Applied ENERGY

OCM Luxembourg Manchester Aparthotel S.A.R.L

Whitworth Locke

External Plant Overview

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1.0 INTRODUCTION

This document has been prepared to provide details of the proposed external plant within the development, to support the planning application for Whitworth Locke, 74 Princess Street, Manchester, M1 6JD.

The Atrium is an existing serviced apartment building consisting of 116 bedrooms over the upper floors. The basement consists of non-operational and redundant nightclub, two restaurants and swimming pool with leisure area. The proposed new scheme will consist of 160 serviced apartments across all floors with two new F&B (food and beverage) offerings, co-working space and a leisure area with a small gym across the basement and ground floor.

2.0 PROPOSAL

The proposal for external plant should be read in conjunction with the supporting set of drawings issued separately to this overview. Given the early stage of the development the proposal is a subject to further detailed design.

The building has an existing roof plant area consisting of a raised steel platform, as detailed in Appendix A. Currently located on the plant space is a centralised air handling unit (AHU) and seven condensing AC units, which are currently not in use and assumed to be redundant.

The proposed plant will consist of a new centralised AHU and air source heat pumps (ASHP) serving ground and basement commercial and common areas. Heat recovery will be installed with achievable efficiencies of at least 67%. To ensure that air quality is maintained, the outside air intakes will be positioned to reduce the possibility of bringing pollutants into the space.

The systems will be specified to comply with internal noise criteria as well as meet with local planning requirements for external plant noise break out. An acoustic report will be provided by the acoustic consultant to explain noise levels surrounding the proposed development.

2.1 Communal Ventilation- Existing

The existing commercial areas located within the basement and ground floor are redundant and non-operational. The plant serving these areas is located on the steel platform positioned above Johnson House 6th floor.

From the visual surveys and partial record information it is understood that the existing AHU mainly served the night club and office areas. Other areas within the ground and basement i.e. leisure area and oriental restaurant are ventilated via local plant discharging at low level.

The existing plant seems to be non-operational and in a state of disrepair as per the example pictures in Appendix A.

2.2 Communal Ventilation – Proposed

Central & Johnson House

It is proposed to serve all new commercial and common areas within the Central and Johnson House with a new supply and extract background ventilation system. The existing AHU is to be removed and replaced with a new unit comprising heat recovery, direct driven fans and low specific fan power meeting the current Building Regulations and EU Directive requirements.

The new unit is to be positioned on the steel platform in the same position as the existing AHU as shown on the separate plans and Figure 1 below.

The technical data for the proposed AHU unit is provided in the Appendix B.

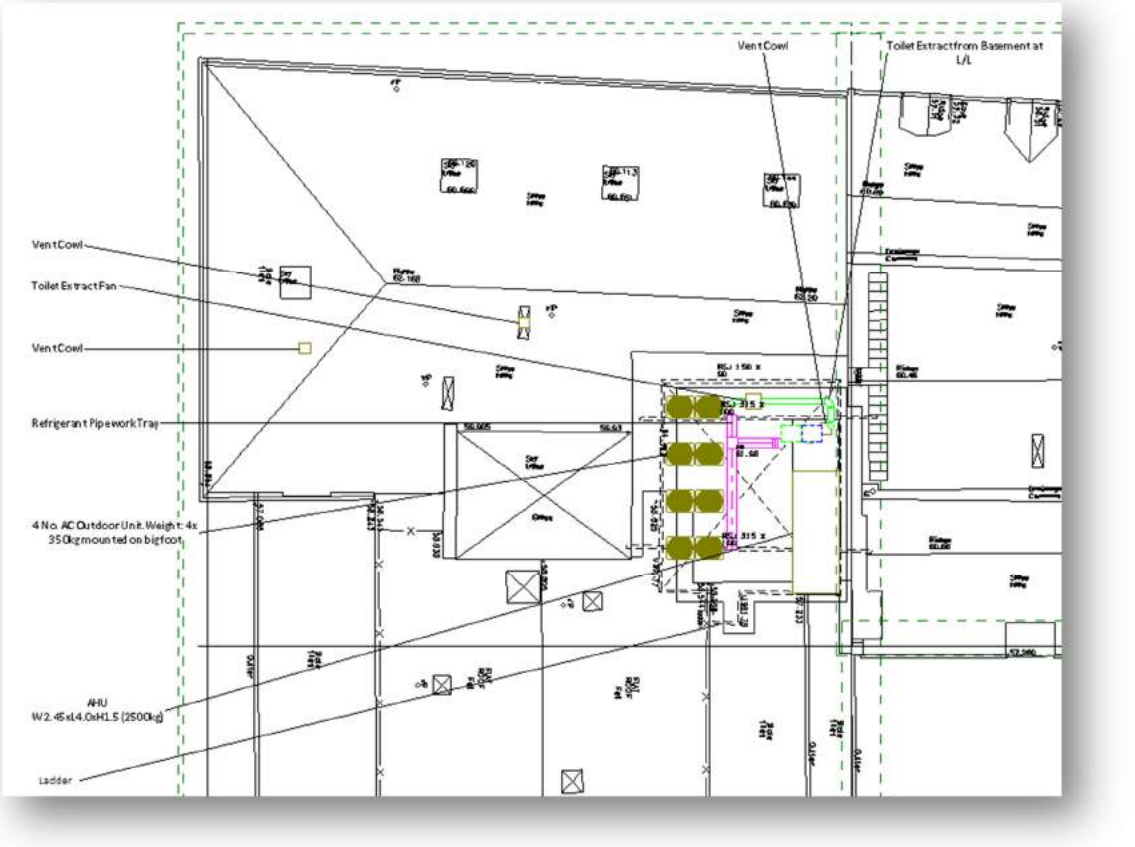


Figure 1. Proposed Plant & Location

Dominion East & Dominion & West House

All areas within the Dominion East and West ground and basement level will require to comply with the latest regulations with regards to energy efficiency.

It is worth noting that both Dominion East and West are structurally separate buildings connected by a narrow link corridor.

Following earlier planning feedback, it understood that due to the heritage importance of the building, the existing façade of Dominion house should be kept free from any ventilation louvres.

Following further strip out works it has become apparent that due to structural and spatial constraints it will not be economical to serve these areas via a centralised AHU, located at the roof level.

Therefore, it is proposed that each area will be served by a number of smaller MVHR (mechanical ventilation with heat recovery) units located at high level. The technical data for the proposed MVHR units is provided in the Appendix E.

All units will connect to common ducts terminating to outside. The ventilation strategy within Dominion East will utilise the existing structural penetrations and ductwork routes with terminal points located above the Atrium roof level. Ventilation ductwork will terminate below the first floor window sills Figure 2 below and Appendix B.

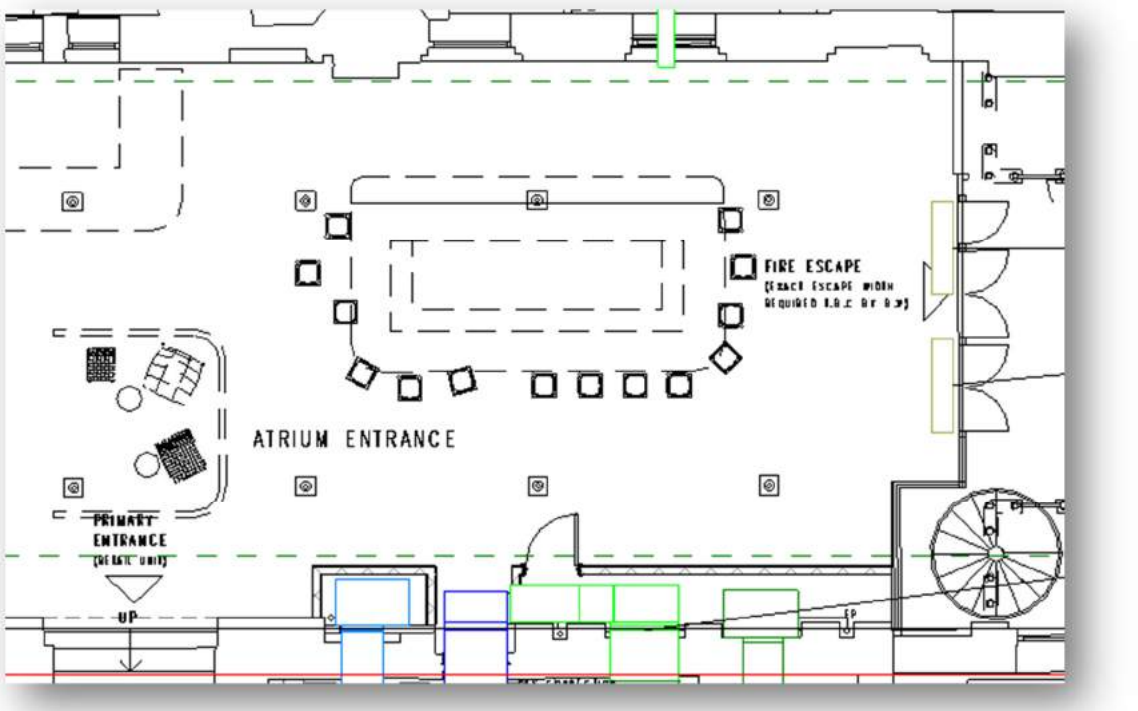


Figure 2. Proposed Routes for Ductwork Serving Dominion East.

The ventilation strategy within Dominion West will utilise the existing riser with ducts terminating at the fifth floor roof level. All ductwork will terminate below eye sight from street level within a dedicated open space as shown on Figure 3 below.

The Kitchen canopy extract duct will terminate above the roof eave in line with the Fume Extraction Requirements document issued by Manchester City Council. Details of the proposed installation are provided within the Kitchen Extract Report.

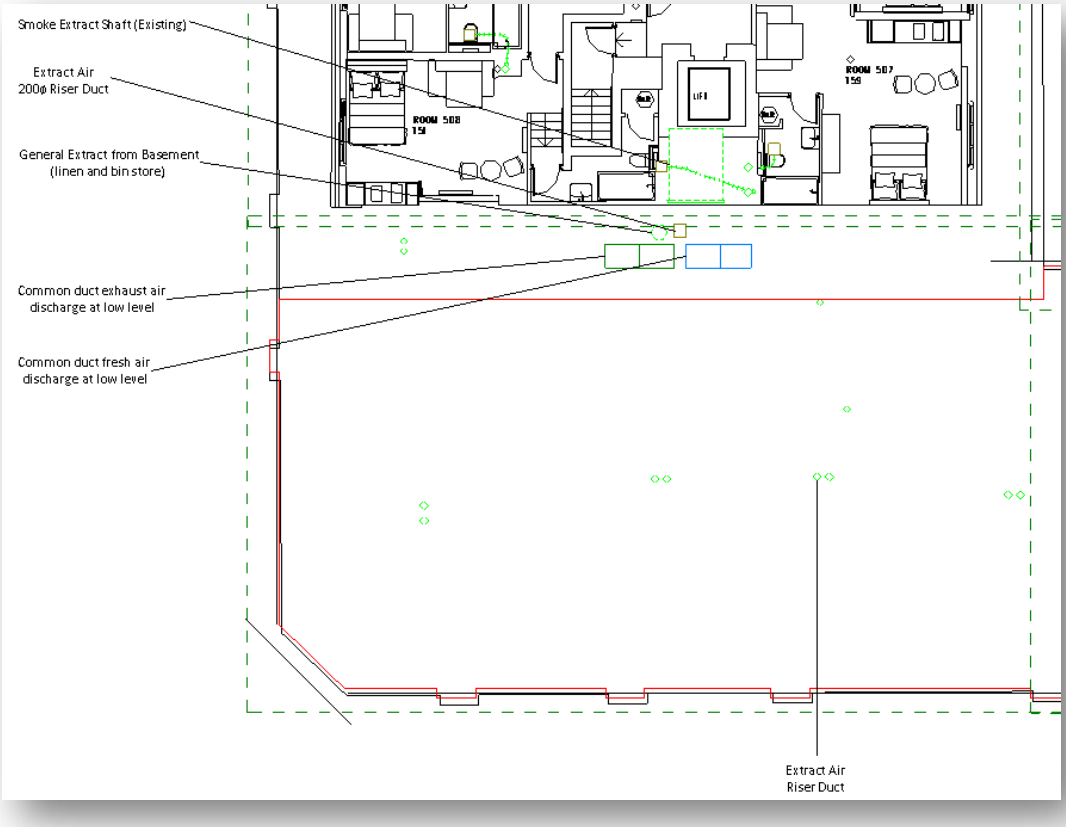


Figure 3. Proposed Routes for Ductwork Serving Dominion West.

All common ducts will be carefully sized allowing for low air velocities and noise levels.

2.3 Comfort Cooling- Existing

There are three ASHPs serving the existing AHU and an additional four ASHPs providing space heating and cooling to the ground and basement areas. This equipment is also non - operational and in a state of disrepair as per the example pictures in Appendix A.

2.4 Comfort Cooling- Proposed

Four new ASHP units are proposed for providing space heating and/or cooling to the new commercial areas within the ground and basement floors.

The proposed air conditioning is a high efficiency VRF system offering simultaneous heating and cooling with heat recovery. Heat recovery allows rejected heat to be transferred from an area that requires cooling to an area that requires heating, and vice versa.

The units will also be positioned on the steel platform as indicated in Figure 1, and as a direct replacement for the existing plant. The new units will utilise a night mode setback and have been assessed by the acoustic consultant as covered in their acoustic report.

Technical data of an example ASHP unit is provided in Appendix D.

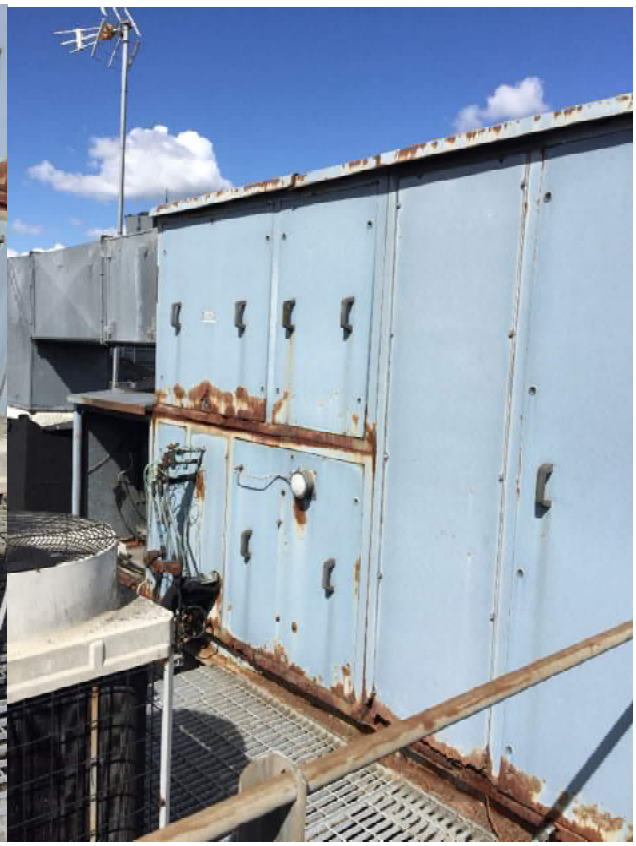
2.5 Final Assessment

Taking into account the above, the proposed external plant will be a direct replacement of the existing redundant and no longer operational equipment. The proposal is in line with the structural constraints of the existing building as well as addresses the local council's desire to avoid ventilation outlets discharging directly through the street facades at low level.

Appendix A. Existing Roof Mounted Plant







Appendix B. Existing Dominion East Elevation (Atrium Side)



Appendix C. AHU Technical Data

Technical data for AHU VES Max

Max®

BESPOKE MODULAR AIR HANDLING UNITS

Variable sizes available with 25mm or 50mm construction

Low energy / high efficiency fans

Specific Fan Power to achieve L2 Building Regulations

Variety of control options to suit application



MAX



25mm double skinned case construction, plantroom or weatherproof, flat or stacked. EC fans with integrated control, cross flow heat exchanger with optional controls and heating types.

Refer to page 8.

- Suitable for many applications
- Unlimited range of duties
- High efficiency heat recovery
- Weatherproof and plantroom units available
- Flatpacked or sectioned

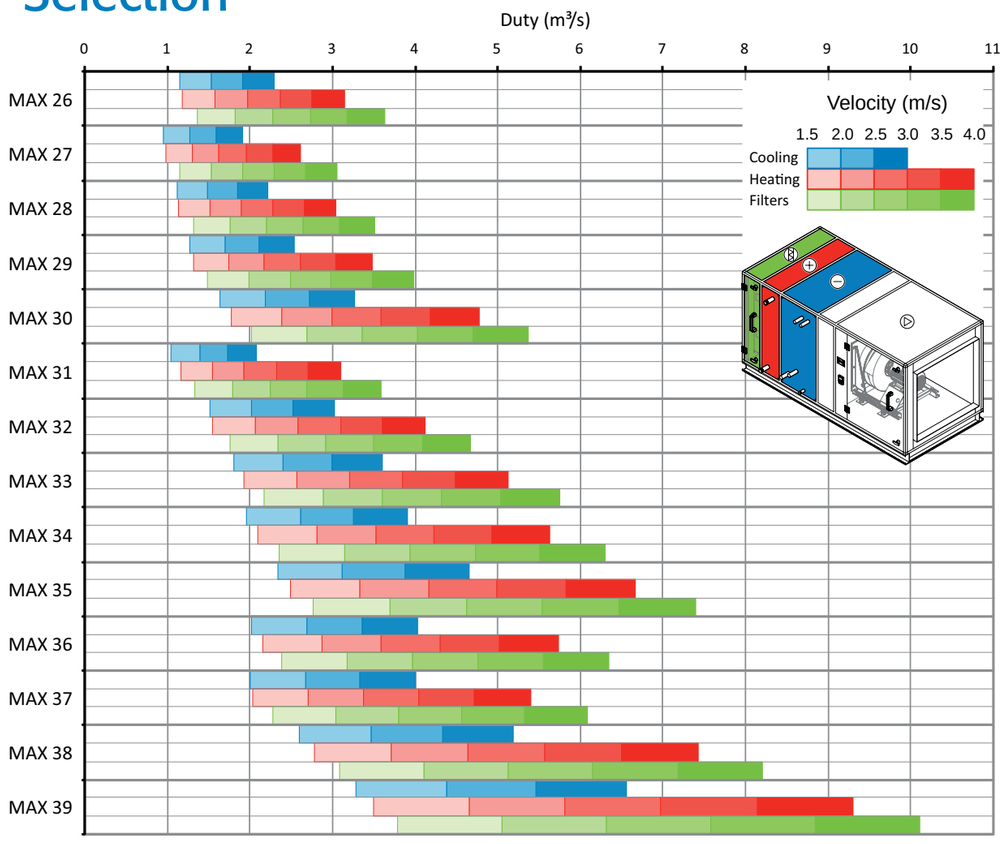
VES MAX AIR HANDLING UNITS
part of a complete range of innovative, flexible products from the HVAC experts

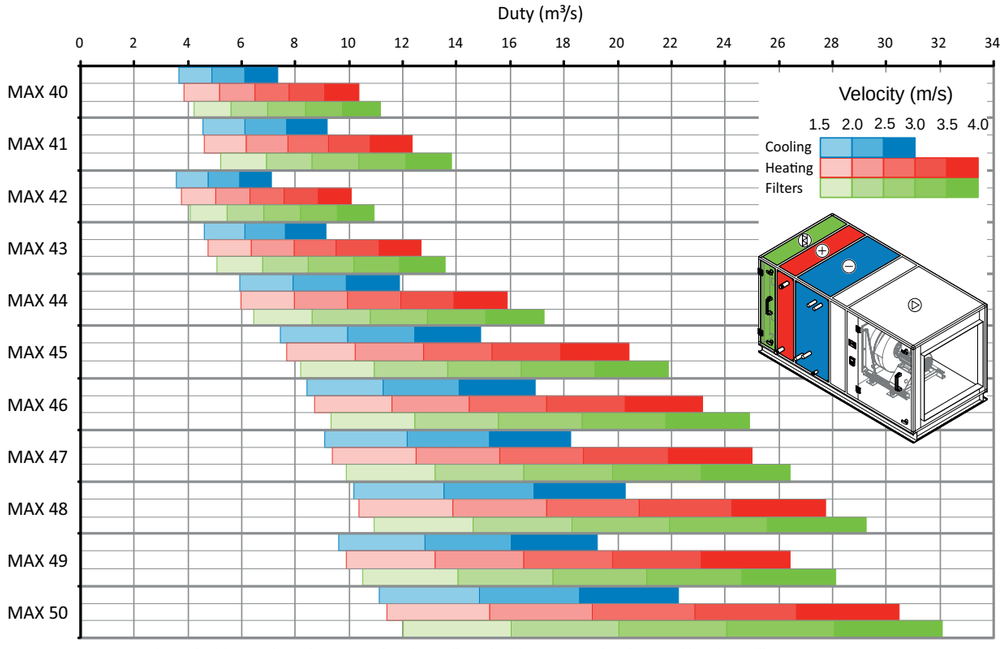
max® bespoke

VES Better air for the built environment

max® bespoke

Product Selection





Note: Heating velocities are based on water heating coils. Velocities across other forms of heating will vary.
Duties over 27m³/s can be achieved using multiple fan arrangements.

Product: MAX
Size: 26 to 50

The charts opposite, listing each Max unit size against air volume, illustrates the relationship between air velocity, and the potential use of heating (water), cooling and filters.
A unit size can be selected depending on the intended components, where a combination of components is required then the lowest figure, ie cooling before heating, heating before filter, should be used.
Please note, these are for guidance only, final unit size will depend on the parameters and selection of components. Please contact the VES sales office on +44 (0)8448 15 60 60 for more details.

Sizes	25mm		50mm	
MAX Model	Width	Height	Width	Height
26	1200	1000	1250	1050
27	1300	800	1350	850
28	1300	900	1350	950
29	1300	1000	1350	1050
30	1300	1300	1350	1350
31	1500	800	1550	850
32	1500	1000	1550	1050
33	1500	1200	1550	1250
34	1500	1300	1550	1350
35	1500	1500	1550	1550
36	1650	1200	1700	1250
37	1900	1000	1950	1050
38	1900	1300	1950	1350
39	2000	1500	2050	1550

Sizes	50mm	
MAX Model	Width	Height
40	2050	1700
41	2050	2050
42	2550	1350
43	2550	1650
44	2550	2050
45	2550	2550
46	2850	2550
47	3050	2550
48	3350	2550
49	3650	2550
50	3650	2550

All dimensions are in mm

Airflow (m³/s) Based on Velocity of					
1.5m/s through heating coil	2.0m/s through heating coil	2.5m/s through heating coil	3.0m/s through heating coil	3.0m/s through cooling coil	3.0m/s through filter
1.18	1.58	1.97	2.37	2.16	2.73
0.98	1.31	1.63	1.96	1.75	2.30
1.14	1.52	1.90	2.28	2.07	2.64
1.30	1.74	2.17	2.61	2.39	2.99
1.79	2.39	2.99	3.59	3.28	4.04
1.16	1.55	1.94	2.32	2.09	2.69
1.55	2.07	2.58	3.10	2.85	3.51
1.92	2.56	3.20	3.84	3.56	4.32
2.11	2.82	3.52	4.23	3.92	4.73
2.50	3.33	4.16	5.00	4.67	5.55
2.15	2.87	3.58	4.30	3.99	4.77
2.03	2.70	3.38	4.05	3.76	4.57
2.79	3.71	4.64	5.57	5.20	6.16
3.49	4.65	5.82	6.98	6.57	7.59

Airflow (m³/s) Based on Velocity of					
1.5m/s through heating coil	2.0m/s through heating coil	2.5m/s through heating coil	3.0m/s through heating coil	3.0m/s through cooling coil	3.0m/s through filter
3.89	5.19	6.48	7.78	7.36	8.37
4.63	6.17	7.71	9.25	9.20	10.38
3.79	5.06	6.32	7.58	7.12	8.21
4.77	6.36	7.95	9.53	9.11	10.20
5.96	7.95	9.93	11.92	11.87	12.95
7.66	10.22	12.77	15.33	14.92	16.43
8.69	11.59	14.49	17.89	16.93	18.69
9.38	12.50	15.63	18.76	18.27	19.82
10.41	13.88	17.35	20.81	20.28	21.95
9.91	13.21	16.52	19.82	19.25	21.11
11.44	15.25	19.06	22.87	22.29	24.07

Max sizes 1-8 are fitted with Drop Rod mounting brackets as standard, Max sizes 9-50 are fitted with a 100mm channel base as standard. Alternative sizes and mounting options available on request.
Weather lids are between 75 – 150mm high dependent on unit size and configuration, alternative sizes available on request.
Refer to page 32 and 33 for weight calculation.

Energy Efficiency Rating



With the selection of the most efficient components available, Max units can be rated to the European Energy Efficiency classification.
Using the specialist Max design software which is configured with the appropriate formulae to account for air velocity, pressure losses, fan electrical power, and recovery efficiency, Max units can be issued with a rating based on the European standard BS EN 13053.
It must be noted that the most practical component selection, in varied climatical conditions may not result in the perceived best energy efficient rating.
VES quotes can be supplied with an energy rating for the selected unit.

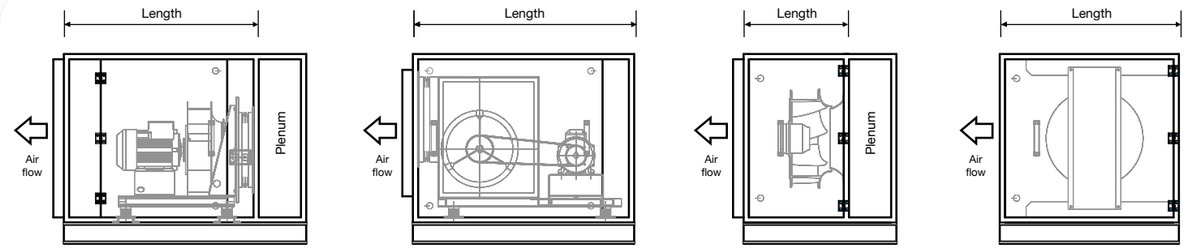
Fans



- Max units are selected with either plug, belt or direct driven fans.
- Priority is given to selecting the best possible efficiency and lowest specific fan powers.
- Motors are suitable for inverter speed control and are available with the current IE options.
- EC (Electronically Commutated) motors are also available.
- Pre-wiring to isolators or fitted control panels are available.
- Fan motor assemblies are fully vibration islolated.
- Run and standby, and duplex arrangements available.
- Motors out of air stream.







Due to the bespoke nature of Max units Specific fan powers (SFPs) will vary. Please contact the Sales office for unit SFPs as these are calculated based on Airflow, external pressure and components selected.

Plenums will be fitted where necessary. Please contact the VES Sales Office for dimensions of HTM fan sections.

MAX Model	Plug Fan Section		Direct Drive Rotor Motor Section				Belt Drive Fan Section					
			Vertical		Side		Standard		Top or Bottom Outlet		Additional Standby Motor	
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
01	*	*	250	5	475	5	Belt Drive Fans are not available on this range of sizes					
02			250	5	475	5						
03	775	25	300	5	600	7						
04	*	*	250	5	475	5						
05	775	25	300	5	600	7						
06	775	25	300	10	600	7						
07	775	35	400	10	700	10	825	35	850	35	425	10
08	775	35	400	10	700	10	825	35	850	35	425	10
09	775	35	400	10	700	10	825	35	850	35	425	10
10	775	35	400	10	700	10	825	35	850	35	425	10
11	775	35	400	10	700	10	825	40	850	35	425	10
12	875	40	400	10	700	10	825	50	950	45	425	15
13	875	45	400	15	800	15	900	50	950	45	425	15
14	925	60	400	15	800	15	975	55	975	50	425	15
15	775	35	400	10	700	10	825	40	850	35	425	10
16	875	45	400	15	800	15	900	50	950	45	425	15
17	925	60	400	15	800	15	975	60	1025	50	425	20
18	925	70	450	25	975	25	1025	65	1075	60	425	25
19	875	40	400	10	700	10	900	50	950	45	425	15
20	925	60	400	15	800	15	975	60	1025	50	425	20
21	925	70	450	25	975	25	1025	65	1075	60	425	25
22	1025	80	450	25	975	25	1050	75	1150	65	425	25
23	775	35	400	15	700	15	825	40	850	35	425	10
24	925	65	400	20	800	20	975	60	1025	50	425	20
25	925	75	450	25	975	25	1025	65	1075	60	425	25

* Plug fans are not available on this range of sizes.

All dimensions are approximate and in mm
All weights are approximate and in kg

MAX Model	Plug Fan Section		Direct Drive Rotor Motor Section				Belt Drive Fan Section					
			Vertical		Side		Standard		Top or Bottom Outlet		Additional Standby Motor	
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
26	1025	80	450	25	975	30	1050	75	1150	65	425	25
27	925	65	450	25	975	25	975	60	1025	50	425	20
28	925	75	450	25	975	25	1025	65	1075	60	425	25
29	1025	80	450	30	975	30	1050	75	1150	65	425	25
30	1175	115	Direct Drive Rotor Motors are not available on this range of sizes				1275	190	1400	175	475	50
31	925	65					975	60	1025	50	425	20
32	1025	85					1050	80	1150	65	425	25
33	1175	115					1200	140	1300	125	425	40
34	1175	115					1275	190	1400	175	475	50
35	1375	295					1350	235	1475	215	475	65
36	1175	115					1200	140	1300	125	425	40
37	1025	85					1050	80	1150	65	425	25
38	1175	120					1275	195	1400	175	425	50
39	1375	300					1350	240	1475	215	425	65
40	1425	305					1600	385	1725	355	475	80
41	1675	490					1800	555	1975	525	575	150
42	1225	125					1325	200	1450	175	475	50
43	1425	310					1600	390	1725	355	475	80
44	1675	500					1800	560	1975	525	575	150
45	1675	510					2125	640	2375	590	575	170
46	1675	515					2125	645	2375	590	575	170
47	1675	520					2125	645	2375	590	575	170
48	1675	525					2125	655	2375	590	575	170
49	1675	525					1950	635	2175	570	575	180
50	1675	530					2125	660	2375	590	475	170

All dimensions are approximate and in mm
All weights are approximate and in kg

Please note direct drive rotor motors are only suitable for low pressure applications for more information please contact the VES sales office.

Direct Drive Fans

- Integrated inlet ring designed for optimum air flow, made of galvanised steelsheet with measuring device for determination of flow rate.
- Instant and accurate measuring of the air volume, right at the fan. There will be no need for duct traverse. Each unit is fitted with pressure tapping connections on the outside of the case, these are piped inside the unit to provide an accurate differential static pressure (Pdiff) across the fan.
- Air volume may be measured on site using a micro manometer or directly by VES factory fitted intelligent control module.
- Plug and EC fans are ErP 2015 compliant.

Belt Drive Fans

- Fans are centrifugal, multivane type, D.I.D.W., with forward or backward curved impeller.
- The fans are supplied with pre-greased sealed for life ball bearings.
- The fan and motor are connected by vee belt drive, pre aligned and tensioned at the VES works. The fan and motor are mounted on a common base frame, which is fully isolated from the case with spring anti vibration mounts and flexible connection to the fan outlet.
- Motors can be external to airstream and connected to an extended shaft fan with bearing and drive also outside of the unit. In this situation the fan, motor and case are rigidly coupled, with the anti-vibration mounts and flexible connection external to unit.

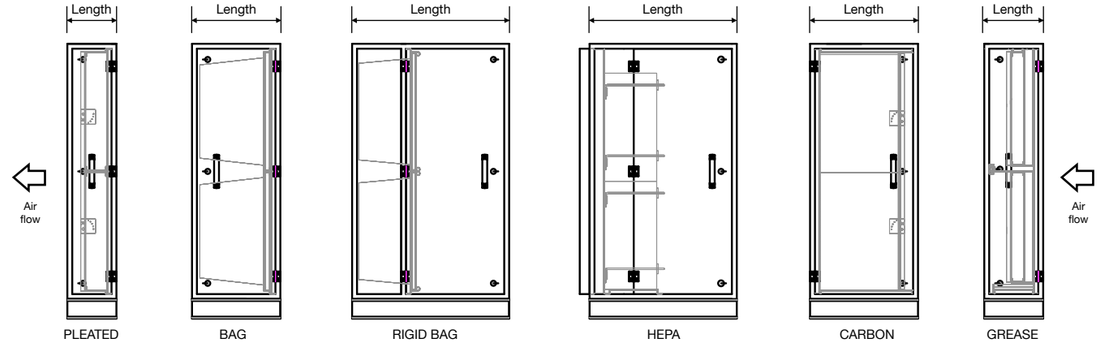
Filtration



- Pleated Filter up to grade F8.
- Bag Filter up to grade F8.
- Rigid Pleated Filter up to grade F8.
- Rigid Bag Filter up to F9.
- HEPA Filter up to grade H14.
- Carbon Filters to suit application.
- Grease Filters, mesh or baffle to suit application.
- Other specialist filters available.
- Filter pressure monitoring devices available.







MAX Model	Pleated		Bag						Rigid Bag		HEPA		Carbon		Grease	
			8" filter		16" filter		30" filter									
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
01	250	2	450	2	500	2	825	2	Rigid bag filters are not available on this range of sizes		700	10	450	20	250	5
02	250	5	450	5	500	5	825	5			700	12	450	25	250	5
03	250	5	450	5	500	5	825	5			700	15	450	40	250	5
04	250	5	450	5	500	5	825	5			700	12	450	30	250	5
05	250	5	450	5	500	5	825	5			700	17	450	45	250	5
06	250	5	450	5	500	5	825	5			700	20	450	50	250	7
07	250	5	450	5	500	7	825	7			700	27	450	65	250	7
08	250	5	450	5	500	7	825	7			700	30	450	75	250	7
09	250	7	450	5	500	7	825	7	700	7	700	30	450	70	250	7
10	250	7	450	7	500	7	825	7	700	25	700	30	450	80	250	10
11	250	7	450	7	500	7	825	10	700	12	700	40	450	85	250	10
12	250	7	450	7	500	7	825	10	700	12	700	45	450	95	250	10
13	250	7	450	7	500	10	825	10	700	12	700	50	450	115	250	12
14	250	10	450	10	500	15	825	15	700	15	700	45	450	125	250	15
15	250	7	450	10	500	10	825	10	700	15	700	50	450	105	250	12
16	250	7	450	10	500	10	825	15	700	15	700	45	450	130	250	12
17	250	10	450	10	500	10	825	15	700	15	700	50	450	140	250	15
18	250	12	450	15	500	15	825	15	700	20	700	60	450	165	250	17
19	250	7	450	10	500	10	825	15	700	15	700	65	450	130	250	12
20	250	12	450	15	500	15	825	20	700	20	700	75	450	160	250	17
21	250	12	450	15	500	15	825	20	700	25	700	80	450	185	250	20
22	250	12	450	10	500	15	825	15	700	25	700	55	450	210	250	20
23	250	10	450	10	500	10	825	20	700	15	700	75	450	145	250	15
24	250	12	450	15	500	15	825	20	700	25	700	90	450	195	250	20
25	250	15	450	15	500	20	825	25	700	25	700	100	450	225	250	25

All dimensions are approximate and in mm
All weights are approximate and in kg

MAX Model	Pleated		Bag						Rigid Bag		HEPA		Carbon		Grease	
			8" filter		16" filter		30" filter									
	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
26	250	15	450	15	500	20	825	20	700	30	700	85	450	255	250	25
27	250	15	450	15	500	20	825	25	700	30	700	95	450	210	250	25
28	250	15	450	15	500	20	825	25	700	30	700	105	450	245	250	25
29	250	15	450	20	500	20	825	30	700	30	700	140	450	275	250	30
30	250	17	450	20	500	25	825	25	875	45	700	95	450	375	250	35
31	250	15	450	20	500	20	825	30	875	30	700	120	450	235	250	25
32	250	17	450	20	500	25	825	25	875	40	700	145	450	310	250	30
33	250	20	450	25	500	30	825	35	875	40	700	160	450	385	250	35
34	250	20	450	25	500	30	825	35	800	45	700	195	450	420	250	40
35	250	30	450	30	500	35	825	40	800	50	700	165	450	515	250	45
36	250	25	450	25	500	30	825	35	800	40	700	160	450	425	250	40
37	250	25	450	25	500	30	825	35	800	45	700	210	450	410	250	40
38	250	25	450	30	500	35	825	45	825	60	700	260	450	560	250	50
39	250	35	450	40	500	45	825	55	825	75	700	285	450	685	250	60
40	250	35	450	40	500	50	825	60	875	85	700	340	450	760	250	65
41	250	45	450	50	500	60	825	75	875	105	700	280	450	910	250	75
42	250	35	450	40	500	45	825	55	875	80	700	345	450	740	250	60
43	250	45	450	50	500	60	825	70	875	105	700	445	450	915	250	80
44	250	55	450	60	500	75	825	90	875	130	700	550	450	1205	250	95
45	250	60	450	70	500	85	825	110	950	165	700	580	450	1475	250	120
46	250	70	450	80	500	95	825	120	950	185	700	635	450	1545	250	130
47	250	75	450	85	500	105	825	130	950	200	700	690	450	1695	250	140
48	250	80	450	95	500	115	825	140	950	210	700	690	450	1850	250	150
49	250	80	450	90	500	110	825	135	950	185	700	690	450	1850	250	150
50	250	85	450	100	500	120	825	155	950	240	700	760	450	2035	250	165

All dimensions are approximate and in mm
All weights are approximate and in kg

Grade	Pre Filter Required	Filter Type	Typical Application
G4	No	P	General office areas
F6	Primary	P, B & RB	Hotels, shopping centres, theatres, conference centres & computer rooms
F7	Primary	P, B & RB	Clean rooms, pharmaceutical, laboratory and medical fields
F8	Primary	P, B & RB	Final filtration for research and manufacturing applications in the electronics, optical pharmaceutical, laboratory and medical fields
F9	Primary	B & RB	
H10	Primary & Secondary	RB & HEPA	
H11	Primary & Secondary	HEPA	
H12	Primary & Secondary	HEPA	
H13	Primary & Secondary	HEPA	
H14	Primary & Secondary	HEPA	
	Primary & Secondary	CARBON	Absorption of odours and low toxicity gases for airports, museums, kitchens, hospitals and clean rooms
		GREASE	Generally used within kitchen extract systems to prevent grease from getting into the extract system

Typical Filter Application Chart - P= Panel, B= Bag, RB = Rigid Bag

Filters

- Panel filters available as clip in or slide in.
- Bag filters will either be mounted in channels for side withdrawal or clipped into purpose made frames for grade F6 and above
- All filters will have been subject to the Eurovent 4/5 (BS6540 Part 1) test procedure
- Filters are available with metal frames on request
- Viewing portholes and bulkhead lights are available as optional extras.

Components shown throughout brochure are part of a composite case. Please specify the number of sections you require the unit to be manufactured in. When Filters of grade F7 and above are fitted as front withdrawal and require an access section. Please contact the Sales office for special configurations. Panel filter sections having more than four filters wide must have a minimum of 550mm to enable the filters to be reached This only applies where panel filters only are fitted i.e. no bag filters. Where rigid filters are used an access section is needed prior to the section to allow for fitting the filters.



Pressure and Airflow Gauges

- Model M8 has a range of 0-200Pa, the M15 range is 0-375Pa.
- Fitted Magnahelic gauges available in ranges up to 750 Pa.
- Fitted Mininahelic gauges available in ranges up to 500 Pa.
- Fitted pressure transducer for modulated fan and filter monitoring.
- Fitted pressure switches for up to 500 Pa.

Heat Recovery

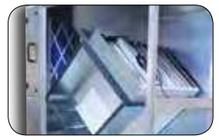


Product | Size | Construction | Configuration

MAX / / SP, SW, FP, FW

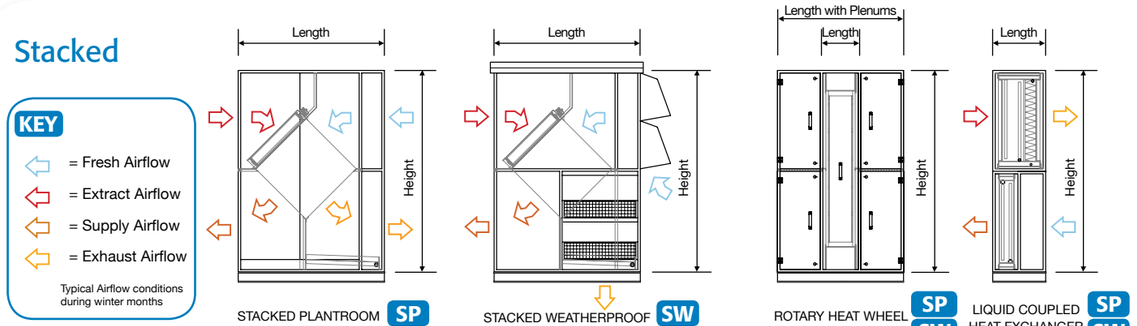
- Cross Flow Plate Heat Exchanger.
  - Single Plate Heat Exchanger. Efficiency up to 65%.
  - Double Plate Heat Exchanger. Efficiency up to 80%.
  - Counter Flow Heat Exchangers also available.
  - Optional Bypass with motorisation alternatives.
- Rotary Heat Wheel. Efficiency up to 75% and above.
  - Constant / Variable Speed Control.
  - Hygroscopic / Non-Hygroscopic.
- Liquid Coupled Heat Exchanger (Runaround Coil Systems). Efficiency up to 50%.
  - Pump set available.
- Mixing Box, two or three way. Refer to pages 18-21.
  - Optional motorisation. Efficiency dependent on local conditions.
- Protective coatings or materials to suit application.



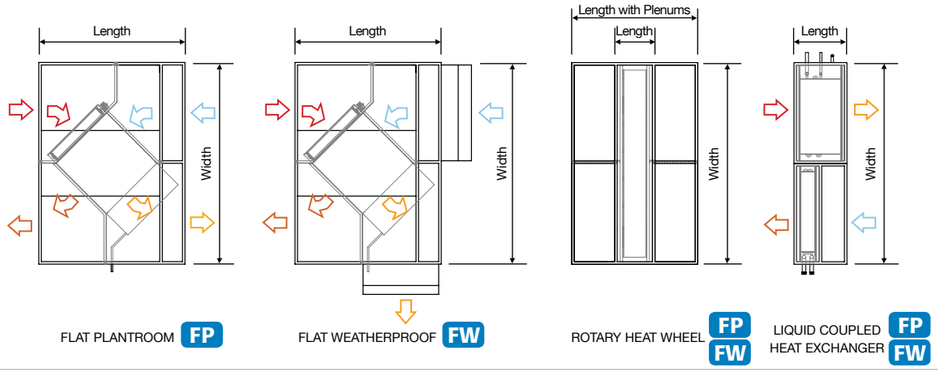


Cross flow heat exchanger section lengths vary dependent on duty and efficiency requirements.
Plenums will be fitted where necessary. Please contact the VES Sales Office for recommended size.

Stacked



Flat



MAX Model	Cross Flow Plate Heat Exchanger								Rotory Heat Wheel				Liquid Coupled Heat Exchanger	
	Stacked				Flat				Length	Length with Plenums	Stacked	Flat		
	Length	Width	Height	Weight	Length	Width	Height	Weight			Weight	Weight	Length	Weight
01	675	400	700	12-15	675	800	350	10 - 12	450	1050	35	20	575	35
02	675	500	700	12-15	675-800	1000	350	12 - 15	450	1050	50	20	575	40
03	675	500	900	12-15	675-800	1000	450	15 - 20	450	1050	50	30	575	40
04	675	550	700	12-15	675-950	1100	350	10 - 15	450	1050	60	20	575	40
05	675	550	900	15-17	675-950	1100	450	15 - 25	450	1050	60	30	575	50
06	675	650	900	17-20	800-1100	1300	450	20 - 35	450	1050	75	35	575	50
07	675 - 950	650	1100	20-27	800-1100	1300	550	20 - 35	450	1050	75	50	575	55
08	675 - 950	650	1200	20-30	800-1100	1300	600	17 - 27	450	1050	75	55	575	60
09	675 -950	700	1100	22-40	950-225	1400	550	27 - 45	450	1050	85	50	575	65
10	675 - 950	750	1100	25-40	1100-1375	1500	550	37 - 55	450	1050	105	50	575	65
11	675 - 950	750	1200	25-40	1100-1375	1500	600	40 - 55	450	1050	105	60	575	70
12	800 - 1100	750	1300	30-45	1100-1375	1500	650	40 - 55	450	1050	105	70	575	70
13	950 - 1225	800	1400	35-50	1100-1375	1600	700	40 - 50	450	1050	115	75	575	80
14	1100 - 1375	800	1600	45-65	1100-1375	1600	800	45 - 65	450	1050	115	95	575	85
15	675 - 950	900	1200	30-45	1225-1650	1800	600	45 - 70	450	1050	125	60	575	80
16	950 - 1225	900	1400	40-55	1225-1650	1800	700	45 - 70	450	1050	125	75	575	85
17	1100 - 1375	900	1600	45-65	1225-1650	1800	800	50 - 80	450	1050	125	95	575	100
18	1100- 1375	900	1800	55-85	1225-1650	1800	900	55 - 80	450	1050	125	120	575	105
19	800 - 1100	1000	1300	35-45	1225-1650	2000	650	40 - 55	450	1050	140	70	575	90
20	1100 - 1375	1000	1600	50-70	1225-1650	2000	800	55 - 85	450	1050	140	95	575	105
21	1100 - 1375	1000	1800	60-95	122-1650	2000	900	55 - 85	450	1050	140	120	575	120
22	1225 - 1650	1000	2000	60-95	1225-1650	2000	1000	60 - 95	450	1050	140	130	575	125
23	675 - 950	1200	1200	35-50	1650-2225	2400	600	60 - 95	450	1050	160	65	575	100
24	1100 - 1375	1200	1600	60-85	1650-2225	2400	800	80 - 130	450	1650	175	100	575	125
25	1100 - 1375	1200	1800	70-110	1650-2225	2400	900	85 - 130	450	1650	175	125	575	140

All dimensions are approximate and in mm
All weights are approximate and in kg

MAX Model	Cross Flow Plate Heat Exchanger								Rotory Heat Wheel				Liquid Coupled Heat Exchanger	
	Stacked				Flat				Length	Length with Plenums	Stacked	Flat		
	Length	Width	Height	Weight	Length	Width	Height	Weight			Weight	Weight	Length	Weight
26	1225 - 1650	1200	2000	70-110	1650 - 2225	2400	1000	95-145	450	1650	175	135	575	150
27	1100 - 1375	1300	1600	65-85	1950 - 2500	2600	800	100-150	450	1650	195	100	575	135
28	1100 - 1375	1300	1800	75-120	1950 - 2500	2600	900	110-165	450	1650	195	125	575	150
29	1225 - 1650	1300	2000	80-125	1950 - 2500	2600	1000	125-185	450	1650	195	135	575	160
30	1650 - 2225	1300	2600	130-215	1950 - 2500	2600	1300	170-260	450	1650	195	185	575	200
31	1100 - 1375	1500	1600	75-105	1950 - 2500	3000	800	110-165	450	1650	240	105	575	155
32	1225 - 1650	1500	2000	90-145	1950 - 2500	3000	1000	130-195	450	1650	240	140	575	185
33	1650 - 2225	1500	2400	125-200	1950 - 2500	3000	1200	135-200	450	1650	240	175	575	215
34	1650 - 2225	1500	2600	125-200	1950 - 2500	3000	1300	150-220	450	1650	240	190	575	230
35	1950- 2500	1500	3000	155-230	1950 - 2500	3000	1500	155-225	450	1650	240	230	575	265
36	1650 - 2225	1650	2400	150-245	1950 - 2500	3300	1200	145-215	450	1650	275	175	575	235
37	1225 - 1650	1900	2000	130-215	1950 - 2500	3800	1000	150-230	450	1650	325	145	575	230
38	1650 - 2225	1900	2600	170-275	1950 - 2500	3800	1300	160-235	450	1650	325	195	575	290
39	1950 -2500	2000	3000	270-415	1950 - 2500	4000	1500	205-300	450	1650	350	235	575	345
40	2000 - 2550	2050	1200	275-425	2000 - 2550	4100	1700	230-345	500	1700	350	270	625	380
41	2000 -2550	2050	3400	250-370	2000 - 2550	4100	2050	250-365	500	1700	350	360	625	450
42	1700 - 2275	2550	4100	255-425	2000 - 2550	5100	1350	195-285	500	1700	510	205	625	385
43	2000 - 2550	2550	2700	285-425	2000 - 2550	5100	1650	200-280	500	1700	510	265	625	470
44	2000 - 2550	2550	3300	300-445	2000 - 2550	5100	2050	260-370	500	1700	510	365	625	560
45	2000 - 2550	2550	4100	320-465	2000 - 2550	5100	2550	320-460	500	1700	510	515	625	665
46	2000 - 2550	2850	5100	360-520	2000 - 2550	5700	2550	335-475	500	1700	845	520	625	735
47	2000 - 2550	3050	5100	385-560	2000 - 2550	6100	2550	340-480	500	1700	945	525	625	775
48	2000 - 2550	3350	5100	425-615	2000 - 2550	6700	2550	355-495	500	1700	1105	525	625	835
49	2000 - 2550	3650	4500	460-675	2000 - 2550	7300	2250	325-450	500	1700	1270	435	625	815
50	2000 - 2550	3650	5100	475-690	2000 - 2550	7300	2550	365-505	500	1700	1270	530	625	900

All dimensions are approximate and in mm
All weights are approximate and in kg

Weight Calculation



Weights shown throughout the catalogue are component weights only, therefore a weight for the case and where appropriate channel base and lids will need to be calculated from the table below.

Please note that all section lengths and weights are approximate and are sized based on a mid duty point for the size of unit. Please contact the VES sales office for more accurate dimension and weight information.

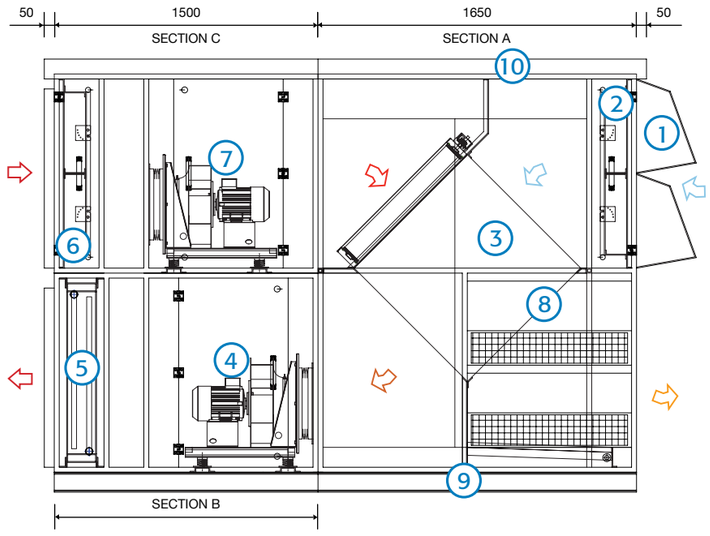
Weight Calculation Example

MAX20 Weatherproof 25mm tubes mineral wool infill

Case Components

(Refer to pages listed below for component weights)

1. Inlet Cowl (Pages 28-29)
2. Panel Filter (Pages 14-15)
3. Cross Flow Heat Exchanger (Pages 16-17)
4. Supply Fan (Pages 12-13)
5. LPHW Coil (Pages 26-27)
6. Panel Filter (Pages14-15)
7. Extract Fan (Pages 12-13)
8. Discharge Cowl (Pages 28-29)
9. Channel Base (Page 33)
10. Weather Lid (Page 33)



Section A
Case Weight 1.65m @ 85kg/m = 140kg
Components ①12kg + ②12kg + ③70kg + ⑧12kg
Channel Base Weight ⑨1.65m @ 14kg/m = 23kg
Weather Lid Weight ⑩1.7m @ 13kg/m = 22kg
Total section weight 140 + 23 + 22 + 12 + 12 + 70 + 12 = 291kg

Section B
Case Weight 1.5m @ 65kg/m = 98kg
Components ④60kg + ⑤30kg
Channel Base Weight ⑨1.5m @ 14kg/m = 21kg
Total section weight 98 + 21 + 30 + 60 = 209kg

Section C
Case Weight 1.5m @ 65kg/m = 98kg
Components ⑥12kg + ⑦ 60kg
Weather Lid Weight ⑩1.55m @ 13kg/m = 20kg
Total section weight 98 + 20 + 12 + 60 = 190kg

Section A 291 + Section B 209 + Section C 190 = TOTAL 692kg

Most components are single case sections, however heat exchanger sections are double height for stacked units or double width for flat units therefore require selection of either flat or stacked from the table opposite for correct weight calculations.

Flat side by side heat recovery units will need the weights for channel bases and lids to be doubled.
MW = Mineral Wool panel infill
PB = Heavy weight Plasterboard infill

MAX Model	Single Case				HX Case - Stacked				HX Case - Flat				Channel Base	Weather Lid
	Tube 25mm		Tube 50mm		Tube 25mm		Tube 50mm		Tube 25mm		Tube 50mm			
	MW kg/m	PB kg/m	MW kg/m	PB kg/m	MW kg/m	PB kg/m	MW kg/m	PB kg/m	MW kg/m	PB kg/m	MW kg/m	PB kg/m	kg/m	kg/m
01	35	45	45	60	45	65	65	85	50	75	70	95	9	8
02	35	55	50	65	50	75	70	95	55	85	75	105	9	9
03	40	60	55	75	55	85	75	105	60	90	80	115	9	9
04	40	55	55	70	50	75	70	95	60	90	80	115	10	9
05	40	60	55	75	55	90	80	110	65	95	85	120	10	9
06	45	65	60	80	60	95	85	115	70	110	95	135	11	10
07	50	70	65	85	65	100	85	120	70	110	90	130	11	10
08	50	75	65	90	65	105	85	130	70	110	90	135	11	10
09	50	75	65	90	65	105	85	125	70	115	95	140	12	11
10	50	75	70	95	65	105	85	130	75	120	100	145	12	11
11	55	80	70	95	70	110	90	135	75	125	100	145	12	11
12	55	80	70	100	70	115	90	140	75	125	100	145	12	11
13	55	90	75	105	75	125	95	145	80	130	100	155	12	11
14	60	95	80	110	80	135	100	155	80	135	105	155	12	11
15	60	90	75	105	75	120	95	145	85	140	110	165	12	12
16	60	95	80	110	80	130	100	150	85	140	110	165	12	12
17	65	100	80	115	85	140	105	160	90	145	110	170	12	12
18	65	105	85	120	90	150	110	170	90	150	115	175	12	12
19	60	95	80	115	80	130	100	155	95	150	120	180	14	13
20	65	105	85	120	85	145	105	165	95	155	115	180	14	13
21	70	110	90	125	95	155	115	180	100	165	120	190	14	13
22	75	115	90	135	95	165	120	185	100	165	120	190	14	13
23	70	105	90	125	85	135	110	165	105	175	135	205	15	15
24	75	115	95	135	95	155	115	180	110	180	130	205	15	15
25	75	120	95	140	100	165	120	190	110	185	135	210	15	15
26	80	125	100	145	105	175	125	200	110	190	135	215	15	15
27	75	120	95	140	95	160	120	185	115	190	140	220	15	16
28	80	125	100	145	100	170	125	195	115	195	145	225	15	16
29	85	130	105	150	105	180	130	205	120	200	140	225	15	16
30	90	145	110	165	125	210	145	235	125	210	145	235	15	16
31	85	130	105	150	100	170	125	195	125	210	155	240	18	18
32	90	140	110	165	110	190	135	215	130	220	155	250	18	18
33	95	150	115	150	125	210	145	235	130	225	155	255	18	18
34	95	155	120	165	130	220	150	245	135	235	160	260	18	18
35	100	165	125	175	140	240	165	270	140	240	165	270	18	18
36	100	160	120	180	125	220	150	245	140	245	165	270	19	19
37	100	165	125	190	125	210	150	240	155	265	185	295	21	22
38	110	180	135	200	140	240	165	270	160	275	185	305	21	22
39	120	195	145	220	155	265	180	295	170	295	195	325	33	23
40	145	225	175	255	180	300	215	340	190	320	230	360	33	23
41	155	240	185	270	200	335	240	380	200	340	240	380	33	23
42	155	235	190	270	175	290	215	330	215	360	260	405	38	27
43	160	250	190	280	190	320	230	360	220	370	265	420	37	27
44	170	265	200	300	215	365	255	410	235	395	275	440	37	27
45	180	290	215	325	245	415	290	465	250	420	295	470	37	27
46	190	305	225	340	255	435	300	485	270	455	315	505	40	30
47	195	315	230	350	260	445	310	495	280	475	330	530	41	32
48	205	330	240	370	270	460	320	515	300	510	350	565	44	35
49	205	335	245	370	260	445	305	495	310	525	365	585	46	38
50	210	350	250	385	280	475	330	530	320	540	375	605	46	38

All dimensions are approximate and in mm
All weights are approximate and in kg

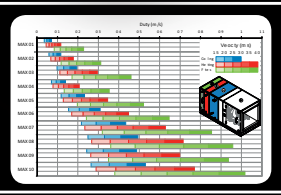
Max
Step by Step Guide

Max
Bespoke AHUs



1 Specify your unit

Pages 8-11



2 Choose from a range of Components

Pages 12-37

- Fans
- Filtration
- Heat Recovery
- Heating
- Cooling
- Inlet/Outlet Sections
- Humidification / Dehumidification
- Attenuation

3 Add and specify Controls packages

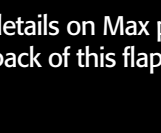
Pages 38-41



4 Select Services

Page 43





For details on Max product codes please turn to the back of this flap.

Other products and services from the complete range of VES HVAC solutions:

Air Handling Units
- *Supply and extract, combined or separate.*
- *Heat recovery including crossflow plate heat exchangers, thermal wheels and run-around coils.*
- *Plantroom or weatherproof, flat or stacked.*
- *Fitted silencers, inverters and controls.*
- *Matching DX condensing units.*
- *Various case constructions including EN 1886 certified units.*

Duct Fans
- *In-line centrifugal, with forward or backward curved impellers.*
- *Round, axial and mixed flow fans.*
- *Fitted silencers available on all units.*
- *Manual and automatic speed controllers available.*

Twin Fans
- *For ceiling void, plantroom and weatherproof.*
- *Many models and configurations.*
- *Fitted auto-changeover system.*

Roof Extract Units
- *Three ranges for volume and pressure.*
- *Curb and soaker sheet bases.*

Wall and Ceiling Fans
- *All types for commercial, industrial and domestic premises.*

Kitchen Hood Extract Fans
- *Heavy duty high temperature fans for hot greasy air.*
- *Motors out of airstream.*
- *Single inlet fans, in-line and vertical jet roof units.*

Control Panels
- *Off the shelf and built to order panels.*
- *Air quality sensors and energy savers.*
- *Intelligent control software.*
- *A range of remotes including touch screen.*

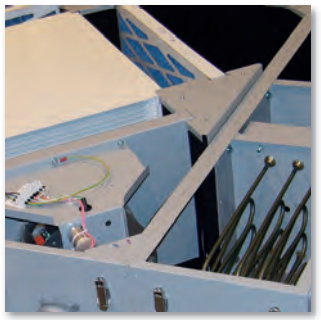
Noise Control
- *Matching silencers available for all ventilation products.*
- *Silencers designed to meet noise criteria.*
- *Cleanable silencers.*
- *Weatherproof silencers.*

Specialist Site Services
- *Plant refurbishment.*
- *Energy saving upgrades.*
- *Noise reduction.*
- *Site surveys.*
- *Kitchen ventilation.*
- *AHU flat pack installation.*
- *Maintenance.*
- *Spares.*





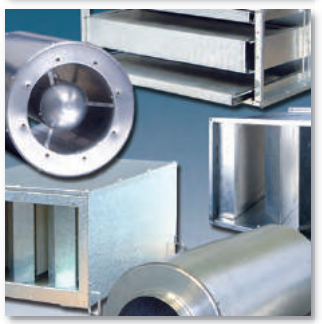




















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Issue MAX02W - 10/2014

ISO 9001 Quality Management Q 05375

BSRIA

B&ES Building & Engineering Services Association

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VES Head Office
Eagle Close, Chandlers Ford Industrial Estate, Chandlers Ford, Eastleigh, Hampshire SO53 4NF
Tel: 023 8046 1150 Fax: 023 8026 1204

Offices in London, Manchester, Glasgow and Birmingham

VES
Better air for the built environment

ves.co.uk **vesdirect.co.uk** **info@ves.co.uk**

Appendix D. ASHP Technical Data

Technical data for ASHP GREE GVM5

GREE ELECTRIC APPLIANCES, INC. OF ZHUHAI

Add: West Jinji Rd, Qianshan, Zhuhai, Guangdong, China 519070
Tel: (+86-756) 852 2218 Fax: (+86-756) 866 9426
Email: gree@gree.com.cn Http://www.gree.com

HONG KONG GREE ELECTRIC APPLIANCES SALES LIMITED

Add: Unit 2612, 26/F., Miramar Tower 132 Nathan Road, TST, Kowloon, HK
Tel: (852) 3165 8898 Fax: (852) 3165 1029

Note:
Gree is committed to continuously improving its products to ensure the highest quality and reliability standards, and to meet local regulations and market requirements.

All features and specifications are subject to change without prior notice.

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GC-1412-02

Distributor information

GREE Multi VRF 5

GREE
AIR CONDITIONER

ONE STOP SOLUTION



GMV5



Key Features

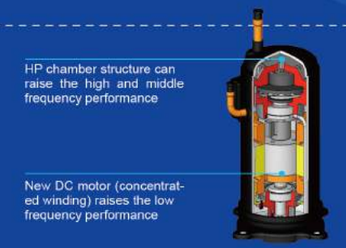
All DC Inverter Technology to Improve Compression Efficiency

All DC inverter compressor and high-performance high pressure chamber are adopted to reduce loss of overheat and improve compression efficiency from direct intake. Compared with low pressure chamber, the compression efficiency is improved. High-efficient permasyn motor is adopted to provide better performance than traditional DC inverter compressor.

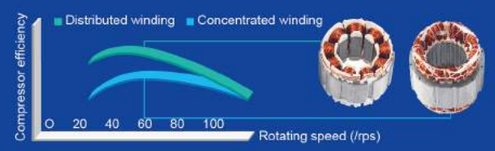
All DC Inverter Compressor

- All DC inverter compressor is used in this system. It can directly intake gas to reduce loss of overheat and improve efficiency.

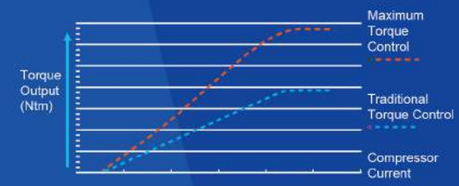




- High-efficient permasyn motor is adopted to provide better performance than traditional DC inverter compressor.



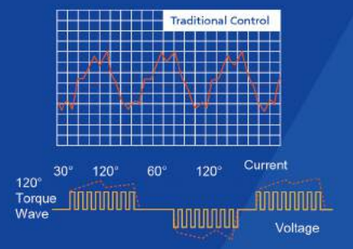
- **Technology of Maximum Torque Control with Minimum Current**
  It can reduce energy loss caused by device winding so as to realize higher efficiency.

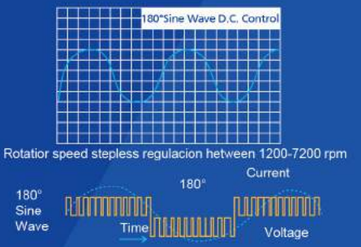


- **Low-frequency Torque Control**
  It can directly control motor torque, through which fan motor can run at a low speed. Users will feel more comfortable while requirements of the system are also met.



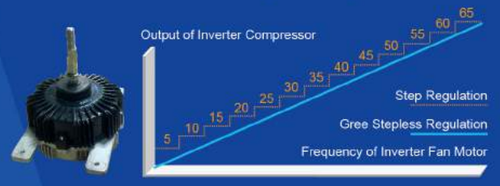
- 180° Sine Wave DC Speed Varying Technology
  It can satisfy various places' demands for different temperature and is able to save a great deal of electricity and provide users with utmost comfort at the same time.



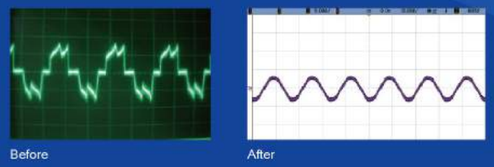


Sensorless DC Inverter Fan Motor

- Stepless speed regulation ranges from **5Hz** to **65Hz**.Compared with traditional inverter motors, the operation is more energy-saving.



- Sensorless control technology guarantees lower noise, less vibration and steadier operation.



88HP Max Capacity-The Largest Free Combination

Max capacity of single outdoor unit reaches **22HP** and max combination capacity is even up to **88HP**, in an industry leading level.

Max combination capacity is extended to 88HP



Money is saved in system cost and piping



Compact design

With compact design, the outdoor unit can be carried to the roof of building through elevator, with no need of crane. It is easier for delivery and installation.



Non-polar CAN Technology to Improve Communication Efficiency

- Gree is the first one to adopt non-polar CAN communication technology in the industry. CAN communication technology provides quicker system response speed, more convenient installation debugging and more reliable communication data.

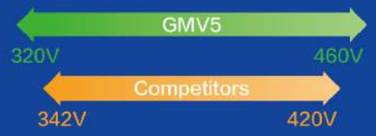
Performance Index	Company A Multi-VRF Network	GMV5 DC Inverter CAN Network
Reliability	Software check	Hardware check, more reliable
	One unit's communication error may lead to a breakdown of the whole network	If one unit has errors, it will exit from the network without any influence to other units.
Communication Efficiency	Low utilization	High utilization
	Communication speed is about 10Kbps.	Communication speed is 20Kbps.
Compatibility	One main network, difficult to add new equipment	Multiple main networks, easy to add new equipment.
Communication Distance	1000m	1500m

- The non-polar CAN communication technology is applied to support flexible wiring installation, greatly reducing construction difficulties.



Wide Range of Voltage and Operation Condition

- Working voltage range of GMV5 system has been improved to **320V~460V**, which surpasses the national standard of 342V~420V. For places with unsteady voltage, this system can still be running well.



- Outdoor operation temperature range is improved to **-5℃~52℃ in cooling** and **-20℃~24℃ in heating**.



Wider Applicable Location

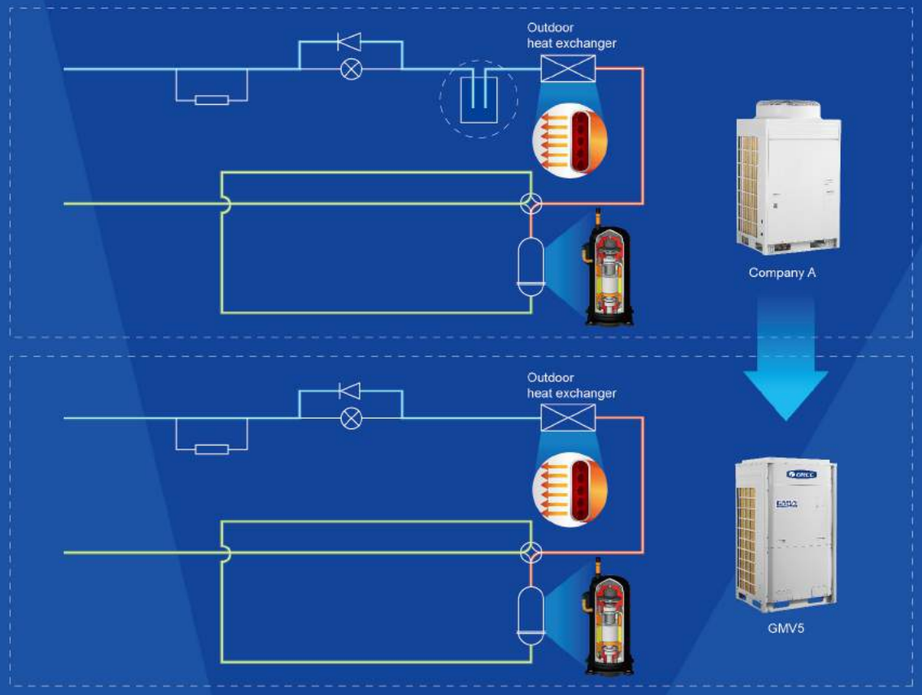
GMV5 can realize a combination of 4 outdoor unit modules connecting with as many as **80** indoor units. It's especially applicable for business building or hotels.



Max.IDU Connection: **80** sets

Refrigerant Storage and Distribution

The GMV5 system is designed without liquid receiver and the excess refrigerant is stored in the piping, which can minimize the refrigerant charging volume and enhance the control accuracy of refrigerant.



High Efficiency and More Energy Saving

Thanks to the advanced all DC inverter technology, optimized system design and accurate intelligent control technology, IPLV of GMV5 All DC Inverter Multi VRF System is up to 6.8.



New Generation of Energy-saving Operation Control Technology with Energy Saving Up to 20%

The GMV5 system has 2 modes for energy saving, which can be chosen to meet different electricity demands.

Mode 1:

In auto energy-saving mode, the system will self-adjust parameters according to the operation status, thus to lower the cost of electricity. Up to 15% of energy can be saved.

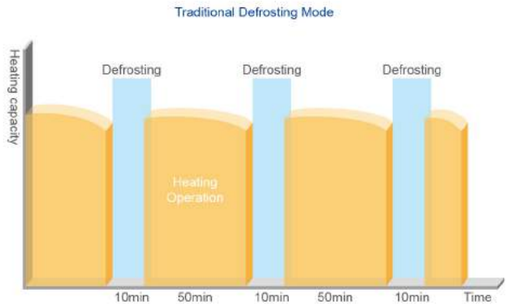
Mode 2:

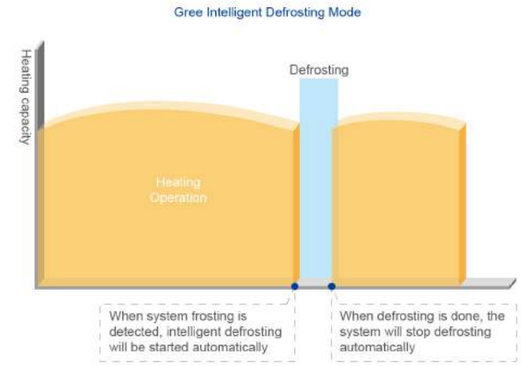
In compulsory energy-saving mode, the system will limit power output forcibly. Up to 20% of energy can be saved.



Comfortable Heating

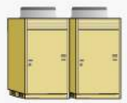
Advanced intelligent defrosting mode is adopted. Gree advanced intelligent defrosting mode will choose the best defrosting way according to outdoor temperature and operation status to realize intelligent defrosting, effectively improving heating effect and performance. While in traditional defrosting mode, timing defrosting is adopted, which not only affects comfort but also reduces energy efficiency.





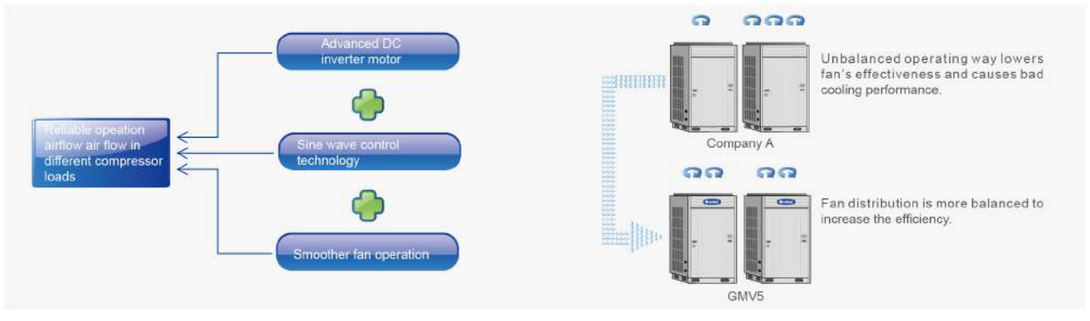
Accurate Intelligent Allocation Technology of Capacity and Output of Optimal Portion to Ensure Highest Efficiency

- When total load demands more than 75% of a running system's capacity, one more unit will automatically start;
- When total load demands less than 40% of a running system's capacity, one unit will automatically shut down;
- Therefore, each unit shares 40%-75% of the total load.
- Experiments show that an air conditioner costs the least energy when it's operating within 40%-75% of its capacity.

	 Company A	 Gree GMV
Allocation Method	10HP(full load) + 2HP(low load)	6HP(partial load) + 6HP(partial load)
Performance Compared	Unit costs more energy and may be soon damaged.	Unit costs less energy and can always be kept in good condition.

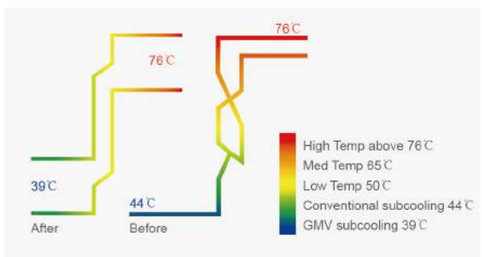
- **Output of Optimal Portion to Ensure Highest Efficiency**

The best heating or cooling performance can be realized in the most energy-saving way. DC inverter compressor and DC inverter fan will also be operating in this way to ensure high efficiency.

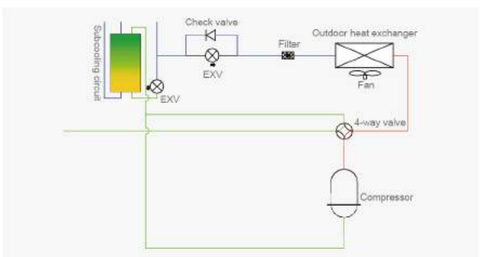


Sub-cooling Control Technology to Ensure Optimal Cooling and Heating

- Heat exchange loop can control the first subcooling process of heat exchanger. Subcooling degree can reach 11℃.



- Subcooling loop can realize 9℃ second subcooling to guarantee cooling and heating performance.



Temperature Controlled by Wired Controller with Higher Efficiency and More Energy Saving

Through setting temperature lower limit in cooling or dry mode, and setting temperature upper limit in heating, 3D heating or heat supply mode, the system is able to operate in a smaller temperature range so as to achieve energy saving.

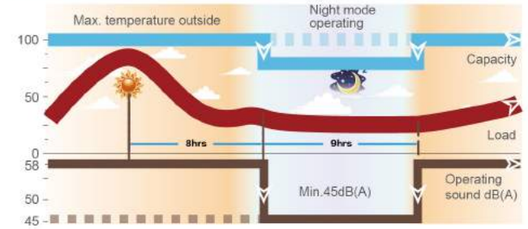
Comfortable Design for A Better Life

The GMV5 system has a wide range of working conditions. Whether it's in a cool winter or a hot summer, normal operation is guaranteed with the least noise, making users feel more comfortable.

Outdoor Unit Quiet Mode and Quiet Control

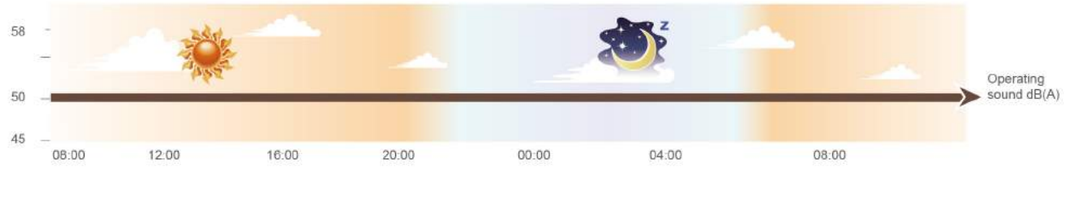
- **Quiet at night**

The system can record the highest outdoor temperature. At night, the system will automatically turn to quiet mode. There are 9 quiet modes which can be set according to actual needs.



- **Quiet in compulsion**

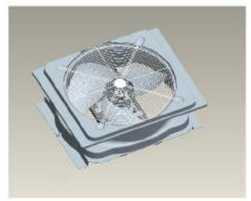
The system can also be set in this mode to ensure low noise as long as it is operating. Noise is as low as 45dB(A).

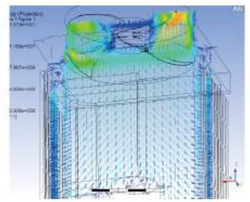


- **Quiet Control**

1. Optimized Bossing Design

After many times of CFD tests, a new fan bossing structure has been developed to reduce vibration of fan during running. Noise can be reduced by 3dB(A).





2. Aerodynamics 3D Axial Fan

Compared with conventional fan, it can increase air volume by 12%, improving efficiency as well as lowering noise.



SPECIFICATIONS & PARAMETER OF OUTDOOR UNITS

Outdoor Units Lineup

MODEL		GMV-224WM/B-X (8HP)	GMV-280WM/B-X (10HP)	GMV-335WM/B-X (12HP)	GMV-400WM/B-X (14HP)	GMV-450WM/B-X (16HP)
	GMV-224WM/B-X (8HP)	●				
	GMV-280WM/B-X (10HP)		●			
	GMV-335WM/B-X (12HP)			●		
	GMV-400WM/B-X (14HP)				●	
	GMV-450WM/B-X (16HP)					●
	GMV-504WM/B-X (18HP)	●	●			
	GMV-560WM/B-X (20HP)		●●			
	GMV-615WM/B-X (22HP)		●	●		
	GMV-680WM/B-X (24HP)		●		●	
	GMV-730WM/B-X (26HP)		●			●
	GMV-785WM/B-X (28HP)			●		●
	GMV-850WM/B-X (30HP)				●	●
	GMV-900WM/B-X (32HP)					●●
	GMV-960WM/B-X (34HP)		●●		●	
	GMV-1010WM/B-X (36HP)		●●			●
	GMV-1065WM/B-X (38HP)		●	●		●
	GMV-1130WM/B-X (40HP)		●		●	●
	GMV-1180WM/B-X (42HP)		●			●●
	GMV-1235WM/B-X (44HP)			●		●●
	GMV-1300WM/B-X (46HP)				●	●●
	GMV-1350WM/B-X (48HP)					●●
	GMV-1410WM/B-X (50HP)		●●		●	●
	GMV-1460WM/B-X (52HP)		●●			●●
	GMV-1515WM/B-X (54HP)		●	●		●●
	GMV-1580WM/B-X (56HP)		●		●	●●
	GMV-1630WM/B-X (58HP)		●			●●
	GMV-1685WM/B-X (60HP)			●		●●
	GMV-1750WM/B-X (62HP)				●	●●
	GMV-1800WM/B-X (64HP)					●●

Specifications of Outdoor Units

380~415V,50/60Hz

Model		-	GMV-224WM/B-X	GMV-280WM/B-X	GMV-335WM/B-X	GMV-400WM/B-X	GMV-450WM/B-X	GMV-504WM/B-X*1	GMV-560WM/B-X*1	GMV-615WM/B-X*1
Capacity range		HP	8	10	12	14	16	18	20	22
Capacity	Cooling	kW	22.4	28	33.5	40	45	50.4	56	61.5
	Heating	kW	25	31.5	37.5	45	50	56	63	69
EER		kW/kW	4.31	4	3.98	3.76	3.56	3.38	2.97	2.75
COP		kW/kW	4.55	4.32	4.17	4.05	3.85	3.84	3.6	3.16
Power supply		V/Ph/Hz	380~415V-3Ph-50/60Hz							
Max. Circuit/Fuse Current		A	15.7/20	20.9/25	24.7/32	28.8/40	33.2/40	36.8/40	43.8/50	48.9/50
Power comsumption	Cooling	kW	5.2	7	8.41	10.65	12.65	14.9	18.9	22.3
	Heating	kW	5.5	7.3	9	11.1	13	14.6	17.5	21.8
Maximum drive IDU NO.		unit	13	16	19	23	26	31	34	38
Refrigerant Charge volume		kg	5.9	6.7	8.2	9.8	10.3	12.7	13	13.5
Sound pressure level		dB(A)	60	61	63	63	63	65	66	66
Connecting pipe	Liquid	mm	Φ9.52		Φ12.7			Φ15.9		
	Gas	mm	Φ19.05	Φ22.2	Φ25.4		Φ28.6	Φ28.6		
	Oil balance	mm	Φ9.52					Φ9.52		
Dimension (W*D*H)	Outline	mm	930*765*1605		1340*765*1605			1340*765*1740		
	Package	mm	1010*840*1775		1420*840*1775			1420*840*1910		
Net weight/Gross weight		kg	225/235	225/235	285/300	360/375	360/375	400/415	400/415	400/415
Loading quantity	40' GP	set	24	24	16	16	16	16	16	16
	40' HQ	set	24	24	16	16	16	16	16	16

208/230V, 60Hz

Model		-	GMV-224 WM/B-F	GMV-280 WM/B-F	GMV-335 WM/B-F	GMV-400 WM/B-F	GMV-450 WM/B-F	GMV-504 WM/B-F*1	GMV-560 WM/B-F*1	GMV-615 WM/B-F*1
Capacity range		HP	8	10	12	14	16	18	20	22
Capacity	Cooling	kW	22.4	28	33.5	40	45	50.4	56	61.5
	Heating	kW	25	31.5	37.5	45	50	56	63	69
EER		kW/kW	4.31	4	3.98	3.76	3.56	3.38	2.97	2.75
COP		kW/kW	4.55	4.32	4.17	4.05	3.85	3.84	3.6	3.16
Power supply	Cooling	V/Ph/Hz	208/230V-3Ph-60Hz							
MCA		A	36	38	43	60	65	68	74	80
MOP		A	60	60	60	80	90	93	103	112
Power comsumption	Cooling	kW	5.2	7	8.41	10.65	12.65	14.9	18.9	22.3
	Heating	kW	5.5	7.3	9.0	11.1	13	14.6	17.5	21.8
Maximum drive IDU NO.		unit	13	16	19	23	26	31	34	38
Refrigerant Charge volume		kg	5.9	6.7	8.2	9.8	10.3	12.7	13	13.5
Sound pressure level		dB(A)	60	61	63	63	63	65	66	66
Connecting pipe	Liquid	mm	Φ9.52		Φ12.7			Φ15.9		
	Gas	mm	Φ19.05	Φ22.2	Φ25.4		Φ28.6			
	Oil balance	mm	Φ9.52							
Dimension (W*D*H)	Outline	mm	930*765*1605		1340*765*1605			1340*765*1740		
	Package	mm	1010*840*1775		1420*840*1775			1420*840*1910		
Net weight/Gross weight		kg	225/235	225/235	285/300	360/375	360/375	400/415	400/415	400/415
Loading quantity	40' GP	set	24	24	16	16	16	16	16	16
	40' HQ	set	24	24	16	16	16	16	16	16

440~460V,60Hz

Model		-	GMV-224 WM/B-U*1	GMV-280 WM/B-U*1	GMV-335 WM/B-U*1	GMV-400 WM/B-U*1	GMV-450 WM/B-U*1	GMV-504 WM/B-U*1	GMV-560 WM/B-U*1	GMV-615 WM/B-F*1
Capacity range		HP	8	10	12	14	16	18	20	22
Capacity	Cooling	kW	22.4	28	33.5	40	45	50.4	56	61.5
	Heating	kW	25	31.5	37.5	45	50	56	63	69
EER		kW/kW	4.15	3.84	3.85	3.69	3.49	3.38	2.97	2.75
COP		kW/kW	4.31	4.12	4.01	3.93	3.76	3.84	3.6	3.16
Power supply	Cooling	V/Ph/Hz	440-460V-3Ph-60Hz							
MCA		A	19	20	24	32	35	37	40	43
MOP		A	30	30	35	40	40	45	50	55
Power comsumption	Cooling	kW	5.4	7.3	8.7	10.85	12.9	14.9	18.9	22.3
	Heating	kW	5.8	7.65	9.35	11.45	13.3	14.6	17.5	21.8
Maximum drive IDU NO.		unit	13	16	19	23	26	31	34	38
Refrigerant Charge volume		kg	6.5	6.7	8.2	9.8	10.3	12.7	13	13.5
Sound pressure level		dB(A)	60	61	63	63	63	65	66	66
Connecting pipe	Liquid	mm	Φ9.52		Φ12.7			Φ15.9		
	Gas	mm	Φ19.05	Φ22.2	Φ25.4		Φ28.6			
	Oil balance	mm	Φ9.52							
Dimension (W*D*H)	Outline	mm	930*765*1605		1340*765*1605			1340*765*1740		
	Package	mm	1010*840*1775		1420*840*1775			1420*840*1910		
Net weight/Gross weight		kg	225/235	225/235	285/300	360/375	360/375	400/415	400/415	400/415
Loading quantity	40' GP	set	24	24	16	16	16	16	16	16
	40' HQ	set	24	24	16	16	16	16	16	16

Note:
*1： This product is under development. The parameters are estimated, please refer to the value on the nameplate.

Appendix E. MVHR Technical Data

Technical data for Mitsubishi Lossnay LGH series

Fresh Air Ventilation Range









GUG-01/02/03SL-E

Enhanced ventilation for LGH-RVX(T) units

Available in 3 sizes, the GUG is an air processing unit which works in conjunction with Mr Slim outdoor units to heat and cool the supply air from a Lossnay LGH-RVX(T)-E unit.

The combination of these 3 products effectively creates an air handing system that can supply fresh air efficiently to commercial applications.

Schools Factories Restaurants Offices Small shops Hotels Leisure



GUF-50/100RD4

Enhanced ventilation with City Multi VRF

Available in 2 sizes, the GUF is an outdoor air processing unit which works in conjunction with City Multi outdoor units to provide ventilation, dust removal and heat recovery and a healthy indoor air quality.

Schools Factories Restaurants Offices Small shops Hotels Leisure

Air Handling Units

Mitsubishi Electric will be launching a new and exciting range of Air Handling Units (AHUs) later this year, allowing us to further enhance our offering of ventilation solutions. The new AHUs will range from 3,000m^3/h up to 20,000 m^3/h, benefit from thermal wheel heat recovery technology and will be fully compliant with Ecodesign 2018.

For further information on this range, please contact your local sales office.

LGH-RVX-E

Commercial Lossnay

Designed to supply fresh air into any commercial building whilst simultaneously extracting stale air. The Lossnay units also recover valuable heat energy for maximum efficiency, with total heat exchange.

Key Features

- Clean, fresh air
- Energy efficient heat recovery
- Can be used in conjunction with Mr Slim and City Multi for highly efficient and effective operation





COMMERCIAL MODELS			LGH15RVX-E	LGH25RVX-E	LGH35RVX-E	LGH50RVX-E	LGH65RVX-E	LGH80RVX-E	LGH100RVX-E	LGH150RVX-E	LGH200RVX-E
ELECTRICAL POWER SUPPLY			220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz	220-240V, 50Hz
RUNNING CURRENT (A)		SP1	0.10	0.10	0.12	0.13	0.15	0.15	0.17	0.29	0.33
		SP2	0.15	0.16	0.26	0.26	0.39	0.36	0.50	0.70	0.88
		SP3	0.24	0.28	0.54	0.59	0.90	0.83	1.20	1.75	2.20
		SP4	0.40	0.48	0.98	1.15	1.65	1.82	2.50	3.71	4.88
INPUT POWER (W)		SP1	7	8	11	12	15	18	21	38	42
		SP2	14	16	31	32	49	60	75	123	153
		SP3	28	33	70	78	131	151	200	311	400
		SP4	49	62	140	165	252	335	420	670	850
AIRFLOW (m^3/h)*2		SP1	38	63	88	125	163	200	250	375	500
		SP2	75	125	175	250	325	400	500	750	1000
		SP3	113	188	263	375	488	600	750	1125	1500
		SP4	150	250	350	500	650	800	1000	1500	2000
AIRFLOW (l/s)*2		SP1	10	17	24	35	45	56	69	104	139
		SP2	21	35	49	69	90	111	139	208	278
		SP3	31	52	73	104	135	167	208	313	417
		SP4	42	69	97	139	181	222	278	417	556
SPECIFIC FAN POWER (W/(l/s))		SP1	0.70	0.47	0.46	0.34	0.33	0.32	0.30	0.37	0.30
		SP2	0.67	0.46	0.63	0.46	0.54	0.54	0.54	0.59	0.55
		SP3	0.90	0.63	0.96	0.75	0.97	0.90	0.96	0.99	0.96
		SP4	1.17	0.90	1.44	1.19	1.39	1.51	1.51	1.61	1.53
EXTERNAL STATIC PRESSURE (Pa)		SP1	6	5	10	8	8	10	11	11	10
		SP2	24	21	40	30	30	38	43	44	38
		SP3	54	48	90	68	68	85	96	98	84
		SP4	95	85	160	120	120	150	170	175	150
SOUND PRESSURE LEVEL (dBA)		SP1	17	17	17	18	18	18	18	18	18
		SP2	19	20	20	19	22	23	23	24	28
		SP3	24	22	28	28	29	30	31	32	36
		SP4	28	27	32	34	34.5	34.5	37	39	40
TEMPERATURE EXCHANGE EFFICIENCY (%)		SP1	84	86	88.5	87	86	85	89.5	85	89.5
		SP2	83	82	86	83.5	84	84	86.5	84	86.5
		SP3	81	80	82.5	81	81	82.5	83	82.5	83
		SP4	80	79	80	78	77	79	80	80	80
ENTHALPY EXCHANGE EFFICIENCY (%)	Heating	SP1	79	83	83.5	82.5	82	81	87	81	87
		SP2	78	76	78.5	75	76	78	78	78	78
		SP3	75.5	72	74	71	71	73.5	74	73.5	74
		SP4	73	69.5	71.5	69	68.5	71	72.5	72	72.5
	Cooling	SP1	79	83	82	82	81	81	85.5	81	85.5
		SP2	78	74.5	78	72.5	74	78	77	78	77
		SP3	74.5	70	73	68	69.5	72.5	73	72.5	73
		SP4	71	68	71	66.5	66	70	71	70.5	71
WEIGHT (kg)			20	23	30	33	38	48	54	98	110
DIMENSIONS (mm)		Width x Depth x Height	780 x 610 x 289	780 x 735 x 289	888 x 874 x 331	888 x 1016 x 331	908 x 954 x 404	1144 x 1004 x 404	1144 x 1231 x 404	1144 x 1004 x 808	1144 x 1231 x 808
DUCT SIZE (mm)			100	150	150	200	200	250	250	(SA,RA)250 (OA,EA)270 x 700	(SA,RA)250 (OA,EA)270 x 700
STANDARD FILTER*1			EU-G3	EU-G3	EU-G3	EU-G3	EU-G3	EU-G3	EU-G3	EU-G3	EU-G3
FUSE RATING (BS88) – HRC (A)			6	6	6	6	6	6	6	10	10

Notes: Running Current, Input Power and Recovery Efficiency are based on the above airflow rate, power supply 240v, 50Hz. Sound Pressure Level measured at 1.5m under the centre of panel.
*1: EU-F7 filter available as optional parts. *2: Airflow tested to Japan industrial standard JIS B 8628. SP1, SP2, SP3 & SP4 relate to the fan speeds of the Lossnay RVX units i.e. fanspeed 1, 2, 3 & 4.

Accessories

Remote Controllers

PZ-61DR-E

Lossnay remote controller for LGH-RVX-E

High Efficiency Filters

PZ-15RFM-E

High efficiency filter for LGH-15RVX-E

PZ-25RFM-E

High efficiency filter for LGH-25RVX-E

PZ-35RFM-E

High efficiency filter for LGH-35RVX-E

PZ-50RFM-E

High efficiency filter for LGH-50RVX-E

PZ-65RFM-E

High efficiency filter for LGH-65RVX-E

PZ-80RFM-E

High efficiency filter for LGH-80RVX-E / LGH-150RVX-E (2 sets)

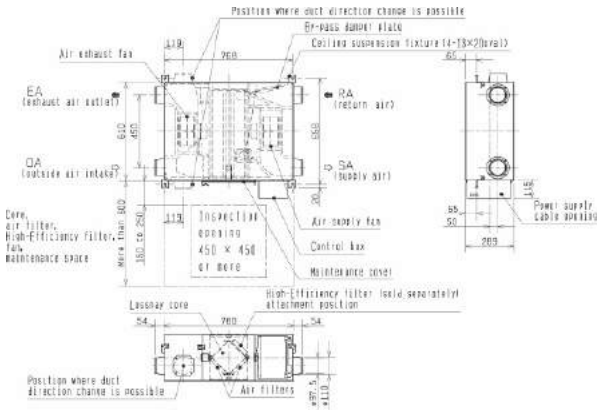
PZ-100RFM-E

High efficiency filter for LGH-100RVX-E / LGH-200RVX-E (2 sets)

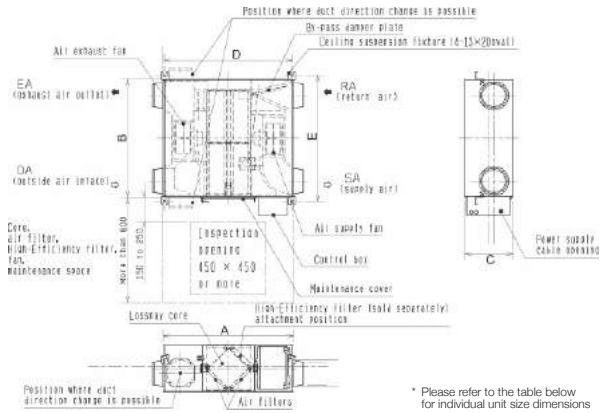
Weather Proof Housings

Weather proof housings are also available

DIMENSIONS LGH-15RVX-E



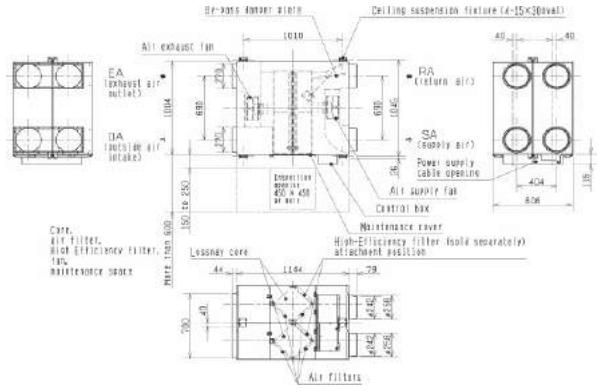
DIMENSIONS LGH-25-100RVX-E*



* Please refer to the table below for individual unit size dimensions

MODEL REFERENCE	DIMENSIONS			CEILING SUSPENSION FIXTURE PITCH		NOMINAL DUCT DIAMETER
	A	B	C	D	E	
LGH-25RVX-E	780	735	289	768	782	150
LGH-35RVX-E	888	874	331	875	921	150
LGH-50RVX-E	888	1016	331	875	1063	200
LGH-65RVX-E	908	954	404	895	1001	200
LGH-80RVX-E	1144	1004	404	1131	1051	250
LGH-100RVX-E	1144	1231	404	1131	1278	250

DIMENSIONS LGH-150RVX-E



DIMENSIONS LGH-200RVX-E

