	65.4	39.8	46.8	42.8
5/6/23	20:45	46.2	59.1	38.2	44.2	41.4
5/6/23	21:00	46.4	59.1	39.2	44.6	41.7
5/6/23	21:15	44.2	61.6	38.9	42.9	40.8

5/6/23	21:30	44.8	59.6	37.4	43	40
5/6/23	21:45	46.8	67	38.4	43.5	40.8
5/6/23	22:00	43.9	57.9	37.8	42.3	39.8
5/6/23	22:15	44.4	58.4	36.6	42.2	39.5
5/6/23	22:30	46.7	63.3	38.1	42.8	40.1
5/6/23	22:45	48	66.9	37	41.2	38.9
5/6/23	23:00	44.2	59.3	37	41.5	39.2
5/6/23	23:15	43	54.5	36.1	41.9	39.3
5/6/23	23:30	46.7	67.2	36.8	41.1	38.2
5/6/23	23:45	43.6	64.6	37.3	41.4	39.3
6/6/23	00:00	43.4	57.4	35.6	41.2	38.3
6/6/23	00:15	44.2	60.2	35.8	41.5	38.8
6/6/23	00:30	41.7	58.2	33.7	40.2	37
6/6/23	00:45	41.5	54.7	33.7	39.3	36.6
6/6/23	01:00	41.4	60.7	33.4	38.5	35.4
6/6/23	01:15	42.1	57.7	34.2	39.4	36.8
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6/6/23	03:15	40.5	57	32.2	38.2	35.2
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6/6/23	03:45	40.1	58.7	33.5	38.6	36.1
6/6/23	04:00	41.2	56.6	32.6	39.2	35.7
6/6/23	04:15	42.3	56.1	33.4	39.9	36.1
6/6/23	04:30	42.2	56.8	32.3	40	36.5
6/6/23	04:45	40.5	57.2	32.2	38.8	35.8
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6/6/23	08:30	49.3	69.4	40.9	46.9	44.1
6/6/23	08:45	48.4	59.1	41.9	46.4	44.2
6/6/23	09:00	49.4	63.5	42.8	48.4	44.9
6/6/23	09:15	47.6	58.3	42.2	46.4	44.2
6/6/23	09:30	48.4	60.1	41.8	46.7	44
6/6/23	09:45	49.2	60.7	42.3	47.6	45.1
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6/6/23	10:15	49.5	63.8	43.8	48.3	46.1
6/6/23	10:30	49.2	64.3	43.5	48	46
6/6/23	10:45	49.9	60.8	44	48.7	46.4

6/6/23	11:00	49.3	62.5	42.5	47.5	44.8
6/6/23	11:15	47.8	60.6	40.2	45.8	43
6/6/23	11:30	47.7	60.9	41.3	46.6	44
6/6/23	11:45	47.3	57.5	40.1	46.1	42.9
6/6/23	12:00	49.1	68.9	42.4	46.8	43.9

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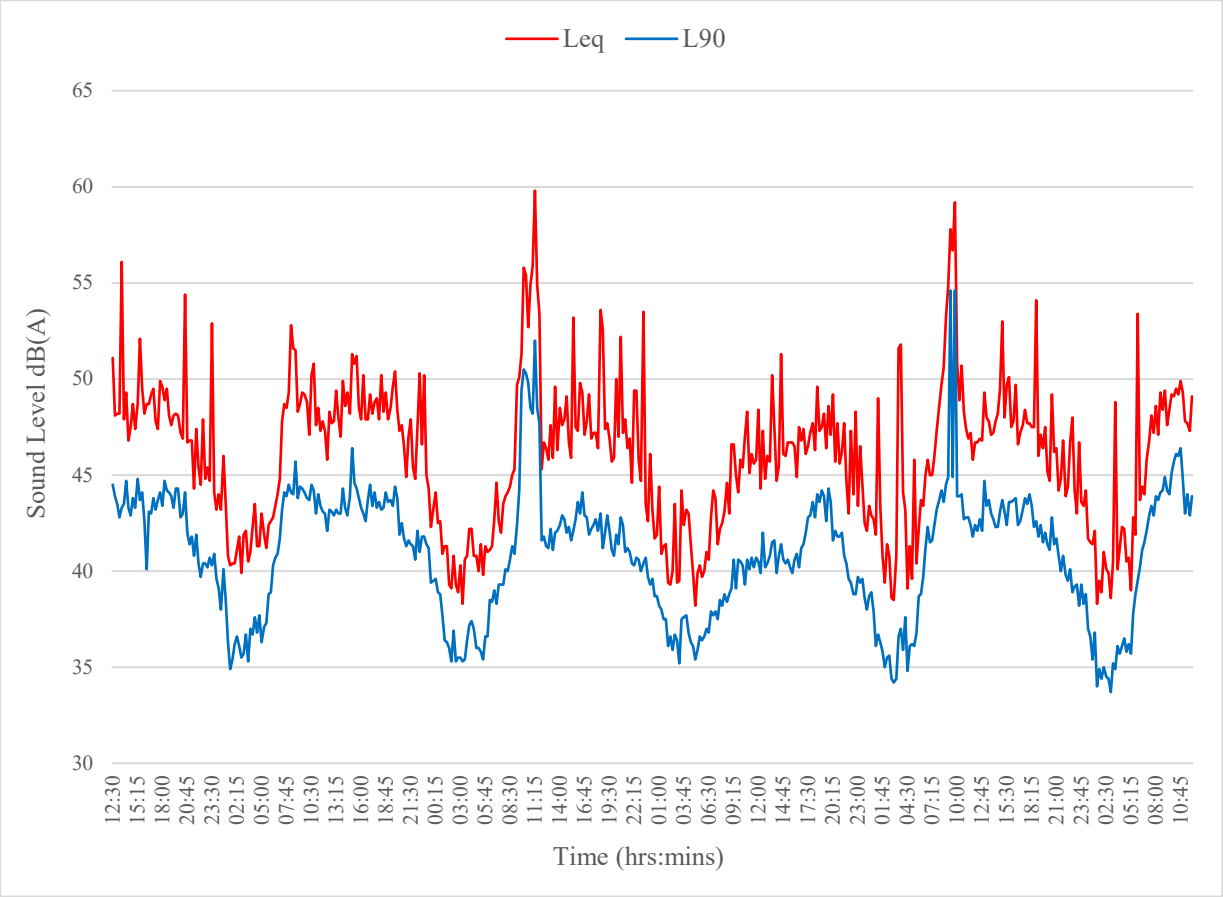
Background Noise Measurements

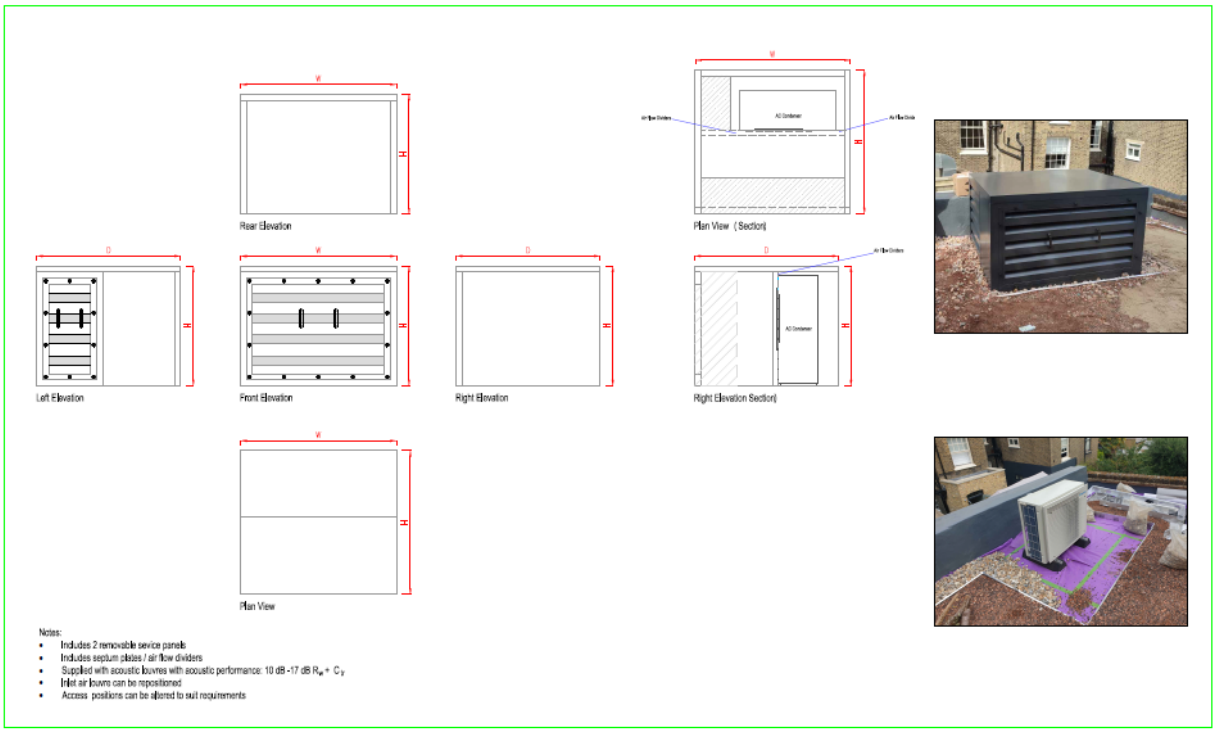
Graph



APPENDIX 6

Noise Mitigation Options

QuietBox 2 – Acoustic Louvred Enclosure



Rev	Amendment	Date	Project: QuietBox 2	Scale: NTS @A3	Date: 14/10.2022	Sound Planning Limited Farnham Surrey Phone: 01252 711972 Fax: 01252 601593 Email: enquiries@soundplanning.co.uk
Notes: No scaling permitted from this drawing. All dimensions shown to be verified prior to construction / manufacture.			Title: Sound Enclosure QuietBox 2	Drawn: B.Walker		soundplanning
				Drawing No: QuietBox 2		

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Noise Mitigation

Acoustic Louvre

Acoustic Performance Certificate (18 dB R_w)

SRL

0444

Test Report No: 24567-SRL-RP-XT-002-P1
Page 16 of 40
Date: 12/05/2020

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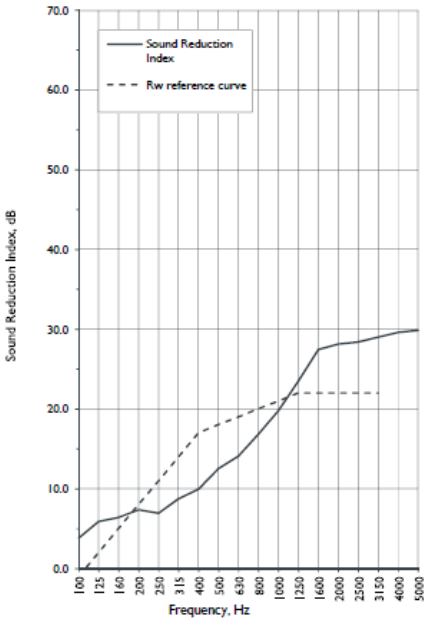
Data Sheet 7

		Test Room:	Source	Receiving
Test Number:	8	**Air Temperature:**	10.6 °C	11.4 °C
Client:	Sound Planning Ltd	**Air Humidity:**	63 %	58 %
Test Date:	17/02/2020	**Volume:**	55 m³	50 m³
Sample Height:	1.1 m			
Sample Width:	1.1 m			
Sample Weight:	N/A kg/m²	**Air Pressure:**	999 mbar	

Product Identification: Louvre AL300 50/50 P45

Freq, f Hz	Sound Reduction Index, dB	
	⅓ Oct	Octave
50+	20.2	12.5
63+	21.4	
80+	8.2	
100	3.8	5.2
125	5.9	
160	6.4	
200	7.3	7.6
250	6.9	
315	8.7	
400	9.9	11.8
500	12.5	
630	14.1	
800	16.8	19.2
1000	19.8	
1250	23.5	
1600	27.4	27.9
2000	28.1	
2500	28.4	
3150	29.0	29.5
4000	29.6	
5000	29.9	
6300+	29.8	27.8
8000+	28.6	
10000+	25.9	
Average 100-3150	15.5	Version v3.1



Rating according to BS EN ISO 717-1:2013

$R_w(C_i;C_{tr})$= 18 (-1 ; -4) dB

* shows measurement corrected for background
> shows measurement limited by background
+ shows Frequency beyond standard and not UKAS accredited

Template Ref: Lab Edition 3 – 14/10/2019

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APPENDIX 7

Vibration Isolation

CMS – Kinetics Model AC[7]

KINETICS™
Fiberglass
Isolators
Model AC

Description

Model AC Fiberglass Isolators consist of a molded inorganic fiberglass isolation pad bonded to a steel load transfer plate and to a formed steel bolt-down bracket and include an equipment anchor bolt with a neoprene grommet to prevent metal-to-metal contact. Fiberglass pads are fine (0.00027"/6.8 microns diameter) bonded annealed glass fibers which are stabilized by pre-compressing the material during manufacture and then coated with a flexible moisture-impervious elastomeric membrane. Fiberglass is unique in that the natural frequency is constant over a wide operating load range and the stiffness increases proportionately with load applied. Model AC Fiberglass Isolators are available in sizes with capacities from 40 to 900 lbs. (18 kg-409 kg) and deflections of 0.18" to 0.70" (4mm-18mm). Kinetics Model AC Isolators are recommended for the isolation of vibration produced by utility ventilating fans, vane axial fans, high speed motors, roof-mounted exhaust fans, and similar mechanical equipment.

Features

- Inorganic fiberglass media
- Flexible elastomeric coating
- Constant natural frequency over a wide load range
- Predictable dynamic response
- High energy dissipation
- Controlled viscous damping
- Load capacities 40 lbs. to 900 lbs. (18kg-409kg)
- Rated static deflection 0.18" to 0.70" (4mm-18mm)
- Steel load transfer plate
- Steel bolt and hold-down support bracket

Application

Kinetics Model AC Fiberglass Isolators can be used for any application requiring isolation of audible frequency vibration, or noise, or for vibration isolation of mechanical equipment with lowest operating speeds of 1750 RPM when mounted on a grade-supported slab or pier.

Model AC isolators are typically used when the predictable dynamic response and permanent load support characteristics of fiberglass are desired in conjunction with a bolt-down and vertical lift control feature.

Typical uses of Model AC isolators include the support and isolation of utility ventilating fans, vane axial fans, motors, roof-mounted exhaust fans, and similar mechanical equipment.

Special application of Model AC isolators have included use as both an isolator and wind lift hold-down support for isolated precast concrete roof systems used to reduce transmitted noise from fly-over aircraft.

Use Model AC mounts when Kinetics fiberglass isolators are recommended and it is desirable to bolt equipment to supporting structures.

[7] Supplied by CMS Acoustics (UK).

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Vibration Isolation

CMS – Kinetics Model AC

Specifications

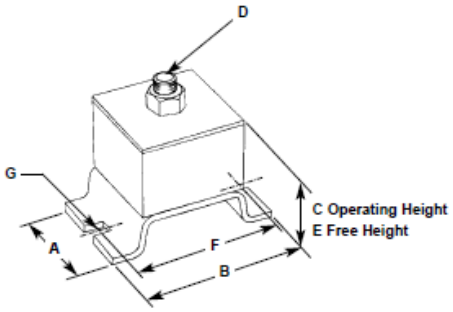
Vibration isolators shall be precompressed molded fiberglass pads individually coated with flexible, moisture-impervious elastomeric membrane. Vibration isolation pads shall be molded from glass fibers with fiber diameters not exceeding 0.00027" (6.8 microns) and with a modulus of elasticity of 10.5 million PSI (750,00 kg per sq. cm).

Natural frequency of fiberglass vibration isolators shall be essentially constant for the operating load range of the supported equipment.

Vibration isolators shall be bonded to a steel load transfer plate and a formed steel bolt-down bracket and shall also include an equipment mounting bolt with a neoprene grommet to prevent metal-to-metal contact.

Vibration isolators shall be selected by the manufacturer for each specific application to comply with deflection requirements as shown on the Vibration Isolation Schedule or as indicated on the project documents.

Vibration isolators shall be model AC, as manufactured by Kinetics Noise Control, Inc.



Isolator Type	Capacity Range	Maximum Deflection	Dimensions A	B	C*	D	E	F	G
AC-221L	40-200 lbs.	0.27"	2.50"	4.75"	1.98"	0.38"	2.25"	3.75"	0.44"
AC-221Q	100-400 lbs.	0.18"	2.50"	4.75"	2.07"	0.38"	2.25"	3.75"	0.44"
AC-331L	90-450 lbs.	0.35"	3.00"	4.75"	1.90"	0.38"	2.25"	3.75"	0.44"
AC-331Q	225-900 lbs.	0.27"	3.00"	4.75"	1.98"	0.38"	2.25"	3.75"	0.44"
AC-222G	20-100 lbs.	0.69"	2.50"	4.75"	2.56"	0.38"	3.25"	3.75"	0.44"
AC-222L	40-200 lbs.	0.54"	2.50"	4.75"	2.71"	0.38"	3.25"	3.75"	0.44"
AC-222Q	100-400 lbs.	0.36"	2.50"	4.75"	2.89"	0.38"	3.25"	3.75"	0.44"
AC-332-L	90-450 lbs.	0.70"	3.00"	4.75"	2.55"	0.38"	3.25"	3.75"	0.44"
AC-332Q	225-900 lbs.	0.54"	3.00"	4.75"	2.71"	0.38"	3.25"	3.75"	0.44"
AC-221L	18-91 kg	6 mm	63 mm	121 mm	50 mm	9.6 mm	57 mm	95 mm	11 mm
AC-221Q	46-182 kg	4 mm	63 mm	121 mm	52 mm	9.6 mm	57 mm	95 mm	11 mm
AC-331L	41-205 kg	9 mm	75 mm	121 mm	48 mm	9.6 mm	57 mm	95 mm	11 mm
AC-331Q	102-409 kg	6 mm	75 mm	121 mm	50 mm	9.6 mm	57 mm	95 mm	11 mm
AC-222G	9-46 kg	17 mm	63 mm	121 mm	65 mm	9.6 mm	83 mm	95 mm	11 mm
AC-222L	18-91 kg	14 mm	63 mm	121 mm	69 mm	9.6 mm	83 mm	95 mm	11 mm
AC-222Q	46-182 kg	9 mm	63 mm	121 mm	73 mm	9.6 mm	83 mm	95 mm	11 mm
AC-332-L	41-205 kg	18 mm	75 mm	121 mm	65 mm	9.6 mm	83 mm	95 mm	11 mm
AC-332Q	102-409 kg	14 mm	75 mm	121 mm	69 mm	9.6 mm	83 mm	95 mm	11 mm

*Operating height varies with applied load.

KINETICS Noise Control

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Kinetics Noise Control, Inc. is continually upgrading the quality of our products. We reserve the right to make changes to this and all products without notice.

AC 2/04

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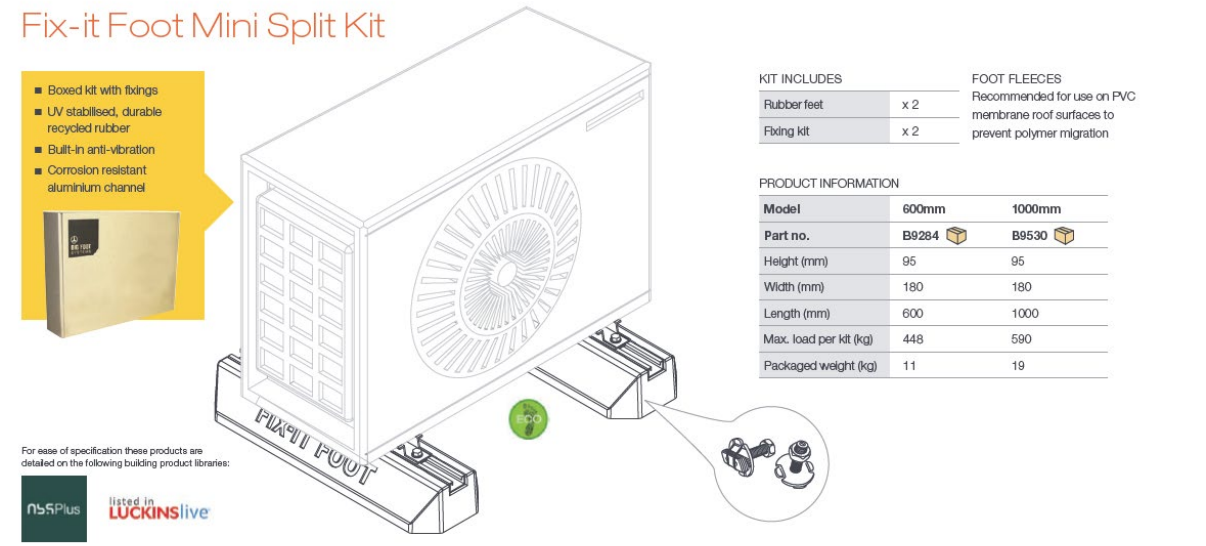
Vibration Isolation

Big Foot Systems[8]

Mini Split Kit






[8] Big Foot Systems – TEL 01323 844355.

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APPENDIX 8

Meteorological Conditions

Weather History for ILONDONL9

Previous | Daily Mode | June | 1 | 2023 | View | Next

Summary
June 1, 2023

	High	Low	Average
Temperature	65.8 °F	49.0 °F	55.2 °F
Dew Point	54.6 °F	45.1 °F	48.5 °F
Humidity	87 %	63 %	79 %
Precipitation	0.00 in	--	--

	High	Low	Average
Wind Speed	20.0 mph	2.0 mph	10.4 mph
Wind Gust	20.0 mph	--	6.0 mph
Wind Direction	--	--	ENE
Pressure	30.36 in	30.26 in	--

Weather History for ILONDONL9

Previous | Daily Mode | June | 2 | 2023 | View | Next

Summary
June 2, 2023

	High	Low	Average
Temperature	65.0 °F	50.2 °F	55.9 °F
Dew Point	50.2 °F	42.9 °F	46.3 °F
Humidity	82 %	55 %	71 %
Precipitation	0.00 in	--	--

	High	Low	Average
Wind Speed	21.0 mph	2.0 mph	11.7 mph
Wind Gust	21.0 mph	--	7.0 mph
Wind Direction	--	--	East
Pressure	30.34 in	30.24 in	--

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Meteorological Conditions

Weather History for ILONDONL9

Previous | Daily Mode | June | 3 | 2023 | View | Next

Summary
June 3, 2023

	High	Low	Average
Temperature	70.8 °F	46.0 °F	57.9 °F
Dew Point	56.4 °F	43.2 °F	49.2 °F
Humidity	92 %	54 %	75 %
Precipitation	0.00 in	--	--

	High	Low	Average
Wind Speed	19.6 mph	0.0 mph	8.8 mph
Wind Gust	20.0 mph	--	5.2 mph
Wind Direction	--	--	East
Pressure	30.29 in	30.22 in	--

Weather History for ILONDONL9

Previous | Daily Mode | June | 4 | 2023 | View | Next

Summary
June 4, 2023

	High	Low	Average
Temperature	71.7 °F	47.6 °F	60.3 °F
Dew Point	54.4 °F	44.8 °F	49.5 °F
Humidity	91 %	47 %	69 %
Precipitation	0.00 in	--	--

	High	Low	Average
Wind Speed	18.4 mph	1.0 mph	8.6 mph
Wind Gust	18.0 mph	--	5.1 mph
Wind Direction	--	--	East
Pressure	30.33 in	30.24 in	--

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Meteorological Conditions

Weather History for ILONDONL9

Previous | Daily Mode | June | 5 | 2023 | View | Next

Summary
June 5, 2023

	High	Low	Average
Temperature	63.4 °F	49.4 °F	55.3 °F
Dew Point	52.7 °F	44.5 °F	47.9 °F
Humidity	84 %	64 %	77 %
Precipitation	0.00 in	--	--

	High	Low	Average
Wind Speed	20.0 mph	2.0 mph	10.5 mph
Wind Gust	20.0 mph	--	6.2 mph
Wind Direction	--	--	East
Pressure	30.33 in	30.24 in	--

Weather History for ILONDONL9

Previous | Daily Mode | June | 6 | 2023 | View | Next

Summary
June 6, 2023

	High	Low	Average
Temperature	60.7 °F	51.6 °F	55.2 °F
Dew Point	51.3 °F	45.6 °F	48.1 °F
Humidity	83 %	69 %	77 %
Precipitation	0.00 in	--	--

	High	Low	Average
Wind Speed	20.0 mph	2.0 mph	11.1 mph
Wind Gust	20.0 mph	--	6.4 mph
Wind Direction	--	--	East
Pressure	30.29 in	30.23 in	--