

# Acoustic Surveillance and Testing Ltd

## Noise Assessment Report – BS4142:1997

*Site address: 50 Eton Avenue, London. NW3 3HN*

*Client: Yusuf Ismail*

**REPORT NUMBER: ASAT 10809 RP NA**



Date of test: 13<sup>th</sup> January 2010 and 23<sup>rd</sup> March 2010

Test conducted by:

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**1. INTRODUCTION – (Details and Aims of Assessment)**

- 1.1 This noise assessment relates to potential noise nuisance from a heat pump installed on the roof of 50 Eton Avenue and it's effect upon the nearest adjacent residential dwellings at 30 Crossfield Road.
- 1.2 The client confirmed that the heat pump will not run continuous but to cover any future potential changes to time of use, the calculations are based on worst case scenario.
- 1.3 This report shows the findings of the noise assessment conducted on 13<sup>th</sup> January 2010 and 23<sup>rd</sup> March 2010.



## 2. NOISE UNITS AND METHODOLOGY

- 2.1 The range of audible sound is from 0 dB – 140 dB. The ear does not respond equally to all frequencies at the same level. Therefore a weighting is given to measurements of noise to correlate to this feature. The international standard accepted is the dB(A) weighting.
- 2.2 For noise sources such as road traffic noise, a difference of 3dB is just distinguishable.
- 2.3 A number of noise indices are used in noise assessment to analyze the varying noise levels:
- LAeq – The equivalent continuous A weighted sound pressure level in decibels. It is defined as the "value of the A weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean squared sound pressure as a sound under consideration whose level varies with time".
  - LA10 – This is the noise level that is exceeded for 10% of the measurement time period and gives an indication of the noisier levels.
  - LA90 – This is the noise level that is exceeded for 90% of the measurement time period and gives an indication of the noise level during quieter periods. It is often referred to as the 'background' noise level.
  - Specific Noise Source – This is the noise source under investigation for assessing the likelihood of complaints.
  - Residual Noise – The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.
- 2.4 Specific Guidelines are given in BS 4142: 1997. This deals with rating industrial noise affecting mixed residential and industrial areas.

BS 4142:1997, gives the following assessment method process;

"Assess the likelihood of complaints by subtracting the measured background noise level from the rating level. The greater this difference the greater the likelihood of complaints. A difference of around +10dB or more indicates that complaints are likely. A difference of around +5dB is of marginal significance. If the rating level is more than 10dB below the measured background noise level then this is a positive indication that complaints are unlikely."

### 3. NOISE MEASUREMENTS AND EQUIPMENT

3.1 The equipment used was as follows:

Bruel & Kjaer	Sound level meter	Type 2250	Serial No: 2671994
Calibration date:	30/12/2008		

Bruel & Kjaer	Calibrator	Type 4231	Serial No: 2499287
Calibration date:	03/02/09		

All measurement instrumentation was calibrated before and after the test.

Start microphone sensitivity: 51.40mV/Pa.

End microphone sensitivity: 50.68mV/Pa.

3.2 The weather conditions were overcast, wind calm, temperature varying between +2.5C and +3.0C

#### 4. TEST AND SITE DETAILS

- 4.1 The tests detailed in this report have been carried out in accordance with British Standards BS 4142:1997.
- 4.2 The noise source/ specific noise will be from a Mitsubishi heat pump unit, model number PUHZ-HW140YHA mounted on the roof of 50 Eton Avenue. Manufacturer's data has been used for all calculations.
- 4.3 Two residential properties were nearest at 6metres from the noise source but one of these had no windows on the wall facing the source and the closest (front) windows were shielded from line of sight by a wall and at 90 degrees to the source. The second property, 30 Crossfield Road had windows facing the source and the façade of the top floor was used for the residual and background noise measurements (approx 7m).
- 4.4 Manufacturer's Data:  
Mitsubishi PUHZ-HW140YHA SPL= 53dB @ 1Metre.

#### 5. RESULTS

- 5.1 Following on-site field calibration of equipment the following results were obtained.

Lowest background noise: LA90 = 34.8dB

Specific/source noise = 53.0dB @ 1metre.

This makes the target criterion to be achieved: **30dBLeq**

- 5.2 Calculations:

**Heat pump:** 53dBA @ 1Metre.

Distance correction formula:  $L1-L2=20\log R2/R1$   
 $= 20\log 6/1 =16$

Predicted:  $53-16 = 37\text{dB}$

Difference: predicted and background = 2dB above background  
Difference: predicted and target = 7dB above target



## 6. CONCLUSION

6.1 According to BS 4142:1997 / 9

***"If the rating level is more than 10dB below the measured background noise level then this is a positive indication that complaints are unlikely"***

***"A difference of around +5dB is of marginal significance"***

6.2 COMPLAINTS ARE LIKELY for the Heat pump.

6.3 An acoustic enclosure with a reduction of at least 8dB will be required. for the Heat pump. A proposed enclosure is the 'Environ S7' and is shown in the Appendix. This reduces the noise level from 53dB to 33dB at 1m from source and therefore far exceeds the required attenuation.

6.4 The appendix shows the measured noise data and manufacturers' data for the heat pump and also the proposed enclosure.

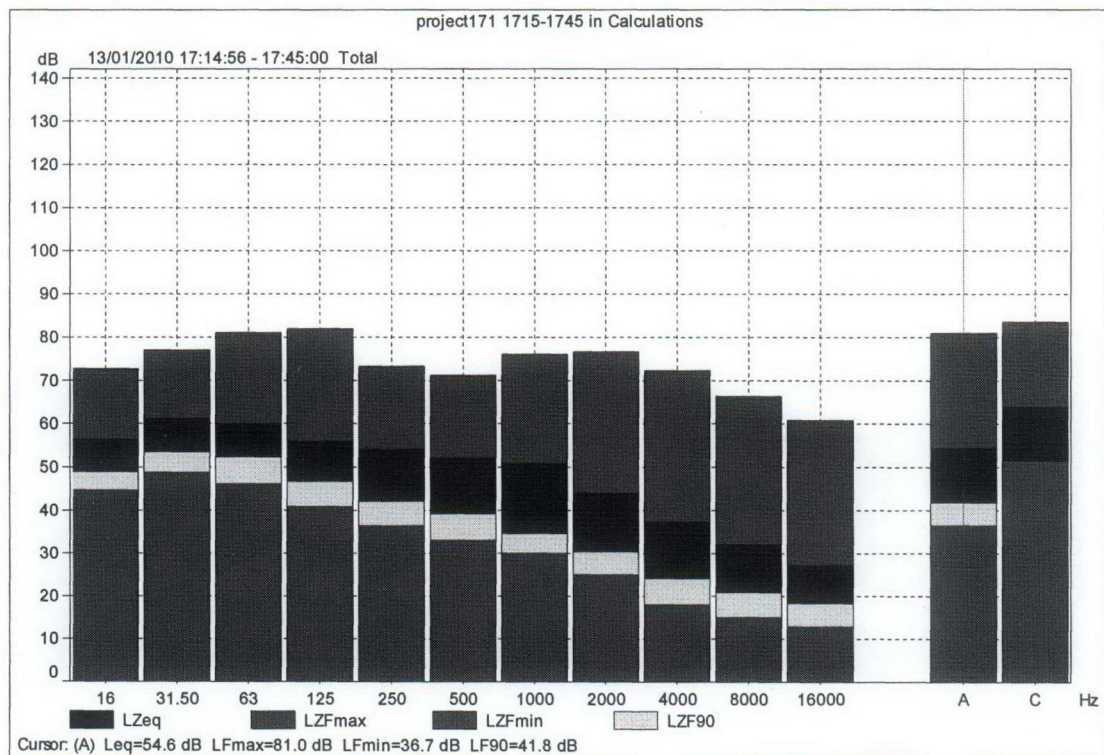
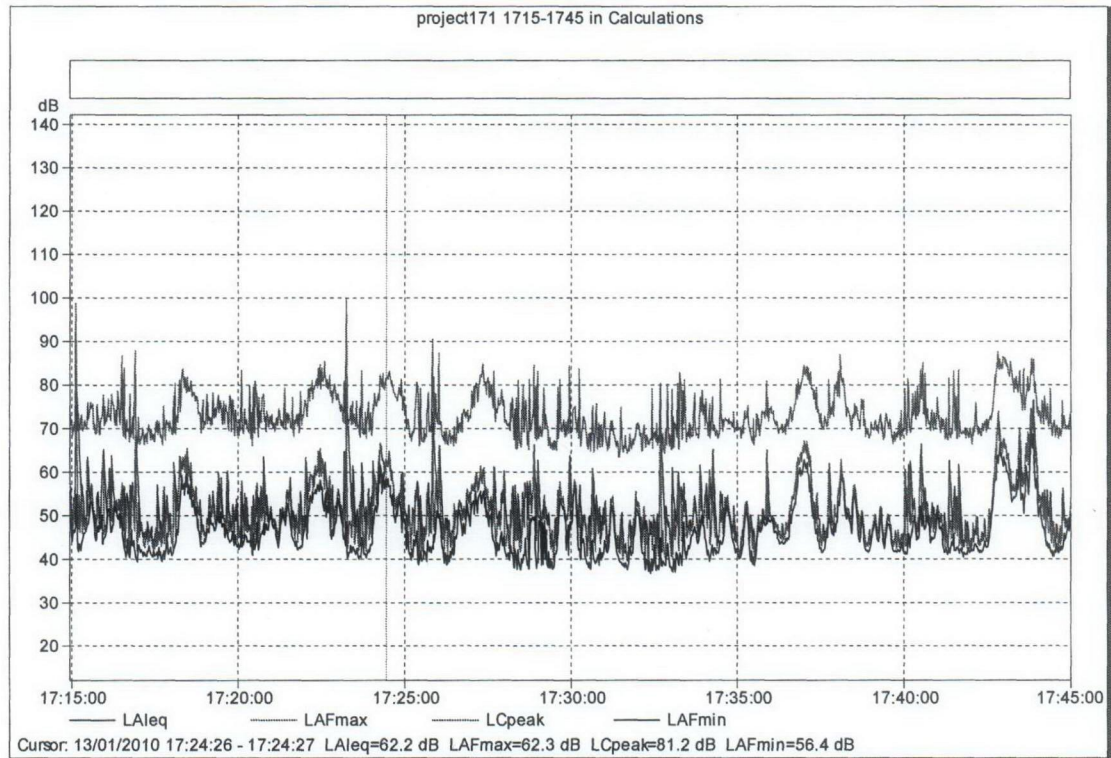


## **7 APPENDIX**

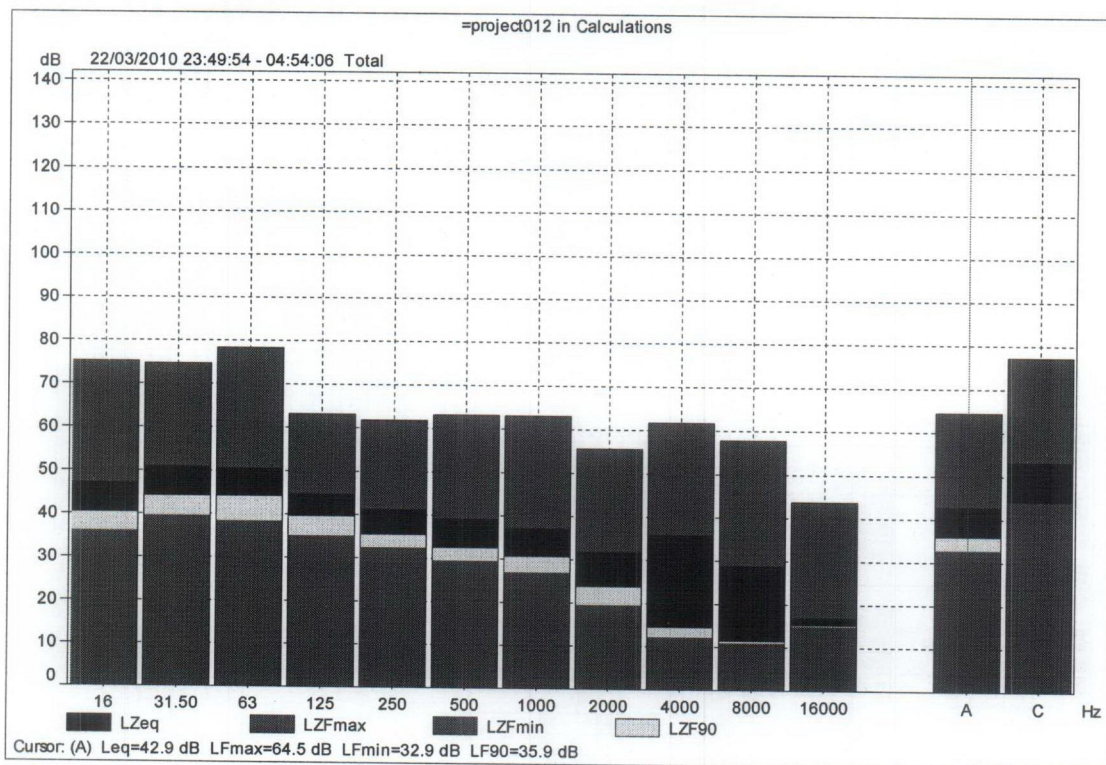
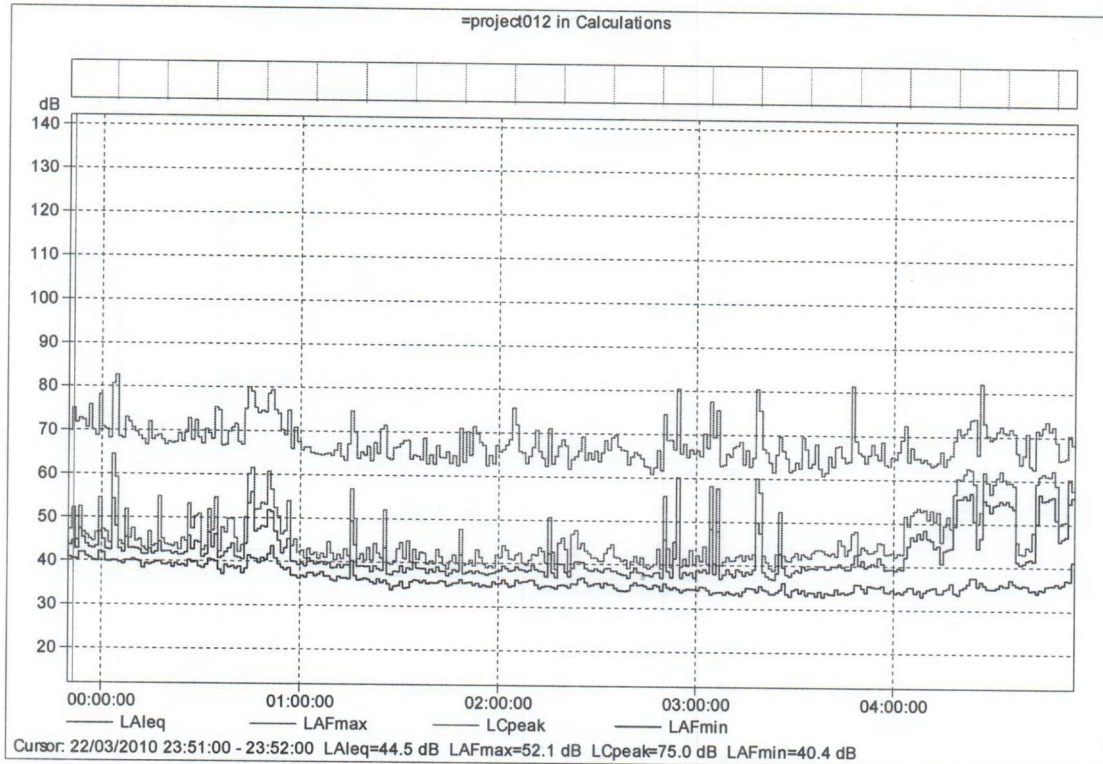
- 7.1 Measured noise data
- 7.2 Mitsubishi heat pump manufacturers' data
- 7.3 Environ S7 enclosure manufacturers' data

## 7.1 Measured noise data

### DAY TIME



# NIGHT TIME





## 7.2 Mitsubishi heat pump manufacturers' data

### PUHZ-HW140VHA(-BS) PUHZ-HW140YHA(-BS)

Power supply (Phase, Voltage, Frequency)		1/3 $\phi$ , 230/400V, 50Hz
Nominal water flow rate (Heating mode)		L/min 40.1
Heating (A7/W35)	Capacity	kW (Min. 4.20 ~ ) 14.00
	COP	4.19
	Power input	kW 3.34
Heating (A2/W35)	Capacity	kW (Min. 4.20 ~ ) 14.00
	COP	2.69
	Power input	kW 5.21
Pressure difference (water circuit)		kPa 9
Heating pump input (based on EN14511)		kW 0.02
Nominal water flow rate (Cooling mode)		L/min 35.8
Cooling (A35/W7)	Capacity	kW 12.50
	EER (COP)	2.59
	Power input	kW 4.82
Cooling (A35/W18)	Capacity	kW 12.50
	EER (COP)	4.01
	Power input	kW 3.12
Pressure difference (water circuit)		kPa 7
Cooling pump input (based on EN14511)		kW 0.02

Note: "COP" and "Power input" in the above table are values that contains the "pump input (based on EN 14511)".

#### Outdoor unit specifications

Model name		PUHZ-HW140VHA(-BS) / PUHZ-HW140YHA(-BS)	
Running current	Heating(A7/W35)	A	14.9 / 5.1
	Cooling(A35/W7)	A	21.5 / 7.3
Power factor	Heating(A7/W35)	%	97 / 95
	Cooling(A35/W7)	%	97 / 95
Max. current		A	35.0 / 13.0
Breaker size		A	40 / 16
Outer casing	Galvanized plate		
External finish	Munsell 3Y 7.8/1.1		
Refrigerant control	Linear expansion valve		
Compressor	Hermetic scroll		
	Model	ANB33FJGMT/ANB33FJFMT	
	Motor output	kW	2.5
	Start type	Inverter	
	Protection devices	HP switch LP switch Discharge thermo	
Oil (Model)	L	0.9 (FV50S)	
	W	-	
Crankcase heater		W	-
Heat exchanger	Air	Plate fin coil	
	Water	Plate heat exchanger	
Fan	Fan(drive)*No.	Propeller fan x 2	
	Fan motor output	kW	0.074 x 2
	Air flow	m <sup>3</sup> /min (CFM)	100 (3,530)
Defrost method	Reverse cycle <sup>*1</sup>		
Noise level (SPL)	Heating	dB	53 <sup>*2</sup>
	Cooling	dB	53 <sup>*2</sup>
Dimensions	Width	mm (in.)	1020 (40-3/16)
	Depth	mm (in.)	330 + 30 <sup>*3</sup> (13+1-3/16)
	Height	mm (in.)	1350 (53-1/8)
Weight		kg (lbs)	134 (296) / 148 (326)
Refrigerant	R410A		
	Quantity	kg (lbs)	4.0 (8.8)
Guaranteed operating range (Outdoor)	Heating	°C	-25 ~ +35
	Cooling	°C	-5 <sup>*4</sup> ~ +46
Outlet water temp. (Max in heating, Min in cooling)	Heating	°C	+60
	Cooling	°C	+5
Return water temperature range	Heating	°C	+5 ~ +59
	Cooling	°C	+8 ~ +28
Water flow rate range		L/min	17.9 ~ 40.1

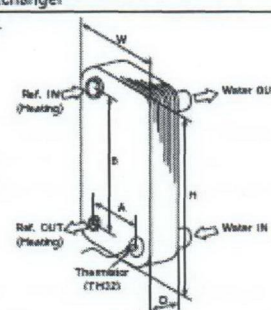
Nominal operating condition	
Heating(A7/W35)	
Outside air temperature (Dry-bulb)	+7°C
Outside air temperature (Wet-bulb)	+6°C
Water temperature (Inlet/outlet)	+30/+35°C
Heating(A2/W35)	
Outside air temperature (Dry-bulb)	+2°C
Outside air temperature (Wet-bulb)	+1°C
Water temperature (Inlet/outlet)	+/-+35°C
Cooling(A35/W7)	
Outside air temperature (Dry-bulb)	+35°C
Outside air temperature (Wet-bulb)	+24°C
Water temperature (Inlet/outlet)	+12/+7°C
Cooling(A35/W18)	
Outside air temperature (Dry-bulb)	+35°C
Outside air temperature (Wet-bulb)	+24°C
Water temperature (Inlet/outlet)	+23/+18°C

#### Plate heat exchanger

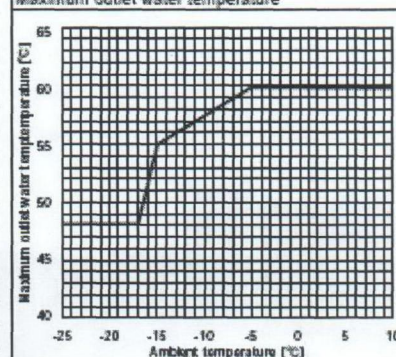
ALFA LAVAL  
ACH50-50

A:50mm  
B:466mm

W:112mm  
H:526mm  
D:130mm  
50 plates



#### Maximum outlet water temperature



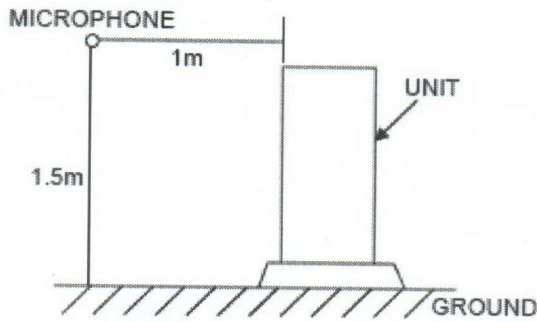
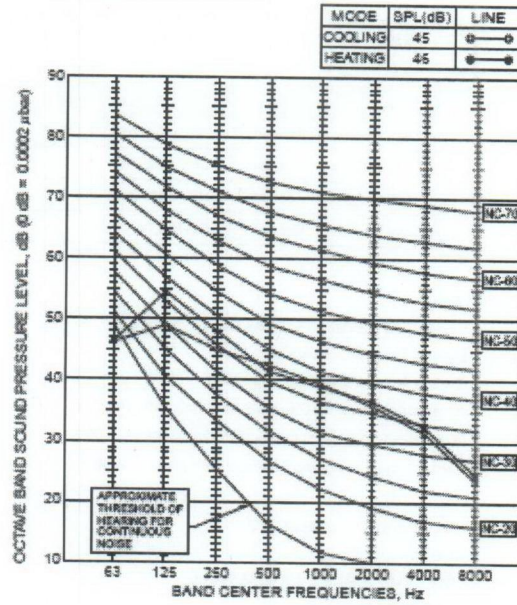
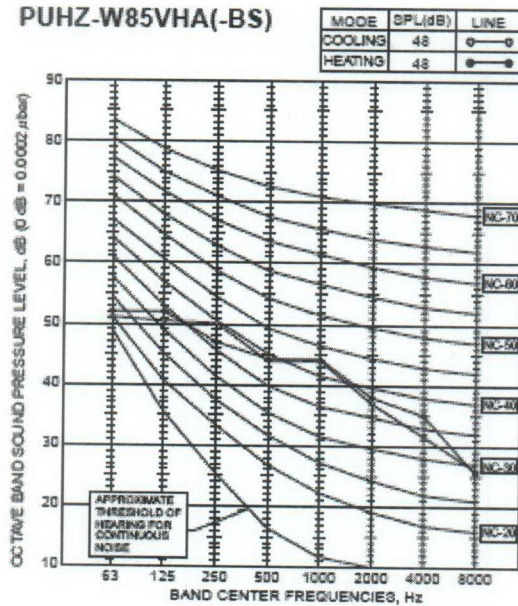
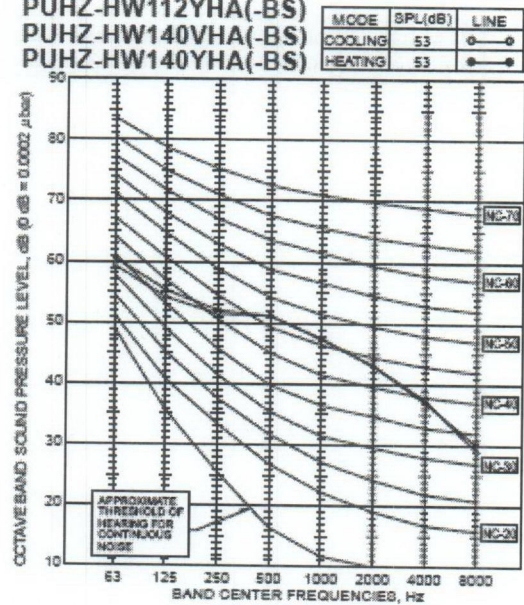
\*1 Hot gas with four-way valve

\*2 at distance of 1m from outdoor unit

\*3 grill

\*4 With the optional air outlet guide, the operation at -15°C outdoor temperature is possible.



**3****DATA****3-1. NOISE CRITERION CURVES****PUHZ-W50VHA(-BS)****PUHZ-W85VHA(-BS)**
**PUHZ-HW112YHA(-BS)**  
**PUHZ-HW140VHA(-BS)**  
**PUHZ-HW140YHA(-BS)**


### 7.3 Environ S7 enclosure manufacturers' data

#### ENVIRON ENCLOSURES FOR DOMESTIC AIR SOURCE HEAT PUMPS

#### 2010 PRICE LIST

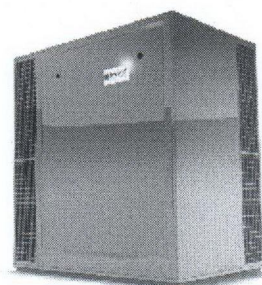


Domestic Air Source Heat Pump					Environ Environmental Enclosure							
Make	Range	Model	Air Flow m3/s	SPL dB(A)*	Enclosure Ref	W (mm)	D (mm)	H (mm)	Weight kg	Noise dB(A)**	Unit Price GDP	
											1	5+
Mitsubishi Electric	Ecodan	PUHZ-W50VHA	0.84	45	S3	1650	950	925	80	25	1050	890
Mitsubishi Electric	Ecodan	PUHZ-W85VHA	0.92	48	S4	1650	950	1075	100	28	1134	972
Mitsubishi Electric	Ecodan	PUHZ-HW140VHA	1.67	53	S7	1700	950	1525	125	33	1344	1152
Mitsubishi Electric	Ecodan	PUHZ-HW140YHA	1.67	53	S7	1700	950	1525	125	33	1344	1152

#### Notes

Non Standard External Finishes Quoted Separately  
 Delivery Quoted Separately  
 On-Site Assembly Quoted Separately  
 Accessories Quoted Separately: Wall Brackets, Drip Tray  
 Guaranteed Acoustic and Airflow Performance  
 Prices Subject to Agreed Payment Terms and Conditions

ENVIRON ENCLOSURES LTD  
 REGUS HOUSE  
 1010 CAMBOURNE BUSINESS PARK  
 CAMBOURNE  
 CAMBRIDGE CB23 6DP  
 0870 383 3344

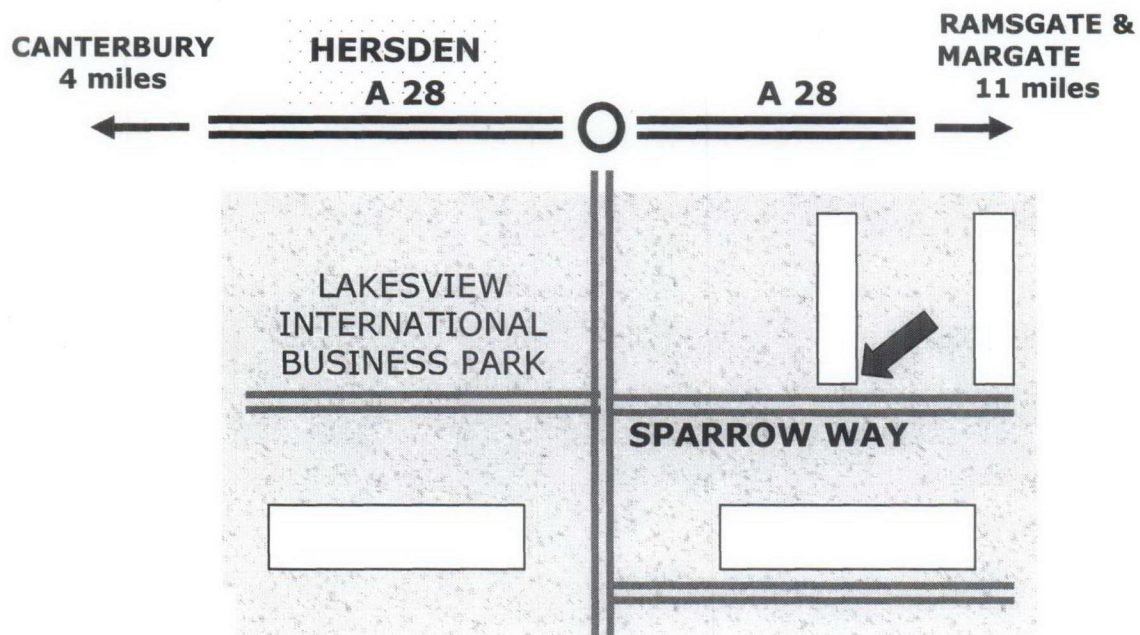


\* heat pump manufacturer published noise data Sound Pressure Level reference 1 metre

\*\* resultant noise level with enclosure Sound Pressure Level reference 1 metre free field conditions

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