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8-10 NEAL'S YARD, LONDON

NOISE IMPACT ASSESSMENT

Report **7741-NIA-01**

Prepared on 16 November 2012

Issued For:

Ellis Financial Systems Ltd

8-10 Neal's Yard

London

WC2H 9DP

ISO 17025 ISO 9001 committed to CSCS Platinum award

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1.0 INTRODUCTION

Clement Acoustics has been commissioned by Ellis Financial Systems to measure existing background noise levels at 8-10 Neal's Yard, London WC2H 9DP. The measured noise levels will be used to determine noise emission criteria for the proposed plant unit installation in agreement with the planning requirements of the London Borough of Camden.

This report presents the results of the environmental survey followed by noise impact calculations and outlines any necessary mitigation measures.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Procedure

Measurements were undertaken at the position shown in indicative site plan 7741-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the nearest noise sensitive receivers.

Continuous automated monitoring was undertaken for the duration of the survey between 12:00 on 9 November 2012 and 10:30 on 12 November 2012. Weather conditions were generally dry with light winds, therefore suitable for the measurement of environmental noise.

Background noise levels at the monitoring positions consisted mainly of existing plant units servicing nearby commercial premises and traffic noise from surrounding roads.

The measurement procedure generally complied with BS7445:1991. *Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use*.

2.2 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. Svantek Type 957 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

3.0 RESULTS

The $L_{Aeq:\ 5min}$, $L_{Amax:\ 5min}$, $L_{A10:\ 5min}$ and $L_{A90:\ 5min}$ acoustic parameters were measured at the location shown in site plan 7741-SP1. The measured noise levels are shown as a time history in Figure 7741-TH1.

Minimum background noise levels are shown in Table 3.1.

	Minimum background noise level $L_{A90:\ 5min}$ dB(A)
Daytime (07:00 - 23:00)	50
Night-time (23:00 - 07:00)	48

Table 3.1: Minimum background noise levels

4.0 NOISE CRITERIA

The London Borough of Camden's general criterion for noise emissions of new plant installations is as follows:

> *"Design measures should be taken to ensure that specific plant noise levels at a point 1 metre external to sensitive façades are at least 5dB(A) less than the existing background measurement (L_{A90}) when the equipment is in operation. Where it is anticipated that equipment will have a noise that has distinguishable, discrete continuous note[...], special attention should be given to reducing the noise at any sensitive façade by at least 10dB(A) below the L_{A90} level."*

We therefore propose to set the noise criteria as shown in Table 4.1 in order to comply with the above requirements.

	Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)
Noise criterion at nearest residential receiver (10 dB below minimum L_{A90})	40 dB(A)	38 dB(A)

Table 4.1: Proposed Noise Emissions Criteria

As the proposed plant is for server room uses and could therefore be required at any time, this assessment will use the 24 hour criterion of 48 dB(A). This will also minimise the effects of any nearby existing plant units on the noise emissions criterion.

5.0 DISCUSSION

The plant installation is comprised of the following units:

- 2 No. Mitsubishi Condenser Unit type MUZ-GE50VA

The selected unit and the associated spectral noise emissions levels, as provided by the manufacturer, are shown in Table 5.1. Loudest modes of operation have been used in order to present a robust assessment.

	Sound Pressure Level (dB) in each Frequency Band at 1m							
Unit	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Mitsubishi Condenser Unit type MUZ-GE50VA	57	57	57	54	51	48	41	36

Table 5.1: Manufacturer's Sound Pressure Levels at 1m

The proposed plant units will be installed on the roof of 8-10 Neal's Yard, as shown in indicative site plan 7741-SP1.

The closest noise sensitive windows likely to be affected by noise emissions from the proposed plant units are at the rear of properties facing on to Monmouth Street, approximately 11m away.

Taking all necessary acoustic corrections into consideration, including corrections for the number of units and distance, noise levels expected at the closest residential window would be as shown in Table 5.2. Detailed calculations are shown in Appendix B.

It should be noted that, as manufacturer noise levels are measured with the unit on a hard surface, corrections for reflections are not necessary for units on a roof, as proposed.

Receiver	24 Hour Criterion	Noise Level at Receiver (due to proposed plant units)
Nearest Noise Sensitive Receiver	38 dB(A)	38 dB(A)

Table 5.2: Noise levels and criteria at nearest noise sensitive receiver

As shown in Appendix B and Table 5.2, transmission of noise to the nearest sensitive window due to the effects of the proposed plant installations would be expected to meet the noise emissions criteria set by the London Borough of Camden, without the need for any particular mitigation measures.

6.0 CONCLUSION

An environmental noise survey has been undertaken at 8-10 Neal's Yard, London WC2H 9DP. The results of the survey have enabled criteria to be set for noise emissions from the proposed plant installation in accordance with the requirements of the London Borough of Camden.

A noise impact assessment has then been undertaken using manufacturer noise data to predict noise levels due to the current proposal at nearby noise sensitive receivers.

Calculations show that noise emissions from the proposed plant unit would meet the requirements of the London Borough of Camden, without the need for any particular mitigation measures.

Report by
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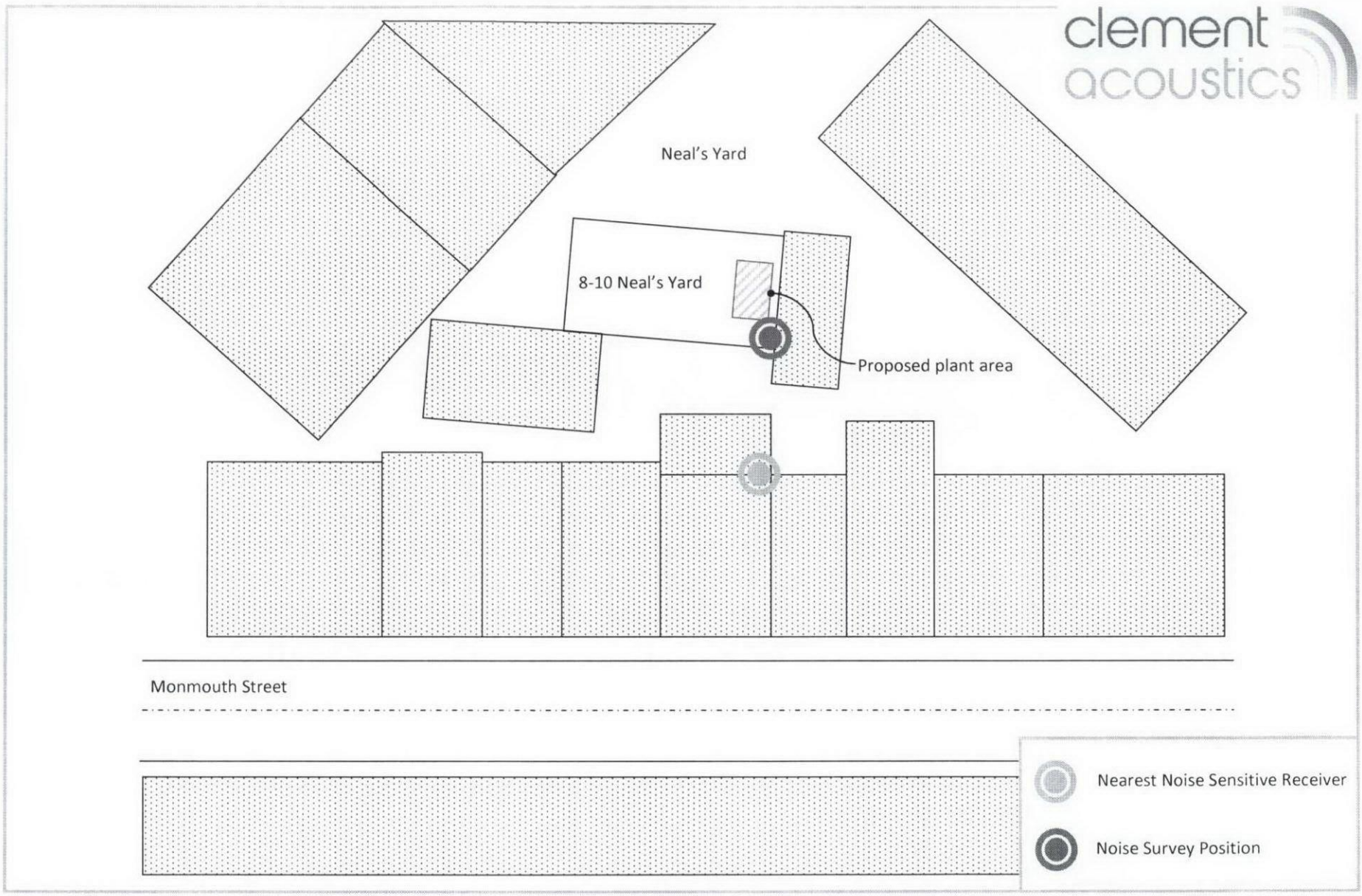

7741-SP1 Indicative site plan showing noise monitoring position and nearest noise sensitive receiver Date: 19 November 2012

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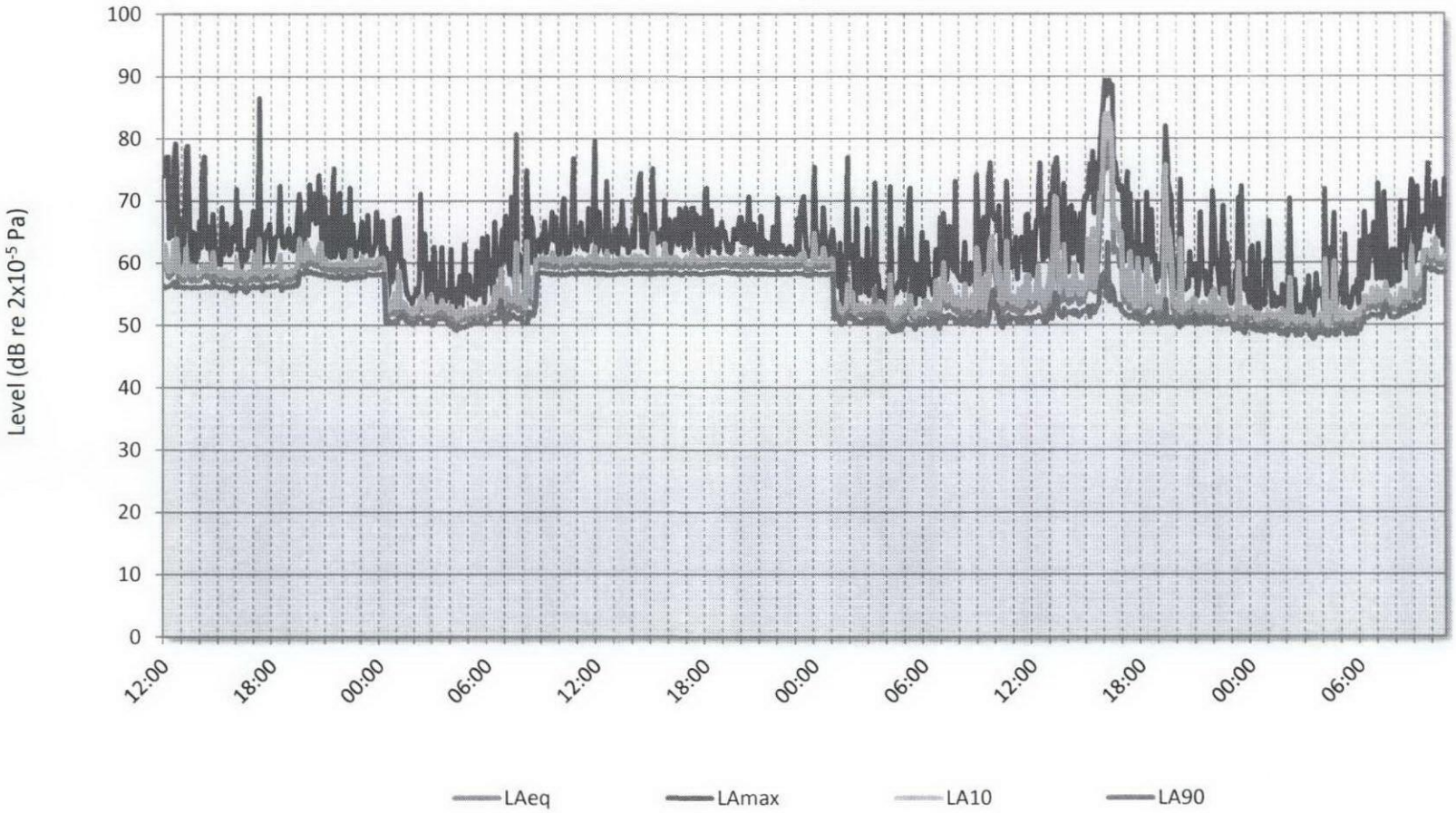
8-10 NEAL'S YARD, LONDON

Environmental Noise Time History

9 November 2012 to 12 November 2012



7741-TH1

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B

7741

8-10 Neal's Yard, London

EXTERNAL PLANT NOISE EMISSIONS CALCULATION

Receiver: Nearest Residential Reciever
Source: Proposed plant installation

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Manufacturer provided sound pressue level at 1 metre Mitsubishi Condenser Unit type MUZ-GE50VA	57	57	57	54	51	48	41	36	56
Correction for number of units (2), dB	3	3	3	3	3	3	3	3	
Correction for minimum distance to receiver (11m), dB	-21	-21	-21	-21	-21	-21	-21	-21	
Resultant sound pressure level at receiver	**39**	**39**	**39**	**36**	**33**	**30**	**23**	**18**	**38**
							Design Criterion		**38**

MITSUBISHI ELECTRIC
AIR CONDITIONING SYSTEMS

Changes for the Better
Mitsubishi Electric Quality

SMART.

New inverter **MSZ-GE** series

R410A

Features

Elegant Stylish Design MSZ-GE22/50
The new design for the model 22-50 indoor units, features a simple ergonomic square shape and pure white colour that blends with a greater range of interior appointments.

Ultra Quiet Operation
Operates at an incredible 19dB (MSZ-GE25/35) at quiet mode and yet still maintains a comfortable indoor climate.

Ultra Quiet Operation only 19dB
*MSZ-GE25/35

High Efficiency Inverter Saves Energy
Advanced inverter technology gently increases or decreases power to suit the prevailing conditions reaching the desired temperature quicker, more efficiently without severe temperature fluctuations.

Quick Clean *MSZ-GE25/35/50
Quick Clean allows the supply air louvre to be easily removed and the fan behind it cleaned to increase operating efficiency.

QUICK CLEAN

"i save" Mode
The "i save" Mode is a simplified setting function that recalls the preferred (preset) temperature at the press of a button on the remote controller. This function ensures the most suitable air conditioning settings are used and savings on power consumption are realized.

Specifications HEAT PUMP

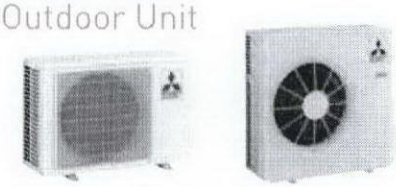
Type				Inverter Heat Pump (R410A)			
Model Name				**MSZ-GE25VA**	**MSZ-GE35VA**	**MSZ-GE42VA**	**MSZ-GE50VA**
Indoor Unit				MSZ-GE25VA	MSZ-GE35VA	MSZ-GE42VA	MSZ-GE50VA
Outdoor Unit				MUZ-GE25VA	MUZ-GE35VA	MUZ-GE42VA	MUZ-GE50VA
Power Supply (V, phase, Hz)				230V, Single, 50Hz, Power by Outdoor unit			
Cooling	**Capacity**	Rated	kW	2.5	3.5	4.2	5.0
		Min. - Max.	kW	1.1 - 3.5	1.4 - 3.9	0.9 - 4.8	1.4 - 5.4
	Total Input (Min.-Rated-Max.)		kW	0.205 - 0.560 - 1.145	0.320 - 1.010 - 1.560	0.160 - 1.260 - 1.940	0.320 - 1.640 - 2.060
	Rated EER			4.46	3.47	3.33	3.05
		Star Rating		4.0	2.0	2.0	1.5
	Running Current (Rated)		A	2.9	4.7	5.8	7.4
	Sound Pressure Level†	Indoor Unit (Quiet-Low-Mid-Hi-SH*)	dB(A)	19 - 21 - 29 - 36 - 42	19 - 22 - 30 - 36 - 43	26 - 30 - 35 - 40 - 46	28 - 33 - 38 - 44 - 49
		Outdoor at 1m (PWL)	dB(A)	46 (58)	47 (61)	50 (62)	54 (69)
	Air Volume	Indoor Unit (Quiet-Low-Mid-Hi-SH*)	L/S	68 - 80 - 111 - 152 - 188	68 - 80 - 111 - 152 - 212	97 - 113 - 143 - 173 - 213	108 - 130 - 160 - 198 - 252
		Outdoor Unit (Rated)	L/S	543	612	605	817
Heating	**Capacity**	Rated	kW	3.2	4.0	5.4	5.8
		Min. - Max.	kW	1.3 - 4.5	1.4 - 4.8	1.4 - 6.0	1.4 - 7.2
	Total Input (Min.-Rated-Max.)		kW	0.255 - 0.730 - 1.200	0.340 - 1.030 - 1.550	0.270 - 1.540 - 2.040	0.320 - 1.650 - 2.490
	COP			4.38	3.88	3.51	3.52
		Star Rating		4.0	3.0	2.5	2.5
	Running Current (Rated)		A	3.8	4.8	7.0	7.4
	Sound Pressure Level†	Indoor Unit (Quiet-Low-Mid-Hi-SH*)	dB(A)	19 - 21 - 29 - 36 - 42	19 - 22 - 30 - 36 - 43	26 - 30 - 35 - 40 - 46	28 - 33 - 37 - 43 - 48
		Outdoor at 1m (PWL)	dB(A)	48 (59)	48 (62)	51 (64)	56 (69)
	Air Volume	Indoor Unit (Quiet-Low-Mid-Hi-SH*)	L/S	68 - 80 - 110 - 152 - 192	68 - 80 - 111 - 152 - 192	97 - 117 - 143 - 173 - 218	108 - 130 - 160 - 203 - 242
		Outdoor Unit (Rated)	L/S	578	578	580	817
Operating Current (max.)				7.4	8.6	10.0	13.0
Indoor Unit	**Input**	Rated	kW	0.022	0.029	29 / 30	0.043
	Operating Current (max.)		A	0.4	0.4	0.29 / 0.31	0.5
	Dimensions	H - W - D	mm	295 - 798 - 232	295 - 798 - 232	295 - 798 - 232	295 - 798 - 232
	Weight		kg	10	10	10	10
Outdoor Unit	**Dimensions**	H - W - D	mm	550 - 800 - 285	550 - 800 - 285	550 - 800 - 285	850 - 840 - 330
	Weight		kg	30	30	36	54
	Operating Current (max.)		A	7.0	8.2	9.6	12.5
	Breaker Size		A	10	10	10	16
Ext. Piping	**Diameter**	Liquid (φ) / Gas	mm	6.35 / 9.52	6.35 / 9.52	6.35 / 9.52	6.35 / 12.7
	Max. Length		m	20	20	20	30
	Max. Height		m	12	12	12	15
Guaranteed Operating Range (Outdoor)		Cooling	°C	-10 ~ +46	-10 ~ +46	-10 ~ +46	-10 ~ +46
		Heating	°C	-15 ~ +24	-15 ~ +24	-15 ~ +24	-15 ~ +24

*SH = Super High

Optional Parts

Part Name	Part Name	Featured in
Anti-allergen Enzyme Filter	**MAC-408FT-E**	MSZ-GE22/25/35/42/50VA
Quick Clean Kit	**MAC-093SS-E**	MSZ-GE22/25/35/42/50VA
MA & Contact Terminal Interface	**MAC-397IF-E**	MSZ-GE22/25/35/42/50VA
M-NET interface	**MAC-399IF-E**	MSZ-GE22/25/35/42/50VA
Centralised On/Off Remote Controller	**MAC-821SC-E**	MSZ-GE22/25/35/42/50VA
Wired Remote Controller	**PAR-21MAA-J**	MSZ-GE22/25/35/42/50VA
Air Outlet Guide	**MAC-889SG**	MUZ-GE25/35/42/50VA

Outdoor Unit



MUZ-GE25/35/42VA MUZ-GE50VA

Products in this brochure contain R410A refrigerant. Please refer to installation instructions before installation or servicing of this product. Only licensed persons and companies qualified and experienced in the installation, service and repair of products containing refrigerants should be permitted to do so. The buyer must ensure that the person and/or company who is to install, service or repair the air conditioner has the necessary licences, qualifications and experience to perform the work. Suitable access for warranty and service is required. Refer to conditions of warranty on the Mitsubishi Electric website. For future improvement, specifications, designs of product and availability are subject to change without notice. Please check with your dealer.

MEPS COMPLIANT MINIMUM EFFICIENCY PERFORMANCE STANDARD

ISO 9001 BUREAU VERITAS Certification — Certificate Number 49385

ISO 14001 JACO — Certificate Number EC97J1132

Mitsubishi Electric Shizuoka Works acquired ISO9001 certification under Series 9000 of the International Standard Organization (ISO) based on a review of Quality warranties for the production of air conditioning equipment. The plant also acquired environmental management system standard ISO 14001 certification.

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