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DRAGONFLY acoustics

The Planning and Design Partnership

Warren House, Hall Drive, Sand Hutton

DC0845 – R1

Noise Impact Assessment

July 2012

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1.0 INTRODUCTION

The Planning and Design Partnership has appointed Dragonfly Acoustics Limited to carry out a noise assessment relating to the installation of an external heat pump at a newly built property on land formerly belonging to Warren House, Hall Drive, Sand Hutton, York.

It is understood that the noise assessment is required to establish the noise levels at the nearest noise sensitive receptor due to the operation of the plant.

The noise assessment has been conducted in accordance with the National Planning Policy Framework. The noise assessment has also been conducted in accordance with Planning and Policy Guidance 24 (PPG24) and British Standard 4142 *Method for rating industrial noise affecting mixed residential and industrial areas.*

This report therefore describes a noise survey of the site and the subsequent analysis to determine the noise impact of the heat pump system on the nearest noise sensitive receptor; it then compares the results with the adopted criteria.

Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature; to assist the reader, a glossary of terminology is included in Appendix A.

2.0 SITE DESCRIPTION

2.1 Existing Site Conditions

Warren House, Hall Drive, Sand Hutton, York is a detached family home with extensive gardens and is located in a rural village.

Land to the East of the property has recently been sold for development, with the construction of a further detached family home being planned.

The land is located centrally within the village and is broadly surrounded by residential properties and agricultural land in all directions.

2.2 Proposed site conditions

It is proposed to build a single residential dwelling on the land on Hall Drive. This development will include installation of a heat pump with external elements, positioned at the North end of a proposed detached garage building.

3.0 GUIDANCE

3.1 Consultation with Ryedale District Council

Dragonfly Acoustics has consulted the planning authority, Ryedale District Council, to confirm its views and policies on noise-related issues.

The National Planning Policy Framework (NPPF) does not provide any specific or quantified guidance with respect to noise and has withdrawn all previous guidance documents on the assessment of noise for planning purposes, which was detailed in Planning and Policy Guidance 24 (PPG24). Instead the NPPF places the onus on a local authority to develop a suitable local development plan, within which noise is addressed, taking account of the guidance within the NPPF.

3.2 Noise Policy Statement for England

The document "Noise Policy Statement for England" sets out the following vision for ongoing noise policy:

"Promote good health and a a quality of life through the effective management of noise within the context of Government policy on sustainable development."

This vision should be achieved through the following Noise Policy Aims:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.*
-

To achieve this the Noise Policy Statement sets three noise levels to be defined by the assessor:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL Noise levels, the Policy Statement requires that:

"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development..... This does not mean that such adverse effects cannot occur."

Where noise levels are below the LOAEL it is considered there will be no adverse effect. Once noise levels are below the NOEL there will be no observable change.

3.3 British Standard 4142

British Standard 4142:1997 *Method for rating industrial noise affecting mixed residential and industrial areas* is intended to be used to assess whether noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises is likely to give rise to complaints from people residing in nearby dwellings.

The procedure contained in BS4142 for assessing the likelihood of complaint requires the calculation of the noise level from the source to be assessed at a location immediately outside the relevant dwelling; this is described as the 'specific noise level'. Where the specific noise source already exists its noise level can be derived by measuring the total noise present, or 'ambient noise', and subtracting from it the noise from sources that are not under consideration. Noises not under consideration are called the 'residual noise'. The specific noise level is then compared with the background noise level at that measurement location. If the specific noise source does not yet exist but the details of the intended plant are known, the specific noise level can derived from first principles using manufacturers' and other data.

The specific, ambient and residual noise levels are measured in terms of $L_{Aeq,T}$ values and the background noise level is measured in terms of an L_{A90} value.

BS4142 considers that certain acoustic features can increase the likelihood of complaint over that expected from a simple comparison between the specific noise level and the background noise level.

These features are:

- The noise contains a distinguishable, discrete, continuous note (whine, hiss, screech, hum, etc.);
- The noise contains distinct impulses (bangs, clicks, clatters, or thumps); and
- The noise is irregular enough to attract attention.

When such features are present a +5dB correction is added to the specific noise level and this corrected value, which is then used in the assessment, is known as the 'rating level'.

In order to rate the likelihood of complaints, the background noise level is subtracted from the rating level. The standard considers that the greater the difference, the greater the likelihood of complaints.

A difference of around +10 dB or higher indicates that complaints are likely. A difference of around +5 dB is of marginal significance. A difference of -10 dB is a positive indication that complaints are unlikely.

BS4142 does not give clear direction on how to quantify either the background or residual noise levels when there are existing sources of industrial or commercial noise. This is of particular interest

where the existing industrial or commercial noise sources are within the control of the owner of the sources under consideration.

For this assessment the values of the NOEL, LOAEL and SOAEL are drawn from the criteria and values detailed in BS4142. The stndard sets very clear limit values and these are interpreted as follows:

NOEL – No Observed Effect Level – Rating Noise Level is 10dBA below the lowest measured background noise level. This is the point at which complaints are considered to be unlikely.

LOAEL – Lowest Observed Adverse Effect Level – Rating Noise Level is 5dBA above the background noise level. The standard considers this to be of marginal significance.

SOAEL – Significant Observed Adverse Effect Level – Rating Noise Level is 10dBA above background noise level. The standard considers this to be the level at which complaints are likely.

4.0 ENVIRONMENTAL NOISE SURVEY

Measurements were undertaken from 5th to 6th July 2012 to establish existing ambient and background noise levels.

The survey methodology and results are set out below.

4.1 Survey Methodology

The measurement location is shown in Appendix B and has been identified throughout the report as follows:

- 'Location 1' – sound level meter positioned externally at the gated entrance to the proposed dwelling, adjacent to the gated entrance of the nearest neighbouring property.

The microphone was placed approximately 1.5 metres above the ground in what were considered to be free-field conditions. All measurements were 5 minutes in duration.

The equipment used during the survey is detailed in Appendix C. The sound level meter was calibrated before and after the measurements and no significant calibration drifts were found to have occurred. All of the noise monitoring equipment had been calibrated by the manufacturer to a traceable standard within the twelve months preceding the survey. Calibration certificates are available on request.

4.2 Survey Results

The weather during the survey was suitable for noise measurements, it being mild and clear with low wind speeds. The full set of data recorded during the survey is given in Appendix D. A summary of the measured noise levels is given in Table 4.1 below.

Table 4.1
Summary of Measured Noise Levels – free-field, dB

Location	Date	Period (h)	$L_{Aeq,T}$	L_{A10}	L_{A90}	L_{AFmax}
Location 1	05/07/12 To 06/07/12	2258h to 0703h	38.1	38.3	29.0	62.9

4.3 Observations and Comments

For the night time assessment it is considered that the noise levels measured are representative of the typical noise environment at the survey location and of the 8 hour average L_{Aeq} at the location. For the purposes of this assessment it is considered that the noise levels measured at the survey location are representative of those noise levels that would be incident the nearest noise sensitive receptor.

5.0 ASSESSMENT

5.1 Assessment of Noise from Fixed Plant

An assessment has been carried out in accordance with the requirements of BS4142 to quantify the likelihood of complaints by residents of the property which is the nearest noise sensitive receptor (a detached residence to the South of the proposed development) due to the noise generated by the external elements of the heat pump.

The specific noise level has been obtained by calculating the noise level at the nearest noise sensitive receptor due to the operation of the pump, using the source noise level taken from the manufacturer's datasheets. The calculations assume the equipment is operating at maximum capacity. These calculations have been undertaken using standard acoustic formulae.

This noise data is as follows:

Table 5.1
Specific Noise Level Incident on Façade of Noise Sensitive Receptor, dB

Plant Item	Noise Sensitive Receptor Façade	Source Noise Level at 1m (dB)	Distance Correction (dB)	Barrier Correction in dB(A)	Level at Noise Sensitive Receptor
Ecodan PUHZ-HW140VHA 14kW heat pump	North	53.0	28.0	15.0	10.0

Given that the measurement location and the nearest noise sensitive receptor are in close proximity to one another it has been assumed that the Background Noise Levels L_{A90} recorded at 'Location 1' are the same as those incident on the nearest noise sensitive receptor. The background noise level for the 5 minute period with the lowest measured noise levels has been used in the calculations.

A distance correction of 28.0dB has been included to account for the 25m distance between the heat pump and the closest facade (North) of the nearest noise sensitive receptor.

A barrier correction of 15.0dB has been included to account for the intervening brick-built structure (garage) between the heat pump and the nearest noise sensitive receptor.

The calculated specific noise level at the nearest noise sensitive receptor is shown in Table 5.1.

Due to the rural nature of the village it is considered that the heat pump may have tonal characteristics that could be considered to be a "distinguishable, discrete, continuous note".

As the operation of the plant contains one of the three characteristics identified by BS4142; the rating level at the nearest noise sensitive receptor will be calculated with the addition of a 5dB correction as stipulated by BS4142.

The results of the assessment are shown in Table 5.2 below:

Table 5.2
Comparison of Noise Level and Background Noise Level, free-field, dB

Location	Façade	Noise Level $L_{Aeq,T}$	Lowest Background Noise Level L_{A90}	Difference
1	North	15.0	22.0	-7.0

BS4142 states that:

"A difference of around 10dB or higher indicates that complaints are likely. A difference of around 5dB is of marginal significance. A difference of -10dB is a positive indication that complaints are unlikely."

Table 5.2 shows that the level of noise generated at the nearest noise-sensitive property by the operation of the units, falls between the categories of "marginal significance" and "complaints unlikely".

This rating noise level is above the NOABL level set but below the LOABL level set. It is considered that the noise level would be acceptable. In addition the proposed noise source is a sustainable element of a larger development, a factor the NPPF seeks to encourage.

7.0 CONCLUSION

The Planning and Design Partnership has appointed Dragonfly Acoustics Limited to carry out a noise assessment relating to the installation of an external heat pump at a newly built property on land formerly belonging to Warren House, Hall Drive, Sand Hutton, York.

It is understood that the noise assessment is required to establish the noise levels at the nearest noise sensitive receptor due to the operation of the plant.

The noise assessment has been conducted in accordance with the National Planning Policy Framework. The noise assessment has also been conducted in accordance with Planning and Policy Guidance 24 (PPG24) and British Standard 4142 *Method for rating industrial noise affecting mixed residential and industrial areas*..

This report therefore describes a noise survey of the site and the subsequent analysis to determine the noise impact of the heat pump system on the nearest noise sensitive receptor; it then compares the results with the adopted criteria.

The assessment has shown that rating noise level for the proposed plant will be 7dB(A) below the lowest measured background noise level at the nearest noise sensitive receptor.

Therefore no mitigation measures are required. The assessment shows that the level of noise generated at the nearest noise-sensitive property by the operation of the units falls between the categories of "marginal significance" and the category of "complaints unlikely".

This rating noise level is above the NOABL level set but below the LOABL level set. It is considered that the noise level would be acceptable. In addition the proposed noise source is a sustainable element of a larger development, a factor the NPPF seeks to encourage.

8.0 CLOSURE

This report has been prepared by Dragonfly Acoustics with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of The Planning and Design Partnership; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from Dragonfly Acoustics.

Dragonfly Acoustics disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

APPENDIX A

Appendix A – Glossary of Terminology

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A-1
Sound Levels Commonly Found in the Environment

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

Acoustic Terminology

dB (decibel) The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$Pa).

dB(A) A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

L_{Aeq} Defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

L_{10} & L_{90} If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index when describing traffic noise.

L_{Amax} The maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment.

APPENDIX B

Appendix B – Measurement Locations

Figure B-1
Measurement Location Plan

APPENDIX C

Appendix C – Noise Monitoring Equipment

Table C-1
Noise Monitoring Equipment

Equipment	Serial Number
Sonus Sound Level Meter	068725
Sonus Microphone	47267
Castle GA607 Calibrator	040772

Appendix D – Full Survey Results

Table D-1
Measured Noise Levels, Location 1, 05/07/12 to 06/07/12 – free-field, dB

Time (h)	Measurement Duration	L_{Aeq}	L_{A10}	L_{A90}	L_{AMax}
22:58	5 minutes	32.8	36.0	29.0	41.5
23:03	5 minutes	33.2	36.0	28.0	45.4
23:08	5 minutes	39.6	42.0	35.0	45.1
23:13	5 minutes	39.6	43.0	35.0	46.9
23:18	5 minutes	39.4	43.0	33.0	53.9
23:23	5 minutes	34.0	37.0	26.0	42.0
23:28	5 minutes	27.3	31.0	23.0	41.9
23:33	5 minutes	28.3	31.0	24.0	40.8
23:38	5 minutes	30.2	33.0	25.0	40.1
23:43	5 minutes	33.4	37.0	28.0	43.9
23:48	5 minutes	34.5	38.0	29.0	42.1
23:53	5 minutes	31.3	35.0	25.0	40.5
23:58	5 minutes	31.0	35.0	26.0	38.6
00:03	5 minutes	33.3	36.0	29.0	42.7
00:08	5 minutes	34.3	38.0	28.0	41.1
00:13	5 minutes	33.8	38.0	25.0	42.5
00:18	5 minutes	29.3	32.0	24.0	40.2
00:23	5 minutes	24.5	26.0	22.0*	34.2
00:28	5 minutes	27.1	31.0	23.0	40.7
00:33	5 minutes	25.2	28.0	22.0*	34.7
00:38	5 minutes	27.2	30.0	24.0	38.0
00:43	5 minutes	31.5	35.0	25.0	40.5
00:48	5 minutes	29.9	32.0	26.0	37.7
00:53	5 minutes	31.3	34.0	27.0	37.2
00:58	5 minutes	33.4	36.0	29.0	41.3
01:03	5 minutes	30.0	32.0	27.0	37.6
01:08	5 minutes	33.2	35.0	27.0	44.6
01:13	5 minutes	29.2	32.0	26.0	37.2
01:18	5 minutes	31.4	35.0	26.0	38.3
01:23	5 minutes	27.6	30.0	25.0	32.8
01:28	5 minutes	30.9	34.0	26.0	41.5
01:33	5 minutes	32.2	36.0	26.0	38.8
01:38	5 minutes	33.4	37.0	25.0	42.8
01:43	5 minutes	28.2	30.0	26.0	33.2
01:48	5 minutes	30.2	33.0	27.0	40.1
01:53	5 minutes	31.3	34.0	27.0	39.5
01:58	5 minutes	32.8	38.0	26.0	43.6
02:03	5 minutes	31.6	37.0	25.0	41.2

APPENDIX D

Time (h)	Measurement Duration	L_{Aeq}	L_{A10}	L_{A90}	L_{AMax}
02:08	5 minutes	29.1	32.0	24.0	36.3
02:13	5 minutes	33.2	36.0	28.0	43.8
02:18	5 minutes	34.0	38.0	26.0	50.3
02:23	5 minutes	31.3	35.0	27.0	39.0
02:28	5 minutes	28.5	32.0	22.0*	38.9
02:33	5 minutes	37.1	41.0	23.0	51.5
02:38	5 minutes	31.3	36.0	23.0	45.9
02:43	5 minutes	29.8	32.0	25.0	43.6
02:48	5 minutes	26.9	29.0	23.0	41.2
02:53	5 minutes	26.7	29.0	23.0	32.5
02:58	5 minutes	29.4	33.0	24.0	38.4
03:03	5 minutes	29.5	32.0	26.0	37.0
03:08	5 minutes	28.5	31.0	25.0	38.9
03:13	5 minutes	32.3	35.0	25.0	43.2
03:18	5 minutes	32.5	35.0	27.0	41.8
03:23	5 minutes	33.9	37.0	28.0	41.9
03:28	5 minutes	34.7	37.0	27.0	59.4
03:33	5 minutes	31.2	35.0	25.0	43.2
03:38	5 minutes	29.9	33.0	24.0	40.1
03:43	5 minutes	36.6	40.0	31.0	44.5
03:48	5 minutes	33.3	37.0	28.0	43.3
03:53	5 minutes	32.9	37.0	28.0	42.5
03:58	5 minutes	35.8	39.0	31.0	49.2
04:03	5 minutes	40.6	44.0	35.0	54.4
04:08	5 minutes	40.0	44.0	34.0	50.0
04:13	5 minutes	39.5	43.0	34.0	51.9
04:18	5 minutes	42.6	47.0	33.0	53.6
04:23	5 minutes	44.5	49.0	35.0	57.3
04:28	5 minutes	42.4	47.0	31.0	54.9
04:33	5 minutes	42.0	47.0	31.0	54.4
04:38	5 minutes	43.7	48.0	30.0	56.1
04:43	5 minutes	43.8	48.0	32.0	55.5
04:48	5 minutes	42.1	47.0	31.0	54.8
04:53	5 minutes	42.7	47.0	34.0	55.4
04:58	5 minutes	43.8	49.0	32.0	55.8
05:03	5 minutes	42.1	47.0	33.0	53.0
05:08	5 minutes	39.7	45.0	32.0	53.0
05:13	5 minutes	40.9	46.0	31.0	55.3
05:18	5 minutes	42.4	47.0	33.0	55.0
05:23	5 minutes	41.2	46.0	32.0	54.2
05:28	5 minutes	39.1	43.0	31.0	52.5
05:33	5 minutes	38.3	42.0	32.0	53.3
05:38	5 minutes	37.8	38.0	31.0	60.0

APPENDIX D

Time (h)	Measurement Duration	L_{Aeq}	L_{A10}	L_{A90}	L_{AMax}
05:43	5 minutes	36.4	40.0	31.0	47.5
05:48	5 minutes	39.0	43.0	32.0	49.7
05:53	5 minutes	36.7	40.0	31.0	51.3
05:58	5 minutes	44.7	47.0	36.0	62.9
06:03	5 minutes	44.5	47.0	38.0	58.2
06:08	5 minutes	39.9	43.0	35.0	50.1
06:13	5 minutes	44.2	49.0	38.0	52.7
06:18	5 minutes	43.4	46.0	38.0	53.6
06:23	5 minutes	40.6	43.0	34.0	56.7
06:28	5 minutes	38.7	41.0	34.0	55.4
06:33	5 minutes	41.2	43.0	37.0	55.5
06:38	5 minutes	38.0	40.0	35.0	47.6
06:43	5 minutes	38.0	40.0	36.0	44.5
06:48	5 minutes	37.9	40.0	35.0	51.1
06:53	5 minutes	39.2	41.0	36.0	49.1
06:58	5 minutes	42.3	44.0	38.0	58.0

*Lowest measured background (L_{A90})

APPENDIX D

Appendix E – Limitations to this Report

This entails a physical investigation of the site with a sufficient number of sample measurements to provide quantitative information concerning the type and degree of noise and vibration affecting the site. The objectives of the investigation have been limited to establishing sources of noise and vibration material to carrying out an appropriate assessment.

The number and duration of noise and vibration measurements have been chosen to give reasonably representative information on the environment within the agreed time, and the locations of measurements have been restricted to the areas unoccupied by building(s) that are easily accessible without undue risk to our staff.

As with any sampling, the number of sampling points and the methods of sampling and testing cannot preclude the existence of "hotspots" where noise or vibration levels may be significantly higher than those actually measured due to previously unknown or unrecognised noise or vibration emitters. Furthermore, noise or vibration sources may be intermittent or fluctuate in intensity and consequently may not be present or may not be present in full intensity for some or all of the survey duration.

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Ecodan - PUHZ-HW140VHA

Ecodan – 14kW (A2 W35) heat pump boiler

Very large modern new build and older properties

Power supply 40 Amp – 3 core 6mm² cable
Maximum running Current - 35 Amps
Maximum flow rate – 40 L/M
Minimum flow rate – 20 L/M
Pipe diameter – *28mm
Noise level – 53 dba

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Domestic Heating

Product Information

Ecodan Air Source Heat Pumps
with Flow Temperature Controller 2

Making a World of Difference

MODEL		PUHZ-W50VHA	PUHZ-W85VHA2	PUHZ-HW140VHA2	PUHZ-HW140YHA2
Heating*1 A2/W35	Capacity (kW)	5.0 (1.5-5.0)	8.5 (2.6-8.5)	14.0 (4.2-14.0)	14.0 (4.2-14.0)
	COP	3.13	3.17	3.11	3.11
	Power Input (kW)	1.60	2.68	4.52	4.52
	Nominal flow rate (L/min)	14.3	25.8	40.1	40.1
Heating*2 A7/W35	Capacity (kW)	5.0 (1.5-5.0)	9.0 (2.7-9.0)	14.0 (4.2-14.0)	14.0 (4.2-14.0)
	COP	4.10	4.18	4.25	4.25
	Power Input (kW)	1.22	2.15	3.31	3.31
	Nominal flow rate (L/min)	14.3	25.8	40.1	40.1
Dimensions (mm)	Width	950	950	1020	1020
	Depth	330+30*	330+30*	330+30*	330+30*
	Height	740	943	1350	1350
Weight (kg)		64	77	134	148
Airflow (m^3/min)		50	55	100	100
Nominal Sound Pressure Level (dBA)*3		45▲	48▲	53▲	53▲
Low Noise Mode (dBA) @ 7°C		40	42	46	46
Guaranteed Operating Range	(Outdoor)	-15~+35°C	-20~+35°C	-25~+35°C	-25~+35°C
Electrical Supply		220-240v, 50Hz	220-240v, 50Hz	220-240v, 50Hz	380-415v, 50Hz
Phase		Single	Single	Single	3
Running Current [Max] (A)		5.4 [13]	10.3 [23]	14.9 [35]	5.1 [13]
Fuse Rating (MCB sizes BS EN 60898) (A)		16	25	40	16

*Grille ▲At distance of 1m from outdoor unit

Nominal operating condition:
*1 Heating (A2/W35) Outside air temperature (dry) +2°C; Outside air temperature (humid) +1°C; Water temperature (inlet/outlet) +30/+35°C

Nominal operating condition as tested to BS EN14511:
*2 Heating (A7/W35) Outside air temperature (dry) +7°C; Outside air temperature (humid) +6°C; Water temperature (inlet/outlet) -30/-35°C

*3 Sound power level of the W50 is 61dBA, W85 is 62.5dBA, HW140V is 65.5dBA and HW140Y is 67.5dBA. Tested to BS EN12102.

Flow Temperature Controller 2

To allow the homeowner to continue to operate both their central heating and hot water time clocking using a commonly available two-channel controller, we have introduced the Flow Temperature Controller (FTC2) interface.

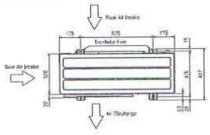
In a Space Heating mode the FTC2 will ensure that Ecodan operates at optimum efficiency, varying the flow temperature to either the radiator or under floor heating system to meet a homes heating requirements.

In a Water Heating mode the FTC2 will allow the Ecodan to work with leading brands of water storage tanks. It is, however, important to consider that the overall performance of the system in Water Heating mode will be very dependant on the thermal performance of the storage tank's heat exchanger. With the packaged systems we offer, the heat exchangers have been designed to give an optimised performance across the whole Ecodan water flow temperature range and these performances have been tested and verified. We therefore strongly recommend that similar consideration is given to the specification of any hot water storage tank before being considered for operation with the Ecodan.

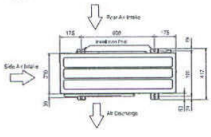
SCHEMATICS

■ PUHZ-W50VHA ■ PUHZ-W85VHA2 ■ PUHZ-HW140VHA2 / YHA2*

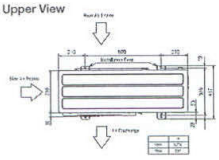
Upper View



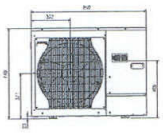
Upper View



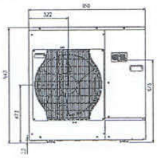
Upper View



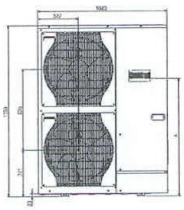
Front View



Front View



Front View



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Green Gateway
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Mitsubishi Electric's commitment to the environment

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