BUROHAPPOLD ENGINEERING

Chenies Mews, UCL Temporary Facilities

Noise Impact Assessment

033111

18 May 2015

Revision 00

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signature	
date	**18 May 2015**

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Contents

1 Introduction **7**

1.1 Scope of Works 7

1.2 Standards, Guidelines and Acoustic Guidance 7

1.3 Description of the Proposed Development and Site 8

1.4 Summary of Findings 9

2 Exiting Baseline Conditions **10**

2.1 Noise Sensitive Receptor Locations 10

2.2 Noise Survey Instrumentation 10

2.3 Noise Survey Results 11

3 Acceptable Noise Levels **12**

3.1 Policy Background 12

3.2 Noise Emission Assessment Criteria 13

3.3 Acceptable Noise Level Criteria 14

4 UCL Temporary Facilities Noise Emission **15**

4.1 Mechanical Plant and Equipment 15

4.2 Predicted Noise Emission Levels at NSRs without Noise Mitigation Measures 15

4.3 Noise Mitigation Measures 16

4.3.1 Noise Mitigation – Option 1 16

4.3.2 Noise Mitigation – Option 2 17

4.4 Predicted Noise Emission Levels at NSRs with Mitigation Measures 17

5 Noise Impact Statement **19**

Appendix A Acoustic Glossary

Appendix B Background Noise Survey

Appendix C Mechanical Plant and Equipment Data Sheet

Table of Tables

Table 1 Noise Survey Instrumentation 10

Table 2 **Lowest Background L_{A90} Noise Level** **11**

Table 3 **Noise Levels from Plant and Machinery at which Planning Permission will not be Granted** **13**

Table 4 **Proposed Mechanical Equipment Sound Power levels** **15**

Table 5 **Predicted Noise Level at NSRs without Mitigation Measures** **16**

Table 6 **Rectangular Silencer Insertion Loss** **16**

Table 7 **Predicted Noise Level at NSRs with Mitigation Measures – Option 1** **17**

Table 8 **Predicted Noise Level at NSRs with Mitigation Measures – Option 2** **18**

Table of Figures

Figure 1 **Site Map (Source: Google Earth)** **8**

Figure 2 **Noise Measurement and NSR Locations (Source: Google Earth)** **11**

1 Introduction

1.1 Scope of Works

This Noise Impact Assessment has been prepared in support of the Planning Application for the proposed UCL Temporary Facilities located at 96A – 98 Chenies Mews.

The scope is to assess:

- The noise impact of the proposed development at nearby noise sensitive receptors.

This assessment includes the following:

- Description of the site and surrounding area,
- Description of the proposed development use and likely noise emissions during operation,
- Existing baseline conditions at the site and surrounding area,
- Acceptable noise criteria,
- Description of potential noise sources,
- Calculations of the potential noise impact,
- Mitigation measures, and
- Noise Impact Statement.

1.2 Standards, Guidelines and Acoustic Guidance

Standards and guidance which forms the basis of this assessment include:

- The London Borough of Camden – Camden Development Policies 2010-2025 Local Development Framework (LPD),
- The National Planning Policy Framework (NPPF), Department for Communities and Local Government, March 2012. Paragraph 123,
- British Standard 4142: 2014 - Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas,
- British Standard BS 7445-2:1991 - Description and Measurement of Environmental Noise,
- IS0 1996:2003 - Acoustics - Description and measurement of environmental noise — Part 1: Guide to quantities and procedures, and
- ISO 1996-2:2007 - Acoustics - Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels.

These standards and guidance are described throughout the report.

1.3 Description of the Proposed Development and Site

The proposed temporary works facility is located within an existing vacated building at 96A – 98 Chenies Mews, London, as shown in the Figure 1 below. The development will provide welfare provisions for site workers and will include the following facilities:

- Offices,
- Meeting rooms,
- Training rooms,
- Toilets, showers, changing room and cloakroom, and
- Canteen.

The surrounding area is of mixed use with student accommodation and University Buildings. The dominant noise source around the site is from existing mechanical plant and equipment serving the adjacent buildings.

The main source of noise emission from the Temporary Works Facility is mechanical plant and equipment such as a heat recovery unit and condensing units. Noise from the activities occurring within the building is highly unlikely to have a noise impact on nearby noise sensitive receptors.

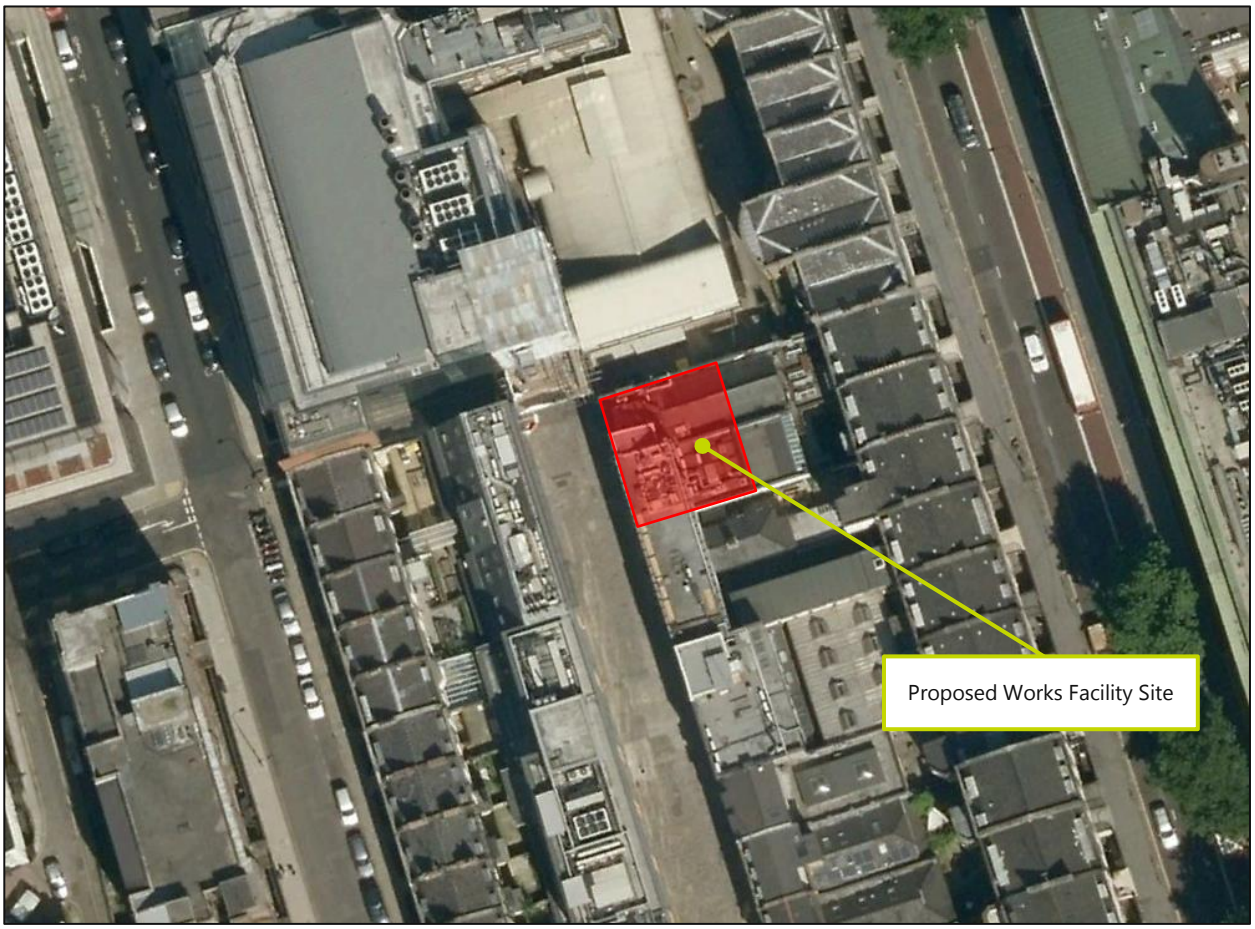


Figure 1 Site Map (Source: Google Earth)

1.4 Summary of Findings

Noise measurements were conducted on site by Buro Happold from Thursday 30 April to Friday 1 May 2015. Acceptable noise level criteria relating to noise emission from the development is derived from the measured Background L_{A90} Noise Level and the London Borough of Camden Noise Threshold requirements.

The make, model and sound power levels of the proposed mechanical plant and equipment are detailed in Section 4.1 of this report. Mitigation measures which will be implemented include installing induct silencers and/or erecting a noise barrier all of which is described in Section 4.3.

After the satisfactory implementation of the proposed mitigation measures, the noise emission from the mechanical plant and equipment serving the UCL Temporary Facilities will meet the London Borough of Camden Noise Threshold requirements.

2 Exiting Baseline Conditions

An environmental noise survey was conducted by Buro Happold around the development site to establish the:

- **Existing Background Noise Levels** - used to determine acceptable noise levels at nearby noise-sensitive receptors due to noise emission from the development.

The measurement location was selected to provide a representative sample of the noise climate around the proposed development.

2.1 Noise Sensitive Receptor Locations

Existing noise sensitive receptors (NSRs) include a combination of student accommodation and UCL buildings as shown in Figure 2.

The approximate distances between the development and NSRs are given below:

- NSR 1 Student Accommodation – approximately 10 metres north-east,
- NSR 2 UCL Building – south adjacent,
- NSR 3 UCL Building – west adjacent, and
- NSR 4 UCL Building – north adjacent,

2.2 Noise Survey Instrumentation

The noise survey was conducted using the following instrumentation:

Table 1 Noise Survey Instrumentation

Description	Model No.	Serial No.
Rion Sound Level Meter	Rion NL-52 Class 1	00610211
Condenser Microphone	Rion UC-59	02553
Preamplifier	Rion NH-25	10205
Enhanced Outdoor Kit	-	ENH40
Brüel Kjær Acoustic Calibrator	B&K 4231	2438725

All instrumentation had been laboratory calibrated (UKAS accredited) and certified within the last two years as required and traceable to National Standards. The instrumentation was field calibrated prior to and after the completion of the noise survey. No adjustments for instrumentation drift during the measurement period were required.

2.3 Noise Survey Results

The noise survey was undertaken by Buro Happold over a 24-hour period from Thursday 30 April to Friday 1 May 2015 at location shown in Figure 2 below. Table 2 presents the lowest background L_{A90} noise level measured over the appropriate day and night reference time interval.

Table 2 Lowest Background L_{A90} Noise Level

Period	Lowest Background L_{A90} Noise Level	
	$L_{A90,\ 1\ hour}$ Day (07:00 – 23:00)	$L_{A90,\ 15\ minute}$ Night (23:00 – 07:00)
Thursday 29 May 2014	56 dB	56 dB

Temperatures during the survey period ranged between 6 to 15 °C with clear skies and wind speeds of up to 7 m/s. Atmospheric conditions were considered ideal for noise monitoring.

Table 2 above shows the same background L_{A90} noise level measured during the day and night. This is due to the highly dominant nearby existing mechanical plant and equipment operating on adjacent rooftops.

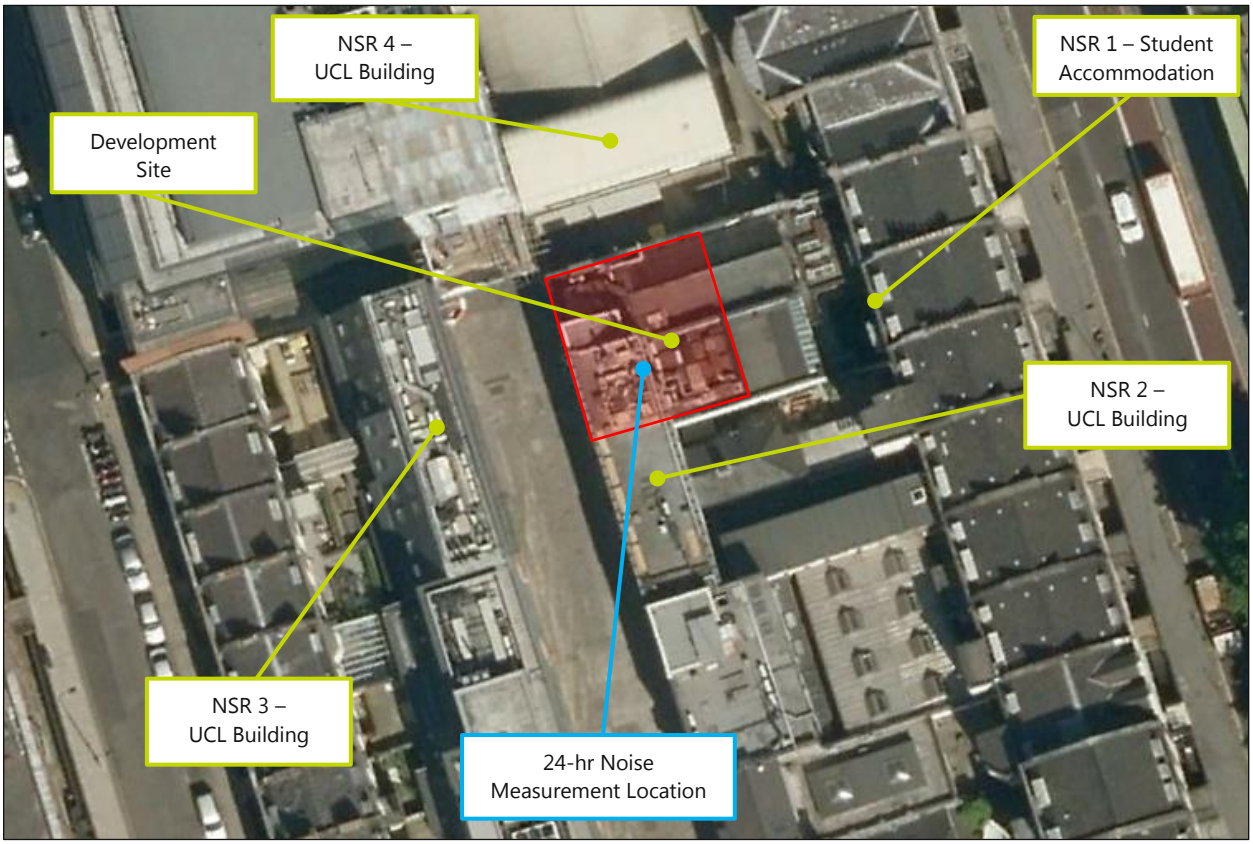


Figure 2 Noise Measurement and NSR Locations (Source: Google Earth)

3 Acceptable Noise Levels

3.1 Policy Background

The key planning policies for the London Borough of Camden include:

The National Planning Policy Framework (NPPF), Department for Communities and Local Government, March 2012. Paragraph 123.

Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

Camden Development Policies 2010-2025 Local Development Framework

DP28 - Noise and Vibration

> *The Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for:*
>
> *a) development likely to generate noise pollution; or*
> *b) development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are provided.*
>
> *Development that exceeds Camden's Noise and Vibration Thresholds will not be granted.*
>
> *The Council will only grant permission for plant or machinery if it can be operated without cause harm to amenity and does not exceed our noise thresholds.*
>
> *The Council will seek to minimise the impact on local amenity from the demolition and construction phases of development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise the impact.*

The London Borough of Camden Noise Thresholds for noise from plant and machinery is detailed in Table E of the LPD and reproduced in Table 3 below.

Table 3 Noise Levels from Plant and Machinery at which Planning Permission will not be Granted

Noise Description and Location of Measurement	Period	Time	Noise Level
Noise at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	5 dBA < L_{A90}
Noise that has a distinguishable discrete continuous noise (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10 dBA < L_{A90}
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10 dBA < L_{A90}
Noise at 1 metre external to sensitive façade where L_{A90}>60 dB	Day, evening and night	0000-2400	L_{Aeq} 55 dB

3.2 Noise Emission Assessment Criteria

The noise emission assessment criteria is derived from the London Borough of Camden Noise Thresholds (see Table 3) and the measured background L_{A90} noise levels.

The assessment is conducted in accordance with British Standard 4142:2014 – *Methods for Rating and Assessing Industrial and Commercial Sound*. The standard describes methods for rating and assessing noise from industrial and/or commercial developments. The noise sources include:

- Sound from industrial and manufacturing processes,
- **Sound from fixed installations which comprise mechanical and electrical plant and equipment,**
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises, and
- 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 the standard takes into account the outdoor sound levels and assess the likely effects of sound on people who might be inside or outside residential premises.

The significance of noise from an industrial and/or commercial source depends on the difference between the 'Rating Level' of the specific sound source and the 'Background Noise Level' around the development and residential premises.

To estimate the magnitude of impact, the 'Background Noise Level' is subtracted from the 'Rating Level'. The resulting number is then compared with the following:

- Typically, the greater the difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

A correction to the Rating Level may be required if the noise source has intermitted, impulsive and/or tonal characteristics such as a whining or hissing noise. However the proposed mechanical equipment is broadband in nature with no intermitted or impulsive characteristics.

The London Borough of Camden Noise Threshold is 5 dB below the background sound level. Therefore according to BS 4142, it is less likely that the specific sound (mechanical plant and equipment serving the facility) will have an adverse impact or a significant adverse impact on nearby noise sensitive receptors.

3.3 Acceptable Noise Level Criteria

The London Borough of Camden Noise Threshold for plant and machinery is 5 dB below the background L_{A90} noise level during the day, evening and night at 1 metre external to a sensitive façade. Therefore the acceptable noise level criterion is:

- Rating Level for broadband noise sources of 56 dBA - 5 dBA = **51 dBA** at all times.

4 UCL Temporary Facilities Noise Emission

The main source of noise from the proposed development is from mechanical plant and equipment located on the rooftop. Noise from activities occurring within the building is highly unlikely to be of significant at the NSRs due to the use of building.

4.1 Mechanical Plant and Equipment

Mechanical plant and equipment selected to serve the UCL Temporary Facilities include:

- 1 x Heat Recovery Ventilation Unit,
- 1 x Variable Refrigerant Flow Condenser Unit, and
- 1 x Close Control Unit Condenser Unit.

The sound power levels and their respective frequency spectrum are given in Table 4 below. Data sheets for the units are attached in Appendix C.

Table 4 Proposed Mechanical Equipment Sound Power levels

Plant Description		Octave Band Noise Level – dB re 10^{-12} W								dBA
		63	125	250	500	1000	2000	4000	8000	
Heat Recovery Ventilation Unit Nuaire XBC75-H-EESWP	Intake	81	80	79	82	75	69	63	59	81
	Discharge	85	84	79	87	86	78	71	69	89
	Breakout	75	69	64	62	53	45	48	40	62
Variable Refrigerant Flow Condenser Unit Mitsubishi PURY-P450YJM-A	-	86	86	86	78	74	70	67	59	82
Close Control Unit Condenser Unit Uniflair CAP0251	-	No Spectrum Available								71

4.2 Predicted Noise Emission Levels at NSRs without Noise Mitigation Measures

The predicted noise emission levels at all times are based on the following assumptions:

- All mechanical plant and equipment operating at full capacity at sound power levels detailed in Table 4,
- No noise mitigation measures installed, and
- Formulas contained in ISO 9613:1996 Acoustics – Attenuation of sound during propagation outdoors.

The predicted Rating Level of the proposed development at the NSRs is show in Table 5 below.

Table 5 Predicted Noise Level at NSRs without Mitigation Measures

Noise Source	Predicted Rating Level - dBA	Target Rating Level - dBA	Compliance
Heat Recovery Ventilation Unit Nuaire XBC75-H-EESWP	61		
Variable Refrigerant Flow Condenser Unit Mitsubishi PURY-P450YJM-A	53		
Close Control Unit Condenser Unit Uniflair CAP0251	43		
Cumulative Noise Level at NSR 1 – Student Accommodation	62 dBA	51 dBA	No Exceeds by 11 dB

4.3 Noise Mitigation Measures

Two noise mitigation options are proposed. Option 1 includes installing induct silencers and a noise barrier while option 2 includes installing the same induct silencers and a specifically designed acoustic kit.

4.3.1 Noise Mitigation – Option 1

Induct Silencer

The Heat Recovery Ventilation Unit (Nuaire XBC75-H-EESWP) will be attenuated on the intake and discharge side with a 900 mm long rectangular silencer. The manufacturer and model of the proposed silencer along with its insertion loss is given in Table 6 below.

Table 6 Rectangular Silencer Insertion Loss

Description	Octave Band Insertion Loss Values - dB							
	63	125	250	500	1000	2000	4000	8000
Nuaire – XBC75-H-SIL900-WP 900 mm (L) x 2000 mm (W) x 1001 mm (H)	4[1]	6	8	18	22	20	16	15

Should a silencer of different make and model be installed, the insertion loss of the silencer will be equal to or greater than that specified in the Table 6 across all octave band frequencies between 63 and 8000 Hz.

Noise Barrier

A solid noise barrier will be erected around the perimeter of the rooftop at a height of 2.4 metres which is 600 mm above the top of the VRF Condenser unit. The VRF unit will be placed at a maximum distance of 1.5 metres from the noise barrier in order to increase the effective barrier height resulting in greater noise attenuation.

[1] The insertion loss value at 63 Hz is not quoted by the manufacturer and therefore has been estimated.

The sound insulation rating of the noise barrier will achieve minimum R_w 25 dB with all gaps acoustically sealed with mastic to ensure no noise leaks.

4.3.2 Noise Mitigation – Option 2

Induct Silencer

Same as detailed in Option 1.

Acoustic Kit

An acoustic kit specifically designed to attenuate noise from the Mitsubishi PURY-P450YJM-A unit will be installed instead of the noise barrier. The full acoustic kit (top attenuator + side louvres) achieves a noise reduction of up to 8 dB which meets the acceptable noise limits detailed in Section 3.3 of this report. Details of the acoustic kit are attached in Appendix C.

4.4 Predicted Noise Emission Levels at NSRs with Mitigation Measures

The predicted noise emission levels at all times are based on the following assumptions:

- All mechanical plant and equipment operating at full capacity at sound power levels detailed in Table 4,
- All mitigation measures as described in Section 4.3 of this report are satisfactorily implemented, and
- Formulas contained in ISO 9613:1996 Acoustics – Attenuation of sound during propagation outdoors.

The predicted Rating Level of the proposed mechanical plant and equipment serving the UCL Temporary Facilities at the NSRs is shown in Tables 7 and 8 below.

Table 7 Predicted Noise Level at NSRs with Mitigation Measures – Option 1

Noise Source	Predicted Rating Level - dBA	Noise Reduction - dB	Target Rating Level - dBA	Compliance
Heat Recovery Ventilation Unit Nuaire XBC75-H-EESWP	43	18		
Variable Refrigerant Flow Condenser Unit Mitsubishi PURY-P450YJM-A	48	5		
Close Control Unit Condenser Unit Uniflair CAP0251	43	0		
Cumulative Noise Level at NSR 1 – Student Accommodation	50 dBA	-	51 dBA	Yes

Table 8 Predicted Noise Level at NSRs with Mitigation Measures – Option 2

Noise Source	Predicted Rating Level - dBA	Noise Reduction - dB	Target Rating Level - dBA	Compliance
Heat Recovery Ventilation Unit Nuaire XBC75-H-EESWP	43	18		
Variable Refrigerant Flow Condenser Unit Mitsubishi PURY-P450YJM-A	45	8		
Close Control Unit Condenser Unit Uniflair CAP0251	43	0		
Cumulative Noise Level at NSR 1 – Student Accommodation	49 dBA	-	51 dBA	Yes

5 Noise Impact Statement

Measurements and calculations show that after the proposed noise mitigation measures detailed in Section 4.3 are satisfactorily implemented, the noise emitted from the proposed mechanical plant and equipment will meet the London Borough of Camden Noise Threshold requirements.

Appendix A Acoustic Glossary

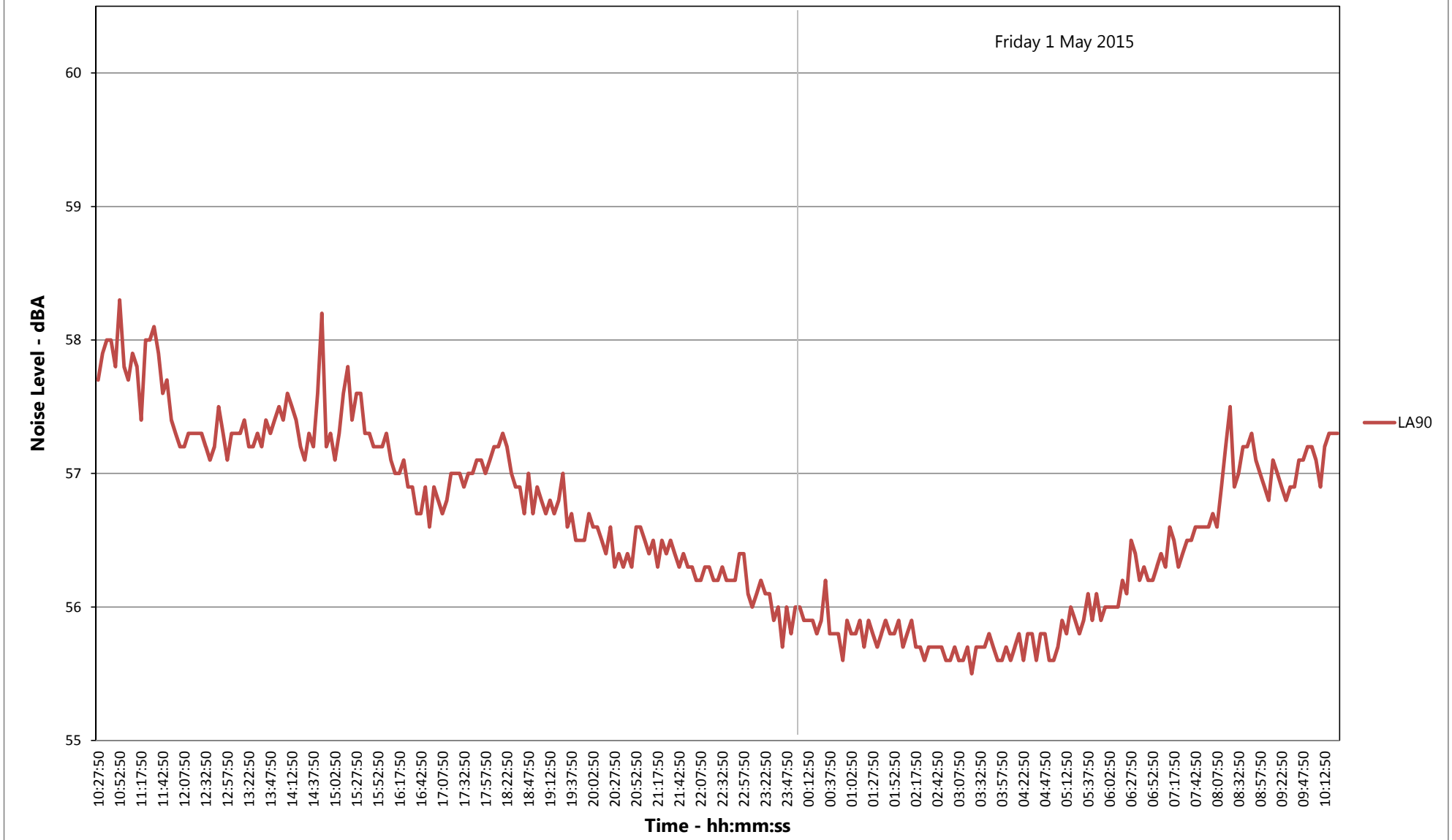
Glossary

Term	Definition
Ambient noise (as defined in BS 4142)	Totally encompassing noise in a given situation at a given time; it is usually composed of noise from many sources, near and far.
Background Noise (as defined in BS 4142)	A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 % of a given time interval, T, measured using time weighting, F, and quoted to the nearest whole number of decibels.
Rating Noise Level (as defined in BS 4142)	The specific noise level plus any adjustment for the characteristic features of the noise.
Specific Noise Level (as defined in BS 4142)	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
$L_{Aeq,T}$	Equivalent continuous sound pressure level (A-weighted) over a period of time, T.
$L_{A90,T}$	Sound pressure level (A-weighted) exceeded for 90% of the measurement period. Referred to as background noise level.
R_w	Weighted sound reduction index: Single-figure value of sound reduction according to ISO 140-3:1995, used for rating partition systems, door-sets or glazing, based on the values of sound reduction index R at different frequencies. The higher the R_w the better the performance.
C_{tr}	Spectrum adaptation term calculated using traffic noise as described in ISO 717-1:1996. This term is provided with weighted single values such as $D_{nT,w}$ or R_w to match with particular requirements (building acoustic or traffic noise spectrum).
Decibel, dB	Commonly used unit used for the comparison of the powers of levels sound. Abbreviation dB. Is the unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (Lp) the reference quantity is 2x10-5 N/m2. The sound pressure level existing when microphone measured pressure is 2x10-5 N/m2 is 0 dB, the threshold of hearing.
L_{eq} (& L_{Aeq})- Equivalent continuous noise level of a time-varying noise	Steady noise level (usually in dB(A)) which, over the period of time under consideration, contains the same amount of sound energy as the time-varying noise over the same period of time.
L_p - sound pressure level	Sound pressure level, in decibels, of a sound is 20 times the logarithm to the base of 10 of the ratio of the sound pressure to the reference pressure. The reference pressure shall be explicitly stated and is defined by standard.
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
Weightings (as defined in IEC 61672:2003):	A-Weighting: Frequency weighting devised to attempt to take into account the fact that human response to sound is not equally sensitive to all frequencies; it consists of an electronic filter in a sound level meter, which attempts to build in this variability into the indicated noise level reading so that it will correlate, approximately, with human response.). C-Weighting: One of the frequency weightings corresponding to the 100-phon contour and the closest to the linear or un-weighted value.

Appendix B Background Noise Survey

Ambient Noise Survey

Located at 96A – 98 Chenies Mews



Appendix C Mechanical Plant and Equipment Data Sheet

SUMMARY FAN DATA SHEET

Nuaire Limited, Western Industrial Estate, Caerphilly, CF83 1NA, United Kingdom. email:info@nuaire.co.uk
UK Commercial Enquiries T:029 2085 8200 UK Residential Enquiries T:029 2085 8500 International Enquiries T:+44.29 2085 8497

Whilst the information given on this data sheet is fan specific, it is in summary and reference to the product selection catalogue and installation & maintenance documents is recommended.
This data sheet produced on 05 May 2015 12:01 using software version 3.1.51.0137 - 27-March-2015

Technical Data

New XBOXER - With Ecosmart Control
Heat Recovery Fan

Fan Code:	**XBC75-H-EESWP**
Installation Manual Links:	671661
Required Duty:	0.74 m³/s @ 200 Pa
Addition for Ancillaries:	+10 Pa
Actual Duty:	0.948 m³/s @ 328 Pa
Actual Duty inc Ancil's:	0.939 m³/s @ 338 Pa
Actual at Required Flow:	0.74 m³/s @ 550 Pa

When Speed Controlled to Required Duty (78.7%):

Motor Input Power:	**0.973 kW**
Specific Fan Power:	**1.3 W/(l/s)**
Motor Input Power:	1.991 kW
Specific Fan Power:	2.1 W/(l/s)
Nominal Fan Speed:	2,140 RPM
Electrical Supply:	3 Phase
Nominal Motor Rating:	2.1 kW
Motor Current:	flc: 3.5 A
Motor Current:	sc: 3.5 A
Heater Power:	12 kW
Heater Current:	flc: 17 A
Heater+Motor Current:	flc: 20.5 A

All Ecosmart fans feature soft-starting and stepless variable speed control. A switch disconnector is required to isolate the fan from the electrical supply.

Max. Operating Temp.:	40°C
Weight:	720 kg

CIBSE BUILDING PERFORMANCE AWARDS 2014 — Winner

XBOXER XBC Heat Recovery Range
Energy Saving Product of the Year

Sound Data

Breakout Noise (dBA): 35 dBA @ 3m
Breakout level is spherical. For hemi-spherical add 3 dBA.

Sound Power Levels re 1 pWatts (Hz):

Hz	63	125	250	500	1k	2k	4k	8k
Breakout	69	61	58	56	47	39	40	32
Induct Intake	75	74	73	76	69	63	57	53
Induct Supply	76	72	66	73	70	60	44	44
Induct Discharge	79	78	73	81	80	72	65	61
Induct Extract	73	67	65	67	62	57	53	52

Above noise calculated speed controlled to required duty (78.7%)

For 100% Speed:	+6	+6	+6	+6	+6	+6	+6	+6
Breakout Noise (dBA):	+6							

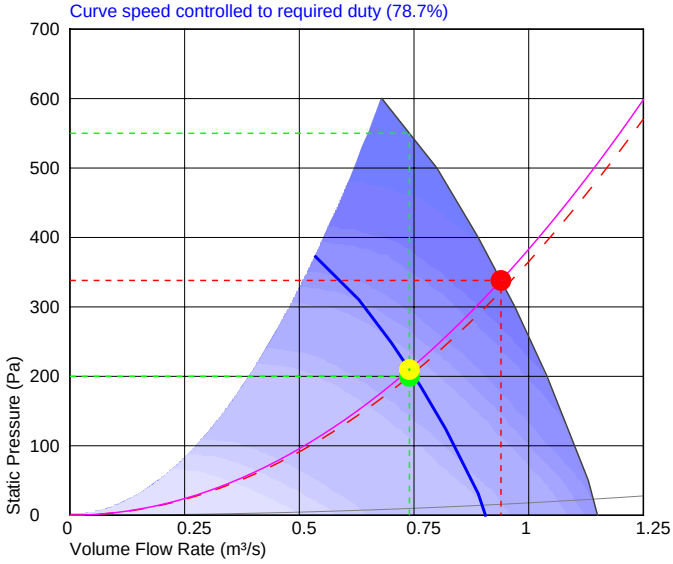
Option XBC75-H-SIL900-WP:

At all volumes	-6	-8	-18	-22	-20	-16	-15

Specification

Nuaire XBOXER horizontal supply & extract heat recovery unit. One-piece, double skinned aluminium pentapost construction with integral acoustic mineral fibre providing low breakout noise levels. Performance optimised backward curved impellers and IP54 EC motors provide low specific fan powers and stepless, speed control without tonal noise generation. The unit incorporates a high efficiency counterflow plate heat exchanger matrix (up to 92% efficiency) with segmented 100% bypass facility (patent app. for) including automatic control and actuator. A condensate pump (with alarm facility) and drip tray is fitted internally, with 8mm external drain connection. Unit is fitted with high capacity pleated G4 panel filters. Energy efficient, unit integrated demand based control of ventilation/heating is provided by Ecosmart control system. The unit is designed for side access and shall be constructed with removable side panels allowing full maintenance access to fan, filter, HX matrix, condensate pump and heater battery (where applicable). Externally mounted control module for commissioning adjustments. Unit supplied as configuration A (refer to technical documentation), complete with weather roof, control cover and base frame (76mm). 5 year warranty.Fitted with electric heater battery and burst fired temperature controller.

Performance Curve



SUMMARY FAN DATA SHEET - ANCILLARIES

Nuaire Limited, Western Industrial Estate, Caerphilly, CF83 1NA, United Kingdom. email:info@nuaire.co.uk
UK Commercial Enquiries T:029 2085 8200 UK Residential Enquiries T:029 2085 8500 International Enquiries T:+44.29 2085 8497

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Technical Data

New XBOXER - With Ecosmart Control
Heat Recovery Fan

Fan Code: **XBC75-H-EESWP**

Selected Ancillaries

1 x XBC75-H-MD230V	Motorised damper 230V motor open/motor closed. No limit switch fitted
1 x XBC75-H-SIL900-WP	Side by side external inline silencer module c/w base frame

XBC75-H-SIL900-WP - Side by side external inline silencer module c/w base frame

Resistance at Design:	6 Pa @ 0.74 m³/s
Resistance at Actual:	10 Pa @ 0.939 m³/s
Size:	900 mm (L) 2,000 mm (W) 1,001 mm (H)
Spigot Size:	940 x 740 mm
Weight:	190 kg

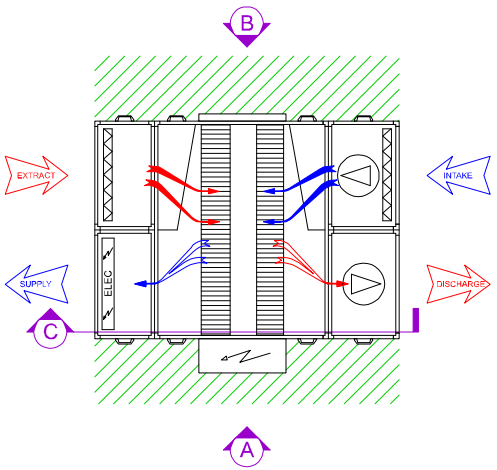
XBC75-H-MD230V - Motorised damper 230V motor open/motor closed. No limit switch fitted

Resistance at Design:	4 Pa @ 0.74 m³/s
Resistance at Actual:	6 Pa @ 0.939 m³/s
Size:	165 mm (L) 620 mm (W) 560 mm (H)
Weight:	14 kg

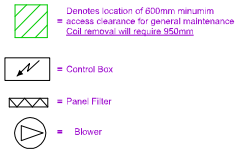
Unit: XBC75-H-EESWP

PLEASE NOTE: This drawing details the factory-standard unit ONLY (unless silencers are shown too). The total length may differ from that shown depending on the ancillaires offered or if the unit code ends in -QA*****.

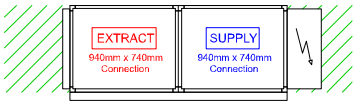
VIEW FROM ABOVE



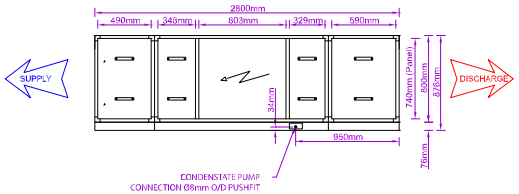
KEY



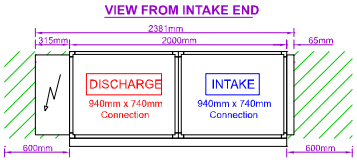
VIEW FROM EXTRACT END



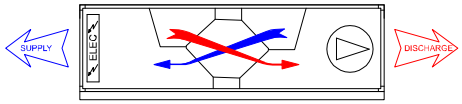
SIDE VIEW 'A'



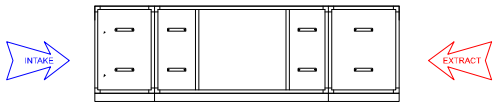
VIEW FROM INTAKE END



SECTION VIEW 'C'



SIDE VIEW 'B'



You can download this CAD drawing from http://www.nuaire.info/CAD/xbc75-85-h-e.dwg

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PLEASE NOTE This drawing **must be signed and returned** with official order for manufacturing to be scheduled.
Nuaire will then advise delivery detail with order acknowledgment.
Approval refers to CAD drawing only and not any other images.

ARRANGEMENT APPROVAL

Date: Signature:

Name (please print):

OUTDOOR UNIT
R2 Series
PURY-P YJM-A(-BS)

Specifications

Model			PURY-P350YJM-A(-BS)	PURY-P400YJM-A(-BS)	PURY-P450YJM-A(-BS)
Power source			3-phase 4-wire 380-400-415V 50/60Hz	3-phase 4-wire 380-400-415V 50/60Hz	3-phase 4-wire 380-400-415V 50/60Hz
Cooling capacity (Nominal)	*1	kW	40.0	45.0	50.0
	*1	BTU / h	136,500	153,500	170,600
	Power input	kW	11.33	13.55	14.49
	Current input	A	19.1-18.1-17.5	22.8-21.7-20.9	24.4-23.2-22.3
	COP	kW / kW	3.53	3.32	3.45
Temp. range of cooling *3	Indoor	W.B.	15.0~24.0°C(59~75°F)	15.0~24.0°C(59~75°F)	15.0~24.0°C(59~75°F)
	Outdoor	D.B.	-5.0~46.0°C(23~115°F)	-5.0~46.0°C(23~115°F)	-5.0~46.0°C(23~115°F)
Heating capacity (Nominal)	*2	kW	45.0	50.0	56.0
	*2	BTU / h	153,500	170,600	191,100
	Power input	kW	10.89	12.75	14.58
	Current input	A	18.3-17.4-16.8	21.5-20.4-19.7	24.6-23.3-22.5
	COP	kW / kW	4.13	3.92	3.84
Temp. range of heating *3	Indoor	D.B.	15.0~27.0°C(59~81°F)	15.0~27.0°C(59~81°F)	15.0~27.0°C(59~81°F)
	Outdoor	W.B.	-20.0~15.5°C(-4~60°F)	-20.0~15.5°C(-4~60°F)	-20.0~15.5°C(-4~60°F)
Indoor unit connectable	Total capacity		50~150 % of outdoor unit capacity	50~150 % of outdoor unit capacity	50~150 % of outdoor unit capacity
	Model / Quantity		P15~P250 / 1~35	P15~P250 / 1~40	P15~P250 / 1~45
Sound pressure level (measured in anechoic room)		dB <A>	60	61	62
Power pressure level (measured in anechoic room)		dB <A>	80	81	82
Refrigerant piping diameter	High pressure	mm (in.)	19.05(3/4) Brazed	22.2(7/8) Brazed	22.2(7/8) Brazed
	Low pressure	mm (in.)	28.58(1-1/8) Brazed	28.58(1-1/8) Brazed	28.58(1-1/8) Brazed
FAN	Type x Quantity		Propeller fan x 1	Propeller fan x 1	Propeller fan x 2
	Air flow rate	m^3/min	225	225	360
		L/s	3,750	3,750	6,000
		cfm	7,945	7,945	12,712
	Driving mechanism		Inverter-control, Direct-driven by motor	Inverter-control, Direct-driven by motor	Inverter-control, Direct-driven by motor
	Motor output	kW	0.92 x 1	0.92 x 1	0.92 x 2
*4	External static press.		0 Pa (0 mmH_2O)	0 Pa (0 mmH_2O)	0 Pa (0 mmH_2O)
Compressor	Type x Quantity		Inverter scroll hermetic compressor	Inverter scroll hermetic compressor	Inverter scroll hermetic compressor
	Starting method		Inverter	Inverter	Inverter
	Motor output	kW	9.9	10.2	11.6
	Case heater	kW	0.045(240 V)	0.045(240 V)	0.045(240 V)
External finish			Pre-coated galvanized steel sheets (+powder coating for -BS type) <MUNSELL 5Y 8/1 or similar>	Pre-coated galvanized steel sheets (+powder coating for -BS type) <MUNSELL 5Y 8/1 or similar>	Pre-coated galvanized steel sheets (+powder coating for -BS type) <MUNSELL 5Y 8/1 or similar>
External dimension HxWxD		mm	1,710(1,650 without legs) x 1,220 x 760	1,710(1,650 without legs) x 1,220 x 760	1,710(1,650 without legs) x 1,750 x 760
		in.	67-3/8(65 without legs) x 48-1/16 x 29-15/16	67-3/8(65 without legs) x 48-1/16 x 29-15/16	67-3/8(65 without legs) x 68-15/16 x 29-15/16
Protection devices	High pressure protection		High pressure sensor, High pressure switch at 4.15MPa (601 psi)	High pressure sensor, High pressure switch at 4.15MPa (601 psi)	High pressure sensor, High pressure switch at 4.15MPa (601 psi)
	Inverter circuit (COMP./FAN)		Over-heat protection, Over-current protection	Over-heat protection, Over-current protection	Over-heat protection, Over-current protection
	Compressor		Over-heat protection	Over-heat protection	Over-heat protection
	Fan motor		Thermal switch	Thermal switch	Thermal switch
Refrigerant	Type x original charge		R410A x 11.8kg (27lbs)	R410A x 11.8kg (27lbs)	R410A x 11.8kg (27lbs)
Net weight		kg (lbs)	270(596)	270(596)	320(706)
Heat exchanger			Salt-resistant cross fin & copper tube	Salt-resistant cross fin & copper tube	Salt-resistant cross fin & copper tube
Optional parts			Joint: CMY-Y102SS-G2,CMY-Y102LS-G2,CMY-R160-J1 BC controller: CMB-P104,105,106,108,1010,1013,1016V-G1 Main BC controller: CMB-P108,1010,1013,1016V-GA1 Sub BC controller: CMB-P104,108V-GB1, CMB-P1016V-HB1	Joint: CMY-Y102SS-G2,CMY-Y102LS-G2,CMY-R160-J1 Main BC controller: CMB-P108,1010,1013,1016V-GA1 Sub BC controller: CMB-P104,108V-GB1,CMB-P1016V-HB1	Joint: CMY-Y102SS-G2,CMY-Y102LS-G2,CMY-R160-J1 Main BC controller: CMB-P108,1010,1013,1016V-GA1 Sub BC controller: CMB-P104,108V-GB1,CMB-P1016V-HB1

Notes:

*1,*2 Nominal conditions

	Indoor	Outdoor	Pipe length	Level difference
Cooling	27ºC DB/19ºC WB (81ºF DB/66ºF WB)	35ºC DB(95ºF DB)	7.5m (24-9/16ft.)	0m (0ft.)
Heating	20ºC DB(68ºF DB)	7ºC DB/6ºC WB(45ºF DB/43ºF WB)	7.5m (24-9/16ft.)	0m (0ft.)

*3 -5ºC DB (23ºF DB) / -6ºC WB (21ºF WB) to 21ºC DB (70ºF DB) / 15.5ºC WB (60ºF WB) with cooling/heating mixed operation.
*4 External static pressure option is available (30Pa, 60Pa / 3.1mmH_2O, 6.1mmH_2O).
*Nominal condition *1,*2 are subject to JIS B8615-1.
*Due to continuing improvement, above specification may be subject to change without notice.

OUTDOOR UNIT
R2 Series
PURY-P YSJM-A(1)(-BS)

Specifications

Model			PURY-P400YSJM-A1(-BS)	PURY-P450YSJM-A1(-BS)	PURY-P500YSJM-A(-BS)
Power source			3-phase 4-wire 380-400-415V 50/60Hz	3-phase 4-wire 380-400-415V 50/60Hz	3-phase 4-wire 380-400-415V 50/60Hz
Cooling capacity (Nominal)	*1	kW	45.0	50.0	56.0
	*1	BTU / h	153,500	170,600	191,100
	Power input	kW	10.73	12.50	14.85
	Current input	A	18.1-17.2-16.5	21.1-20.0-19.3	25.0-23.8-22.9
	COP	kW / kW	4.19	4.00	3.77
Temp. range of cooling *3	Indoor	W.B.	15.0~24.0°C(59~75°F)	15.0~24.0°C(59~75°F)	15.0~24.0°C(59~75°F)
	Outdoor	D.B.	-5.0~46.0°C(23~115°F)	-5.0~46.0°C(23~115°F)	-5.0~46.0°C(23~115°F)
Heating capacity (Nominal)	*2	kW	50.0	56.0	63.0
	*2	BTU / h	170,600	191,100	215,000
	Power input	kW	11.62	13.30	15.10
	Current input	A	19.6-18.6-17.9	22.4-21.3-20.5	25.4-24.2-23.3
	COP	kW / kW	4.30	4.21	4.17
Temp. range of heating *3	Indoor	D.B.	15.0~27.0°C(59~81°F)	15.0~27.0°C(59~81°F)	15.0~27.0°C(59~81°F)
	Outdoor	W.B.	-20.0~15.5°C(-4~60°F)	-20.0~15.5°C(-4~60°F)	-20.0~15.5°C(-4~60°F)
Indoor unit connectable	Total capacity		50~150 % of outdoor unit capacity	50~150 % of outdoor unit capacity	50~150 % of outdoor unit capacity
	Model / Quantity		P15~P250 / 1~40	P15~P250 / 1~45	P15~P250 / 1~50
Sound pressure level (measured in anechoic room)		dB <A>	59	59.5	60
Power pressure level (measured in anechoic room)		dB <A>	79	79.5	80
Refrigerant piping diameter	High pressure	mm (in.)	22.2(7/8) Brazed	22.2(7/8) Brazed	22.2(7/8) Brazed
	Low pressure	mm (in.)	28.58(1-1/8) Brazed	28.58(1-1/8) Brazed	28.58(1-1/8) Brazed

Set Model

Model			PURY-P200YJM-A(-BS)	PURY-P200YJM-A(-BS)	PURY-P200YJM-A(-BS)	PURY-P250YJM-A(-BS)	PURY-P250YJM-A(-BS)	PURY-P250YJM-A(-BS)
FAN	Type x Quantity		Propeller fan x 1	Propeller fan x 1	Propeller fan x 1	Propeller fan x 1	Propeller fan x 1	Propeller fan x 1
	Air flow rate	m^3/min	185	185	185	185	185	185
		L/s	3,083	3,083	3,083	3,083	3,083	3,083
		cfm	6,532	6,532	6,532	6,532	6,532	6,532
	Driving mechanism		Inverter-control, Direct-driven by motor		Inverter-control, Direct-driven by motor		Inverter-control, Direct-driven by motor	
	Motor output	kW	0.92 x 1	0.92 x 1	0.92 x 1	0.92 x 1	0.92 x 1	0.92 x 1
*4	External static press.		0 Pa (0 mmH_2O)	0 Pa (0 mmH_2O)	0 Pa (0 mmH_2O)	0 Pa (0 mmH_2O)	0 Pa (0 mmH_2O)	0 Pa (0 mmH_2O)
Compressor	Type x Quantity		Inverter scroll hermetic compressor		Inverter scroll hermetic compressor		Inverter scroll hermetic compressor	
	Starting method		Inverter	Inverter	Inverter	Inverter	Inverter	Inverter
	Motor output	kW	5.4	5.4	5.4	6.8	6.8	6.8
	Case heater	kW	0.035(240 V)	0.035(240 V)	0.035(240 V)	0.035(240 V)	0.035(240 V)	0.035(240 V)
External finish			Pre-coated galvanized steel sheets (+powder coating for -BS type) <MUNSELL 5Y 8/1 or similar>		Pre-coated galvanized steel sheets (+powder coating for -BS type) <MUNSELL 5Y 8/1 or similar>		Pre-coated galvanized steel sheets (+powder coating for -BS type) <MUNSELL 5Y 8/1 or similar>	
External dimension HxWxD		mm	1,710(1,650 without legs) x 920 x 760	1,710(1,650 without legs) x 920 x 760	1,710(1,650 without legs) x 920 x 760	1,710(1,650 without legs) x 920 x 760	1,710(1,650 without legs) x 920 x 760	1,710(1,650 without legs) x 920 x 760
		in.	67-3/8(65 without legs) x 36-1/4 x 29-15/16	67-3/8(65 without legs) x 36-1/4 x 29-15/16	67-3/8(65 without legs) x 36-1/4 x 29-15/16	67-3/8(65 without legs) x 36-1/4 x 29-15/16	67-3/8(65 without legs) x 36-1/4 x 29-15/16	67-3/8(65 without legs) x 36-1/4 x 29-15/16
Protection devices	High pressure protection		High pressure sensor, High pressure switch at 4.15MPa (601 psi)		High pressure sensor, High pressure switch at 4.15MPa (601 psi)		High pressure sensor, High pressure switch at 4.15MPa (601 psi)	
	Inverter circuit (COMP./FAN)		Over-heat protection, Over-current protection		Over-heat protection, Over-current protection		Over-heat protection, Over-current protection	
	Compressor		Over-heat protection		Over-heat protection		Over-heat protection	
	Fan motor		Thermal switch	Thermal switch	Thermal switch	Thermal switch	Thermal switch	Thermal switch
Refrigerant	Type x original charge		R410A x 9.5kg (21lbs)	R410A x 9.5kg (21lbs)	R410A x 9.5kg (21lbs)	R410A x 9.5kg (21lbs)	R410A x 9.5kg (21lbs)	R410A x 9.5kg (21lbs)
Net weight		kg (lbs)	240(530)	240(530)	240(530)	240(530)	240(530)	240(530)
Heat exchanger			Salt-resistant cross fin & copper tube		Salt-resistant cross fin & copper tube		Salt-resistant cross fin & copper tube	
Pipe between unit and distributor	High pressure	mm (in.)	15.88(5/8) Brazed	15.88(5/8) Brazed	15.88(5/8) Brazed	19.05(3/4) Brazed	19.05(3/4) Brazed	19.05(3/4) Brazed
	Low pressure	mm (in.)	19.05(3/4) Brazed	-	19.05(3/4) Brazed	-	22.2(7/8) Brazed	-
Optional parts			Outdoor Twinning kit: CMY-R100VBK Joint: CMY-Y102SS-G2,CMY-Y102LS-G2,CMY-R160-J1 Main BC controller: CMB-P108,1010,1013,1016V-GA1 Sub BC controller: CMB-P104,108V-GB1,CMB-P1016V-HB1		Outdoor Twinning kit: CMY-R100VBK Joint: CMY-Y102SS-G2,CMY-Y102LS-G2,CMY-R160-J1 Main BC controller: CMB-P108,1010,1013,1016V-GA1 Sub BC controller: CMB-P104,108V-GB1,CMB-P1016V-HB1		Outdoor Twinning kit: CMY-R100VBK Joint: CMY-Y102SS-G2,CMY-Y102LS-G2,CMY-R160-J1 Main BC controller: CMB-P108,1010,1013,1016V-GA1 Sub BC controller: CMB-P104,108V-GB1,CMB-P1016V-HB1	

Notes:

*1,*2 Nominal conditions

	Indoor	Outdoor	Pipe length	Level difference
Cooling	27ºC DB/19ºC WB (81ºF DB/66ºF WB)	35ºC DB(95ºF DB)	7.5m (24-9/16ft.)	0m (0ft.)
Heating	20ºC DB(68ºF DB)	7ºC DB/6ºC WB(45ºF DB/43ºF WB)	7.5m (24-9/16ft.)	0m (0ft.)

*3 -5ºC DB (23ºF DB) / -6ºC WB (21ºF WB) to 21ºC DB (70ºF DB) / 15.5ºC WB (60ºF WB) with cooling/heating mixed operation.
*4 External static pressure option is available (30Pa, 60Pa / 3.1mmH_2O, 6.1mmH_2O).
*Nominal condition *1,*2 are subject to JIS B8615-1.
*Due to continuing improvement, above specification may be subject to change without notice.

UNIFLAIR™

UNIFLAIR TECHNICAL DATA

PROJECT REF	:	**UCL**
CLIENT REF	:	**Buro Happold**
AREA REF	:	**Print Lab**
DATA SHEET REF	:	**QC7381t**
UNIT TYPE	:	**Direct expansion air cooled**
MODEL SELECTED	:	**SUAC0151 B**

Return air	**dry bulb temperature**	**22 °C**
	relative humidity	**50 %rh**
Ambient temperature		**35.0 °C**
Total cooling capacity at coil		**5.9 kW**
Sensible cooling capacity at coil		**5.0 kW**
Net sensible cooling capacity		**4.5 kW**
Sensible heat ratio		0.85
No. of cooling circuits (each unit)		1
No. of compressors		1
Compressor type		Rotary scroll
Refrigerant type		R410A
Compressor power absorbed		1.6 kW
Air pattern		**upflow face return**
Air volume		0.40 m³/s
External static pressure		20 Pa
No. of motors		1
No. of fans		1
Fan type	direct driven forward curved centrifugal	
Fan motor power absorbed		0.5 kW
Filter efficiency		EU4
Heating type		Electric heating
Heating capacity		2.0 kW
Number of stages		Single
Humidifier type		electrode boiler
Humidifier capacity		2.0 kg/h
Power supply (V/Ph/Hz)		230/1/50
Unit run current		16.8 Amps
Full load current		25.1 Amps

Dimensions	width	550 mm
	depth	450 mm
	height	1740 mm*
	height (inc. discharge plenum & plinth)	2290 mm
	weight	125 kg

Sound pressure level (Free field) dB(A) 47.7 @ 2m

Please note that all sound levels are measured 1.0m above floor level. Upflow unit levels are based on normal working conditions with ducted supply, excluding the effect of diffusers, and air return as above.

** Excludes height of 350mm front discharge plenum & 200mm plinth for pipework (both supplied loose)*

Data subject to measurement tolerances prescribed in EN 14511 and EN ISO 3744 standards

Uniflair has a policy of continuous innovation and reserves the right to amend data without prior notice.

UNIFLAIR™

TECHNICAL DATA

AREA REF	:			**Print Lab**
DATA SHEET REF	:			**QC7381t cont'd**
CONDENSER(S) SELECTED	:	**1**	**x**	**CAP0251**
Matching room unit model	:			SUAC0151

All data relate to each individual condenser

Air volume		0.85	m^3/s
Direction of airflow		horizontal	(vertical with leg kit option)
Type of fan		axial	
Number of fans		1	
Fan speed		880	rpm
Total power absorbed		0.15	kW
Condenser coil			
Total internal volume		2.7	dm^3
Number of circuits		1	
Electrical supply (1Ph+N,50Hz)		230	V
Unit run current		0.7	Amps
Dimensions	width	830 (830)	mm
	depth	530 (750)	mm
	height	720 (750)	mm

(Figures in brackets for unit with optional leg kit for vertical air discharge)

Weight	28	kg
Minimum recommended clearances (horizontal discharge)		
Fan Side	4.0	m
Coil Side	0.7	m

Sound Pressure Levels (Free field)

Horizontal discharge	dB(A)	49.1	@ 5m
Vertical discharge (with optional leg kit)	dB(A)	47.4	@ 5m

Please note that all sound levels are measured 1.0m above ground level.

Information regarding inter-connecting pipework sizes is contained in the Uniflair Engineering Data

No inter-connecting wiring is required between room units and condensers.
Condenser power supply must be taken from nearest convenient local source, not from room unit.

Air Conditioning

Product Information

Acoustic Kits

PUHY and PURY series units (YJM)

Making a World of Difference

*2

A range of Acoustic Kits designed for noise reduction. An industry first, these kits offer up to an 8dBA noise level reduction from standard.

Key Features

- Up to 8dBA noise reduction
- Manufacturer approved
- From £607 to £2326*1

*1 May vary slightly depending on application and size of order
*2 Colour for representation only, real colour is matched to standard outdoor unit colour (off white)

MITSUBISHI ELECTRIC
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Air Conditioning | Commercial Heating
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Product Information

Acoustic Kits

PUHY and PURY series units (YJM)

Making a World of Difference

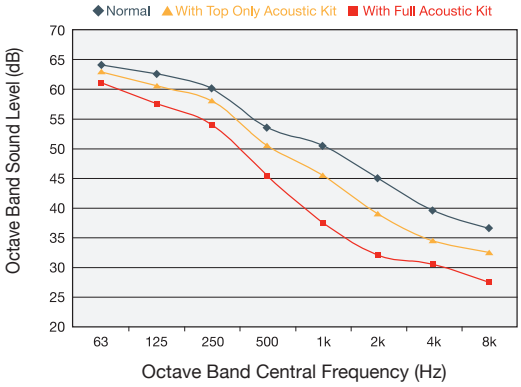
TYPES OF KIT

Both a 'full kit' and 'top only' kit are available. The 'full kit' comprises left, right and back louvres with a top attenuator. The 'top only' has a top attenuator only.

If space is an issue, then the 'top only' kit is available which can still reduce the noise level by up to 4dBA.

The noise level is calculated from an average of the noise at a height of 1m and distance of 1m from the front, back, left, right and 1m above the top. All noise measurements are performed in an anechoic chamber.

PURY-EP200YJM-A ACOUSTIC NOISE LEVEL DATA*



* Indication only

SUPPLY AND/OR INSTALLATION

Please contact Ambient Acoustics directly for supply and installation costs.

Installation costs will vary depending on location and number of units to be fitted with acoustic kits.

Ambient Acoustics Ltd
PO Box 1585, Wedmore, Somerset, BS28 4WZ
Tel: 01934 712802
Fax: 01934 710420
Email: sales@ambientacoustics.co.uk

Ambient Acoustics is an independent supplier of acoustic attenuation products, all warranties and liabilities rest with Ambient Acoustics Ltd. The acoustic attenuation kits have been tested and approved by Mitsubishi Electric UK.

BASIC ACOUSTIC KIT COSTS

S-module

L-module

XL-module

For all PUHY and PURY Series (YJM)

3 models are available, small, large and extra large. Small fits on the S-module outdoor units, large fits on the L-module outdoor units and extra large on the XL-module outdoor units.

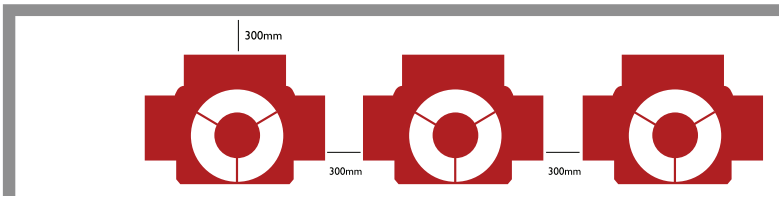
S-module	Complete acoustic kit target price Top attenuator only target price	£1452 £607
L-module	Complete acoustic kit target price Top attenuator only target price	£1585 £648
XL-module	Complete acoustic kit target price Top attenuator only target price	£2326 £1102

All costs include delivery.

INSTALLATION

Due to the wrap around coil of the YJM, the louvres are attached to 3 sides of the unit. Therefore, when installing multiple module systems, a 300mm gap between each louvre is required.

See diagram below.



1 full kit per outdoor unit is required, unless specifying top attenuator only. In this case, space units as normal.

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