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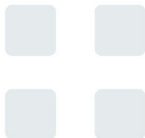
**Proposed Installation of
Mechanical Plant**

**Mimosa House,
47 Theobalds Road, London, WC1X 8SP**

Environmental Noise Assessment

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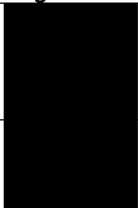
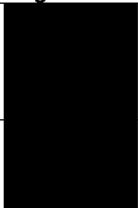
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Proposed Installation of Mechanical Plant	
Project Address:	Mimosa House 47 Theobalds Road, London, WC1X 8SP
Project Reference:	104222

Issue/Revision Record			
Issue:	Date:	Remarks:	Author:
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	Signature:	Print:	Title:	Date:
Author:		Phil Huffer	Senior Consultant	13/10/2021
Reviewer:		Andy Dodd	Principal Consultant	13/10/2021

1. INTRODUCTION

- 1.1 Acoustics Plus Ltd (APL) is an independent firm of multi-disciplinary acoustic engineers. APL is engaged by both private and public sector clients. APL is a registered member of The Association of Noise Consultants (ANC) and the author is a corporate member of The Institute of Acoustics (IOA).
- 1.2 APL has been instructed by the applicant's architect, Matheson Whiteley, to consider and advise upon the noise implications of the proposed installation of 1no. external air condenser unit.
- 1.3 It is understood the Local Planning Authority (LPA) require further information on noise levels from the proposed installation in order to fully assess the noise impact upon the surrounding neighbourhood. This report provides the response to the LPA, on behalf of the Applicant.
- 1.4 This report has been prepared by Acoustics Plus Limited (APL) with all reasonable skill, care, and diligence in accordance with generally accepted acoustic consultancy principles and taking account the services and terms agreed between APL and our client.
- 1.5 Any information provided by third-parties and referred to herein may not have been checked or verified by APL unless expressly stated otherwise. Certain statements made in the report are predictions based on reasonable assumptions and good industry practice.
- 1.6 Such statements involve risk and uncertainty which could cause measured and predicted results to differ materially. APL does therefore not guarantee or warrant any prediction contained in this report.

2. BASELINE SITUATION

- 2.1 The Application Site (the "site") is situated at Mimosa House, 47 Theobalds Road, London, WC1X 8SP. The site is a mid-terraced property arranged over ground and three upper storeys. The site is currently used as an art gallery.
- 2.2 The site has recently been subject to refurbishment and it is now the intention to install a climate control system to provide comfort cooling to the gallery spaces.
- 2.3 This will require the installation of 1no. external air condenser unit which is proposed to be located on an area of flat roof at the rear of the second floor. The proposed condenser unit will be a Panasonic 1no. Panasonic CU-3Z52TBE.
- 2.4 The hours of operation of the comfort cooling will mirror the opening hours of the gallery, 10:00 to 23:00hrs.
- 2.5 The proposed location of the unit can be seen in Diagram 1 below and Diagram 2 overleaf.

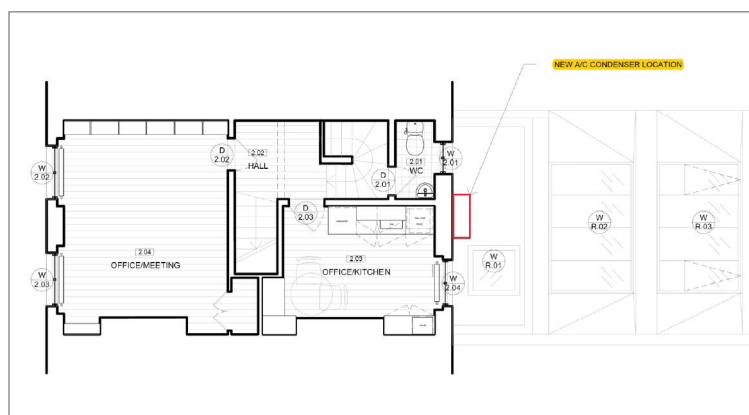


Diagram 1

- 2.6 The nearest noise sensitive façade to the proposed condenser unit is understood to belong to a two bedroom apartment located on the upper floors above W Channon locksmith's at 45 Theobalds Road. The distance from the nearest noise sensitive façade to the location of the proposed condenser unit was determined from measurements obtained from scaled drawings at approximately 3m. It is not apparent whether this window belongs to a habitable room.



Diagram 2

3. NOISE OUTLINE

- 3.1 In order to produce an environmental noise assessment, consideration must be given to the prevailing background noise in the locality of the installation.
- 3.2 Measurements of background noise were obtained over a 24 hour period at a location deemed representative of background noise levels experienced at the nearest noise sensitive façade. The data obtained during the exercise was captured at second floor roof level at the rear of the property, in close proximity to the noise sensitive façade considered.
- 3.3 The particulars of the measurement exercise are recorded below. The weather conditions were considered appropriate to monitor environmental noise.

Date: 7th – 8th October 2021
Start Time: 11:50 hrs
Location: Rear flat roof of site

- 3.4 Minimum background and average noise levels over the proposed operational hours are shown in Table 1 below with the full 24 hour level vs time history shown in Diagram 3 (L_{Aeq} and L_{A90}). The daytime/evening noise climate was dominated by existing mechanical plant noise which is shown in the figure sheets attached.

Time period	Lowest $L_{A90,15min}$	Average $L_{Aeq,T}$
10:00 to 23:00hrs	53	55

Table 1

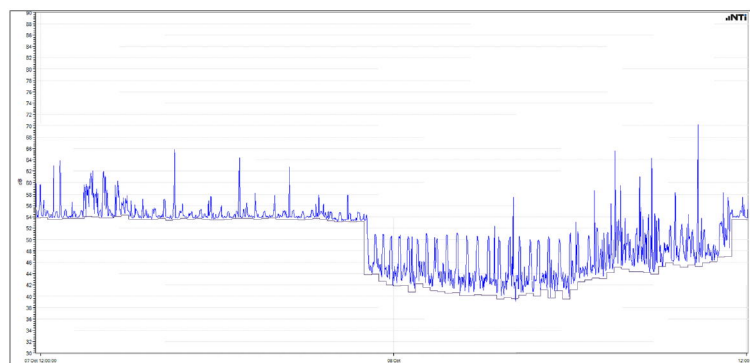


Diagram 3

4. DESIGN CRITERIA

- 4.1 Information regarding the noise levels not to be exceeded by the proposed installation was extracted from the LPA (London Borough of Camden) Local Plan Adopted version June 2017 (Appendix 3 Noise thresholds).

Industrial and Commercial Noise Sources

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

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

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

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

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

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

- 4.2 The procedure contained in BS4142 is to quantify the “specific sound level”, which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.
- 4.3 The specific sound level is converted to a rating level by adding penalties to account for either tonality or impulsivity. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.
- 4.4 The commentary to paragraph 9.2 of BS 4142:2014+A1:2019 suggests the following subjective methods for the determination of the rating penalty for tonal, impulsive and/or intermittent specific sounds:

Intermittency

- 4.5 When the specific sound has identifiable on/off conditions, the specific sound level should be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Impulsivity

- 4.6 A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

Tonality

- 4.7 For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a rating penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.
- 4.8 If the subjective method is not sufficient for assessing the audibility of tones in sound or the prominence of impulsive sounds, BS4142:2014 suggests using the one-third octave method and/or the reference methods, as appropriate.

- 4.9 The $\frac{1}{3}$ octave method tests for the presence of a prominent, discrete-frequency spectral component (tone) and typically compares the LZeq,T sound pressure level averaged over the time when the tone is present in a $\frac{1}{3}$ octave band with the time-average linear sound pressure levels in the adjacent $\frac{1}{3}$ octave bands. For a prominent, discrete tone to be identified as present, the time-averaged sound pressure level in the $\frac{1}{3}$ octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent $\frac{1}{3}$ octave bands by some constant level difference. The level differences between adjacent $\frac{1}{3}$ octave bands that identify a tone are:

- 15 dB in the low-frequency one-third-octave bands (25Hz to 125Hz);
- 8 dB in the middle-frequency one-third-octave bands (160Hz to 400Hz);
and
- 5 dB in the high-frequency one-third-octave bands (500Hz to 10,000Hz).

Other Sound Characteristics

- 4.10 Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.
- 4.11 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level of the specific sound. In the context of the Standard, adverse impacts include, but are not limited to, annoyance and sleep disturbance. Typically, the greater this difference, the greater is 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.*
 - *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.*

- 4.12 The background noise levels were assessed using statistical analysis of the measured data, as directed in BS4142. The histogram can be seen in Diagram 4.

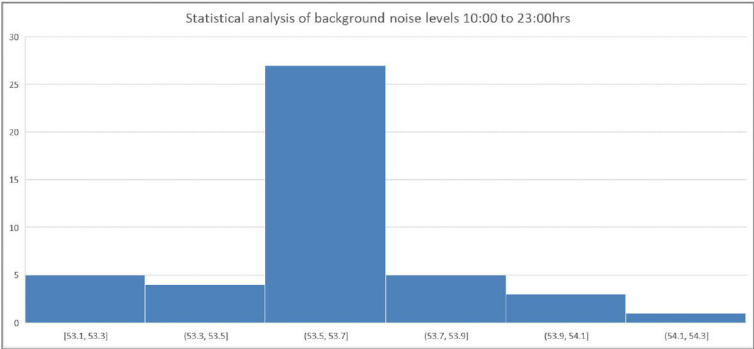


Diagram 4

- 4.13 The background noise level does not vary during the considered period that the unit will operate (unit operation will mirror the trading hours and will operate between 10:00 and 23:00hrs). The noise climate was dominated by existing mechanical plant noise located on a first floor roof at the rear of 43 Theobalds Road and most likely associated with Papa John's Pizza restaurant. The most commonly occurring background noise level during the considered period was 53dB LA90,15min.
- 4.14 The plant noise emission criteria that should not be exceeded is therefore based on Table 1 and is shown in Table 2 below. This level should not be exceeded at the nearest noise sensitive façade and is indicative of being 10dB less than the considered measured background noise. At such a level, there is an indication that the specific sound source will have a low impact.

Noise emission limit for mechanical plant
L _{Aeq} ≤43dB

Table 2

- 4.15 The unit that is proposed to be installed is listed below (with the data sheet provided in Appendix A):
- 1 No. Panasonic CU-3Z52TBE @ 47dBA @ 1m

5. EQUIPMENT

- 5.1 All background noise measurements were obtained using the following equipment:
- NTi XL2 Class 1 Serial No. A2A-14612-E0
 - Rion Calibrator Type NC-74 Class 1 Serial No. 00410215
- 5.2 The relevant equipment carries full and current traceable calibration. The equipment, where necessary, was calibrated prior to and after the measurements were carried out.

6. CALCULATIONS

- 6.1 In order to predict the noise impact of the operation of the condenser, consideration has been given to noise egress to the nearest noise sensitive façade. In considering the propagation of noise from the condenser, consideration was given to point source propagation.
- 6.2 Noise leaving the condenser unit was propagated over 3m to the nearest noise sensitive façade. The output level of the unit was adjusted (+3dB) to account for the reflecting plane behind the unit.
- 6.3 The following corrections were accounted for to determine a rating level:

Results	Correction	Relevant clause	Commentary
On time correction	-3dB	7.3.14	The condenser is likely to switch on and off as required on a demand for heating/cooling basis. The condenser is assumed to be operating for half the 60min assessment period during the day
Acoustic feature corrections	+2dB +3dB	9.2 9.2	Just perceptible tonality Readily distinctive intermittency

Table 3

- 6.4 The calculation exercise for the proposed condenser is shown in Table 4.

Condenser on flat roof	L _p dBA
1no. Panasonic CU-3Z52TBE	47dB
Distance attenuation (3m)	-10dB [20Log(3/1)]
Reflective plane correction	+3dB
BS4142 acoustic feature corrections	+2dB [-3+2+3]
Rated noise level at nearest noise sensitive façade	42 dB

Table 4

- 6.5 In order to comply with the requirements of the LPA, any noise from the proposed installation of mechanical plant should not exceed a level of 43 dBA at 1m from the nearest noise sensitive façade.
- 6.6 The calculated noise impact is 42dBA. The calculation exercise (Table 4) demonstrates that the proposed installation meets the LPA criteria.

7. CONCLUSION & MITIGATION MEASURES

- 7.1 The foregoing assessment indicates that the proposed installation meets the LPA planning criteria. Additional mitigation measures will not be required.
- 7.2 If an alternative supplier or manufacturer of condenser is chosen, the acoustic performance should be checked prior to installation to ensure that the installation will still meet the requirements imposed by the LPA.
- 7.3 It is also recommended that the unit is positioned on vibration isolation mounts to minimise structural borne vibration and re-radiated noise into the fabric of the building. Rubber turret mounts are suitable for this kind of application, available from the following, as shown in Diagram 5 below.

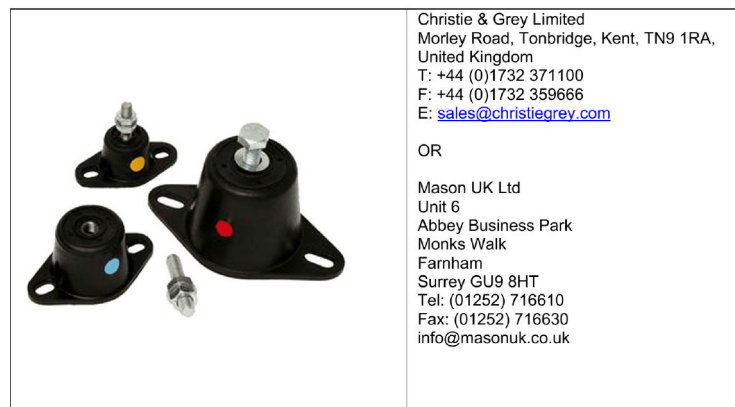


Diagram 5

Figures

Rear of Mimosa House, 47 Theobalds Road, London



Figure 1



Figure 2

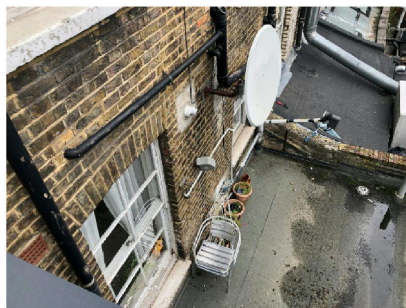


Figure 3



Figure 4

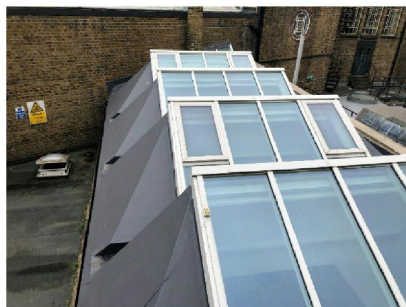


Figure 5

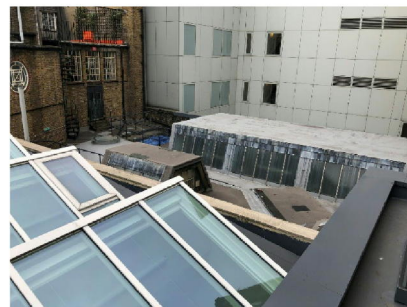


Figure 6

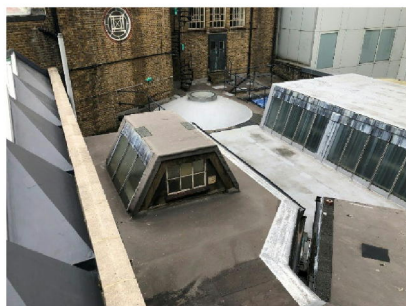


Figure 7



Figure 8

Appendix A

Panasonic

R32



Outdoor unit Free Multi System Z • R32 refrigerant

Indoor nominal capacity [Min - Max]			3,2 ~ 6,0 kW	3,2 ~ 6,0 kW	3,2 ~ 7,7 kW	4,5 ~ 9,5 kW	4,5 ~ 11,2 kW	4,5 ~ 11,5 kW	4,5 ~ 14,7 kW	4,5 ~ 18,3 kW
Unit			CU-2Z35TBE	CU-2Z41TBE	CU-2Z50TBE	CU-3Z52TBE	CU-3Z68TBE	CU-4Z68TBE	CU-4Z80TBE	CU-5Z90TBE
Cooling capacity	Nominal [Min - Max]	kW	3,50 [1,50 - 4,50]	4,10 [1,50 - 5,20]	5,00 [1,50 - 5,40]	5,20 [1,80 - 7,30]	6,80 [1,90 - 8,00]	6,80 [1,90 - 8,80]	8,00 [3,00 - 9,20]	9,00 [2,90 - 11,50]
EER ¹⁾	Nominal [Min - Max]	W/W	4,86 [6,00 - 4,09]	4,56 [6,00 - 3,80]	4,24 [6,00 - 3,62]	4,77	3,66 [7,04 - 3,38]	4,39 [5,59 - 3,56]	4,04 [5,66 - 3,21]	4,09 [5,27 - 2,98]
SEER ²⁾			8,50 A+++	8,50 A+++	8,50 A+++	8,50 A+++	8,00 A++	8,00 A++	7,90 A++	8,50 A+++
Pdesign [cooling]		kW	3,50	4,10	5,00	5,20	6,80	6,80	8,00	9,00
Input power cooling	Nominal [Min - Max]	kW	0,72 [0,25 - 1,10]	0,90 [0,25 - 1,37]	1,18 [0,25 - 1,49]	1,09 [0,36 - 2,18]	1,86 [0,27 - 2,37]	1,55 [0,34 - 2,47]	1,98 [0,53 - 2,87]	2,20 [0,55 - 3,86]
Annual energy consumption ³⁾		kWh/a	144	169	206	214	298	298	990	1100
Heating capacity	Nominal [Min - Max]	kW	4,20 [1,10 - 5,60]	4,60 [1,10 - 7,00]	5,60 [1,10 - 7,20]	6,80 [1,60 - 8,30]	8,50 [3,30 - 10,40]	8,50 [3,00 - 10,60]	9,40 [2,20 - 10,60]	10,40 [3,40 - 14,50]
Heating capacity at -7 °C		kW	—	—	—	3,95	4,45	4,45	—	—
COP ¹⁾	Nominal [Min - Max]	W/W	4,88 [5,24 - 4,18]	4,79 [5,24 - 3,91]	4,63 [5,24 - 4,00]	4,63 [5,00 - 3,82]	3,95 [5,32 - 3,64]	4,47 [5,17 - 3,96]	4,63 [6,00 - 3,46]	4,84 [6,42 - 3,42]
SCOP ²⁾			4,60 A++	4,60 A++	4,60 A++	4,20 A+	4,20 A+	4,20 A+	4,70 A++	4,68 A++
Pdesign at -10 °C		kW	3,20	3,50	4,20	5,00	5,20	5,80	6,80	8,50
Input power heating	Nominal [Min - Max]	kW	0,86 [0,21 - 1,34]	0,96 [0,21 - 1,79]	1,21 [0,21 - 1,80]	1,47 [0,32 - 2,17]	2,15 [0,62 - 2,86]	1,90 [0,58 - 2,68]	2,03 [0,70 - 3,06]	2,15 [0,53 - 4,24]
Annual energy consumption ³⁾		kWh/a	974	1065	1278	1667	1733	1933	2026	2543
Current	Cool / Heat	A	3,35 / 4,00	4,15 / 4,45	5,35 / 5,50	5,00 / 6,70	8,40 / 9,70	7,00 / 8,60	9,50 / 9,50	10,50 / 10,10
Power source		V	230	230	230	230	230	230	230	230
Recommended fuse		A	16	16	16	16	16	20	20	25
Recommended power cable section		mm ²	2,5	2,5	2,5	2,5	2,5	2,5	2,5	3,5
Sound pressure ⁴⁾	Cool / Heat [Hi]	dB(A)	48 / 50	48 / 50	50 / 52	47 / 48	51 / 52	49 / 50	51 / 52	53 / 54
Dimension ⁵⁾	H x W x D	mm	619 x 824 x 299	619 x 824 x 299	619 x 824 x 299	795 x 875 x 320	795 x 875 x 320	795 x 875 x 320	999 x 940 x 340	999 x 940 x 340
Net weight		kg	39	39	39	71	71	72	80	81
Piping connections	Liquid pipe	Inch [mm]	1/4 [6,35]	1/4 [6,35]	1/4 [6,35]	1/4 [6,35]	1/4 [6,35]	1/4 [6,35]	1/4 [6,35]	1/4 [6,35]
	Gas pipe	Inch [mm]	3/8 [9,52]	3/8 [9,52]	3/8 [9,52]	3/8 [9,52]	3/8 [9,52]	3/8 [9,52]	3/8 [9,52]	3/8 [9,52]
Pipe length range total ⁶⁾		m	6 ~ 30	6 ~ 30	6 ~ 30	6 ~ 50	6 ~ 60	6 ~ 60	6 ~ 70	6 ~ 80
Pipe length range to one unit		m	3 ~ 20	3 ~ 20	3 ~ 20	3 ~ 25	3 ~ 25	3 ~ 25	3 ~ 25	3 ~ 25
Elevation difference [in/out]		m	10	10	10	15	15	15	15	15
Pipe length for additional gas		m	20	20	20	30	30	30	45	45
Additional gas amount		g/m	15	15	15	20	20	20	20	20
Refrigerant (R32) / CO ₂ Eq.		kg / T	1,12 / 0,756	1,12 / 0,756	1,12 / 0,756	2,10 / 1,418	2,10 / 1,418	2,10 / 1,418	2,72 / 1,836	2,72 / 1,836
Operating range	Cool Min ~ Max	°C	-10 ~ +46	-10 ~ +46	-10 ~ +46	-10 ~ +46	-10 ~ +46	-10 ~ +46	-10 ~ +46	-10 ~ +46
	Heat Min ~ Max	°C	-15 ~ +24	-15 ~ +24	-15 ~ +24	-15 ~ +24	-15 ~ +24	-15 ~ +24	-15 ~ +24	-15 ~ +24

1) EER and COP calculation is based in accordance to EN14511. 2) Energy Label Scale from A+++ to D. 3) The annual energy consumption is calculated in accordance to EU/626/2011. 4) The sound pressure of the units shows the value measured of a position 1 m in front and 1 m in rear side of the main body. The sound pressure is measured in accordance with JIS C 9612. 5) Add 70 or 95 mm for piping port. 6) Minimum piping length is 3 meters per indoor unit.

Possible outdoor / indoor units combinations • R32 refrigerant

Rooms	Model	Indoor capacity connected (Min - Max)	Wall-mounted Ethera Silver							Wall-mounted Ethera Pure White Matt							NEW Wall-mounted TZ super-compact							Floor Console*							4 Way 60x60 Cassette							Low Static Pressure Hide Away										
			16	20	25	35	42	50	60	71	16	20	25	35	42	50	60	71	16	20	25	35	42	50	60	71	16	20	25	35	42	50	60	71	16	20	25	35	42	50	60	71						
2	CU-2Z35TBE	3,2 ~ 6,0 kW	✓	✓	✓					✓	✓	✓	✓					✓	✓	✓					✓	✓	✓					✓	✓	✓					✓	✓	✓							
	CU-2Z41TBE	3,2 ~ 6,0 kW	✓	✓	✓					✓	✓	✓	✓	✓				✓	✓	✓					✓	✓	✓					✓	✓	✓					✓	✓	✓							
	CU-2Z50TBE	3,2 ~ 7,7 kW	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾		✓	✓	✓	✓ ⁽¹⁾	✓	✓	✓	✓ ⁽¹⁾		✓	✓	✓					✓	✓	✓	✓ ⁽¹⁾					
3	CU-3Z52TBE	4,5 ~ 9,5 kW	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾		✓	✓	✓	✓ ⁽¹⁾	✓	✓	✓	✓ ⁽¹⁾		✓	✓	✓					✓	✓	✓	✓ ⁽¹⁾					
	CU-3Z68TBE	4,5 ~ 11,2 kW	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾		✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾	✓	✓	✓	✓ ⁽¹⁾		✓	✓	✓					✓	✓	✓	✓ ⁽¹⁾				
4	CU-4Z68TBE	4,5 ~ 11,5 kW	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾		✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾	✓	✓	✓	✓ ⁽¹⁾		✓	✓	✓					✓	✓	✓	✓ ⁽¹⁾				
	CU-4Z80TBE	4,5 ~ 14,7 kW	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾		✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾	✓	✓	✓	✓ ⁽¹⁾		✓	✓	✓					✓	✓	✓	✓ ⁽¹⁾				
5	CU-5Z90TBE	4,5 ~ 18,3 kW	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾			✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾		✓	✓	✓	✓ ⁽¹⁾	✓ ⁽¹⁾	✓	✓	✓	✓ ⁽¹⁾		✓	✓	✓					✓	✓	✓	✓ ⁽¹⁾				

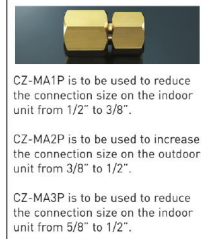
1) A CZ-MA1P pipe reducer is needed on the 42 and 50, a CZ-MA2P pipe expander is needed on the 60 and 71, and CZ-MA3P pipe reducer on the 71.

* Compatible only with 2 ports R32 outdoor CU-2Z35TBE / CU-2Z41TBE / CU-2Z50TBE. Minimum quantity of connection: 2 indoor units. Floor console indoor unit is compatible with R410A outdoors with 3, 4 or 5 ports: CU-3E18PBE, CU-3E23PBE, CU-4E23PBE, CU-4E27PBE and CU-5E34PBE.

Outdoor Multi combination model

	Model
CS-MZ16VKEW / CS-MT216WKE CS-XZ20VKEW / CS-Z20VKEW / CS-TZ20WKEW / CS-MZ20UFEAW / CS-MZ20UB4EAW / CS-MZ20UD3EAW CS-XZ25VKEW / CS-Z25VKEW / CS-TZ25WKEW / CS-Z25UFEAW / CS-Z25UB4EAW / CS-Z25UD3EAW CS-XZ35VKEW / CS-Z35VKEW / CS-TZ35WKEW / CS-Z35UFEAW / CS-Z35UB4EAW / CS-Z35UD3EAW	CU-2Z35TBE / CU-2Z41TBE / CU-2Z50TBE / CU-3Z52TBE / CU-3Z68TBE / CU-4Z68TBE / CU-4Z80TBE / CU-5Z90TBE
CS-Z42VKEW / CS-TZ42WKEW CS-XZ50VKEW / CS-Z50VKEW / CS-TZ50WKEW / CS-Z50UFEAW / CS-Z50UB4EAW / CS-Z50UD3EAW	CU-2Z50TBE / CU-3Z52TBE / CU-3Z68TBE / CU-4Z68TBE / CU-4Z80TBE / CU-5Z90TBE
CS-TZ60WKEW / CS-Z60UB4EAW / CS-Z60UD3EAW	CU-3Z68TBE / CU-4Z68TBE / CU-4Z80TBE / CU-5Z90TBE
CS-Z71VKEW / CS-TZ71WKEW	CU-4Z80TBE / CU-5Z90TBE

* For CZ-MA3P necessary to use adaptor CZ-MA2P too.



CZ-MA1P is to be used to reduce the connection size on the indoor unit from 1/2" to 3/8".

CZ-MA2P is to be used to increase the connection size on the outdoor unit from 3/8" to 1/2".

CZ-MA3P is to be used to reduce the connection size on the indoor unit from 5/8" to 1/2".