

## Energy Recovery Ventilator



		E25DZUA + Filter BOX (BE25DZUA)			E35DZUA + Filter BOX (BE25DZUA)			E50DZUA + Filter BOX (BE50DZUA)			
Notch		SH	H	L	SH	H	L	SH	H	L	
Heat Exchange Ventilation	Air Volume [m³/h]	250	250	150	350	350	255	500	500	350	
	Noise [dB(A)]	33	33	26	37	36.5	30.5	38	37.5	32	
	Power Consumption [W]	157	148	82	282	253	172	376	349	215	
	Static Pressure [Pa]	90	40	0	100	18	0	60	0	0	
	Temperature Exchange (%)	Cooling	60	60	65	53	53	53	53	53	58
		Heating	75	75	77	78	78	75	78	78	78
	Temperature Exchange (%)	Cooling	61	61	70	66	66	63	66	66	66
		Heating	67	67	74	71.5	71.5	70	70	70	69
	ERV Main Body	Size [mm]	650*750*220			680*920*230			680*1090*240		
		Weight	30			39			45		
OA side duct diameter					ø200						
Duct diameter RA/SA/EA					ø150			ø200			
Filter Box	Duct Diameter [mm]				ø200						
	Size [mm]	600*380*240						600*380*350			

1. The above parameters are measured under the operation of assembly of ERV and Filter Box Unit.
2. The input power, the current and the exchange efficiency are measured at the standard air volume.
3. The input power indicated in name plate is the maximum value at the static pressure of 0 Pa.
4. The noise is measured 1.5m away from the bottom face of the unit.  
The noise value measured at the total acoustic room is more than the indicated value in actual operation.
5. The above parameters are measured according to standard JIS B 8628.

## Accessories



**MGX100K / MGX150K**  
(Pipe Hood with Net)



**MCX100K / MCX150K**  
(Pipe Hood without Net)



**VGX100K / VGX150K**  
(Vent Cap with Net)



**VCX100K / VCX150K**  
(Vent Cap without Net)



KDK Company, Division of PES  
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<http://kdk.jp>

• Actual colors may vary slightly from those shown.  
• Specifications are subject to change without prior notice.

CATALOG NO: K-VM001A1

PRINTED IN HONG KONG (02.18)



SINCE 1909  
JAPAN

THE HOME VENTILATION BOOK

ADVICES FOR A BETTER LIVING ENVIRONMENT!

**VENTILATION IS CLOSELY RELATED TO OUR HEALTH**  
**WE PROVIDE SOLUTIONS FOR A HEALTHY HOME**

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Ventilation Products

**Don't you want to live with Clear Air?**

Buildings nowadays mostly are tightly built with aluminum casing windows and rubber lining door to retain energy efficiency and limit heating or cooling loss. However, it comes at the cost of poor indoor air quality.

In order to provide a healthy living environment to you, ventilation plays an essential role.

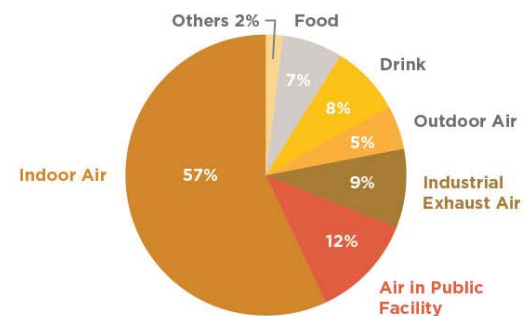


**Why Indoor Air Quality is Important?**

*You can't see it, but you take a lot into your body – AIR*

Air quality in a house is an important factor for your health and comfort. In general, windows are not opened in airtight house due to using of air conditioning.

It is difficult to fulfill air exchange in a modern house, as a result, the stale indoor air becomes polluted easily.



Source: Murakami Shuzo, "Indoor Environments and Air Pollutants"

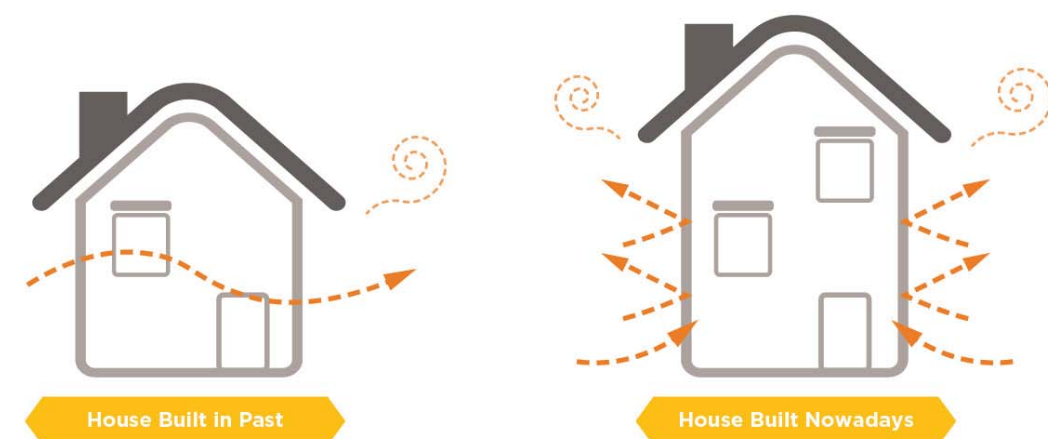
Besides "Sick House Syndrome", insufficient ventilation also affects human's health and aging of building

- Yellow stain on wall caused by tobacco smoking
- Allergic illnesses induced with mold and mite that are caused by moisture
- Discomfort due to smells from toilet and cooking
- Lowering of concentration due to shortage of oxygen
- Building deterioration resulting from condensation and mold

**Air Problems in Home**

**Home Airtightness**

Homes designed and built in recent years are more airtight and energy efficient than in the past. To obtain an airtight design, house wraps, newly designed windows and doors, sealing caulks and other insulating materials are used to create a seal for optimum energy efficiency. It results the cost saving to heat and air-condition at home, but pollutants retained in airtight buildings can be hazardous to our health and can jeopardize structural integrity.

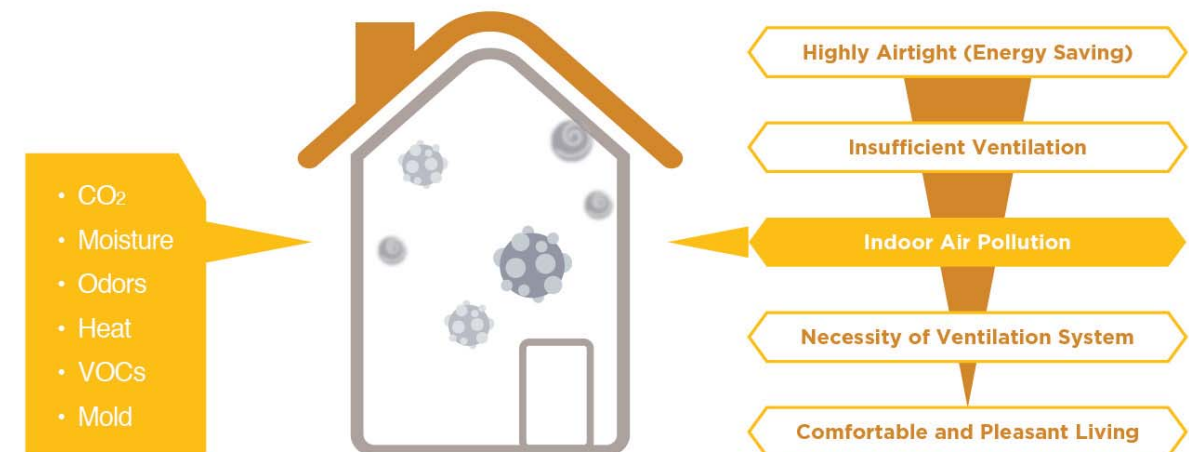


House Built in Past  
Natural and wooden building material are adopted that allow air exchange between interior and exterior

House Built Nowadays  
Chemical made building material and sashes are employed to ensure high airtightness

**Issues Raised with Home Airtightness?**

Highly airtight house restricts air ingress from outside that can closely retain the expected indoor temperature for energy saving. However, airtightness also brings out the problem of indoor air quality (IAQ) which may be a cause of sick house syndrome.



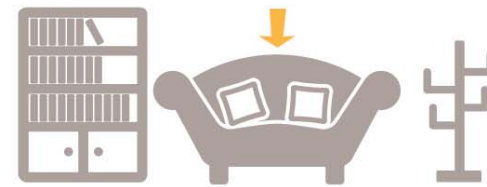


## Indoor Air Problem – Allergy (Mite)



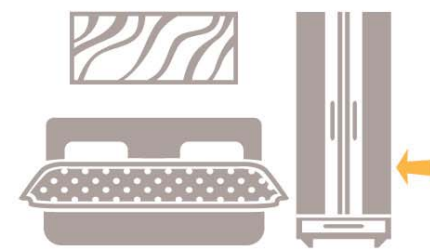
### SOFA FABRIC AND STUFFED DOLL!

Scurf and dander from human beings (and pets) are the mites favorites. Thus, it is important to be cautious with fabric sofa and stuffed dolls.



### CLOSETS ARE THE WONDERLAND FOR MITES AND MOLDS!

Closets, a place of low temperature, bad ventilation and high humidity, provide a propagation place for mites and mold.



Account for 90% of home mites.

Dermatophagoides Pteronyssinus (Dust mite group)

From time to time, we live with a massive amount of mites without notice.

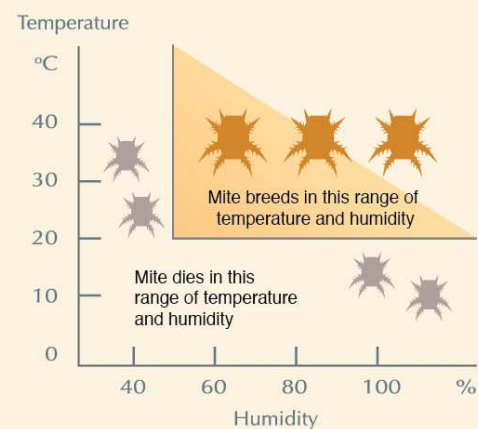
### Mites in homes

There are normally around 30 types of mites found in a home. In general, most mites live without causing any harm to human beings. However, sting mites like Cheyletidae, blood-sucking mites like House Mite, and the Dust Mites group which can cause allergen also exist.

	Sting Nite	Suck-blood mite	Allergen mites
Type	Cheyletidae group	House mite, Ornithonyssus, Bacati	Dust Mite Group
Habitat	Mainly found in tatami and quilt	Body and nest of rats or with birds	Feeding on human's scurf and dander, and therefore found in quilt, carpet, stuffed doll, and fabric sofa

### Temperature and Humidity for miter breeding

Mites breed when temperature is over 20 degrees and humidity is over 60%.



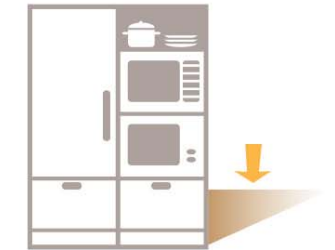
(Source: "Information of Residence and Home"; Environment Hygiene Section, Health and welfare Department, Osaka Prefecture)

## Indoor Air Problem – Allergy (Mold)



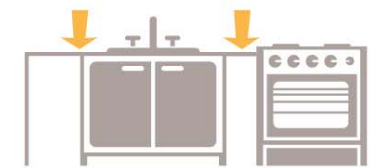
### BACKSIDE OF FURNITURE IS SECRET HOME FOR MOLD!

The space between furniture and walls are usually of low temperature because of bad ventilation, and dew condensation forms easily. Dust then becomes the nutrition for mold to breed.



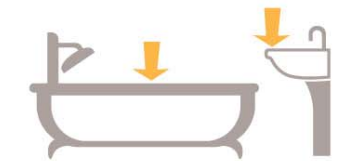
### KITCHEN WITH LOTS OF WATER VAPOUR IS THE FOOD STORAGE FOR MOLD!

Water vapor is created when gas is being burnt. Also, the dirt after cooking provides nutrition for mold.



### BATHROOM WITH HEAVY AMOUNT OF WATER VAPOUR IS THE WONDERLAND FOR MOLD!

Heavy amount of vapor can be produced in a short period of time. Wall, flooring and bathroom ceilings are made of moisture-proof materials and thus high temperature is maintained. Be sure to clean your bathroom without leaving any soap residue.



### Enlarged Photo of Mold

Dermatophagoides Pteronyssinus (Dust mite group)



### Mold in Our Home

Mold breeds faster when humidity increases, and nearly everything inside and outside our residence can provide nutrients for it. Mold not only damages our home appearance and creates bad odors, it also has bad effects on the human body. Furthermore, mold increases during rainy season, and its spores fly around at the end of the rainy season.

#### PROBLEMS CAUSED BY MOLD

- Causes for allergic illness like atopic dermatitis, asthma and so on.
- Mold transpiration substances have harmful effects on humans.
- Some mold will cause infection on humans.
- Some mold will produce mold poison.
- Mold is food for mites.

### LITTLE KNOWLEDGE Mold Grows on Metal

Even the manufacturing field is being widely affected and damaged by mold. Mold could be found in either computers, one of the most vital machines which cannot be separated from our daily lives, or even aluminum fuel tanks of Jet Planes which have led to fuel leaking accidents in the past. Aluminum is a metal said to be difficult to be rusted or corroded. However, there is mold like Cladosporium Legionella, which can corrode it and make a hole in it. Its metal corrosion capabilities are yet more proof of its sheer strength.

(Source: "Little Knowledge of Living and Mold"; Research Laboratory of Dr. Earth, Doctor of Mold)



## Indoor Air Problem – Termite



### FLOOR AND BATHROOM SINKS ARE GOOD PLACES FOR TERMITES TO LIVE!

High humidity of bathrooms (especially the floor) , provides good places for termites to live.



### BE CAUTIOUS ABOUT AREAS UNDER THE FLOOR WITH BAD VENTILATION!

Termites love environments with bad ventilation and little sunshine.



Termites love places of bad ventilation, little sunshine and high humidity.

#### DAMAGES DONE BY TERMITE

It is common to find termite damages like wall crack, undulating eaves and roof, and even broken windows/shutters. Compared to termites which cause damage mainly under floor, home termites causes damage to the whole house (till ceiling).

#### Little Knowledge

##### APART FROM WOOD, EVEN CONCRETE!?

Even concrete buildings aren't really safe. It is because termites can penetrate by removing concrete particles with its big jaw. There are cases of 5cm-thick-walls penetrated by termites in the space of a week.

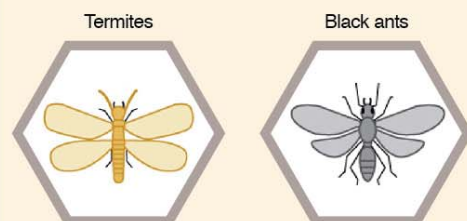
However, it is not because they love to eat concrete, the reason for their continuous hole digging is just because they know their favorite feed (wood) is right after the concrete.

### What are termites?

Do you think termites are a group of ant? In fact, cockroaches are said to be the ancestor of termites, while ants should be same group as the bee.

Also, Termites have been existed since 300 million years ago, while ants (black ants) only existed for around 200 million years (when dinosaurs were still alive).

#### HOW TO DISTINGUISH TERMITES FROM BLACK ANTS (WINGED ANT)



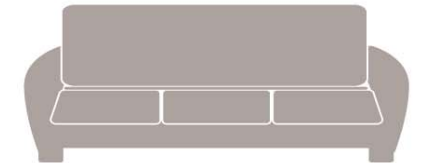
- |   |   |
|---|---|
| <p><b>Termites</b></p> <ul style="list-style-type: none"> <li>• No waist</li> <li>• Beaded antennae</li> <li>• Front and back wings are of same size</li> </ul> | <p><b>Black ants</b></p> <ul style="list-style-type: none"> <li>• Small waist</li> <li>• "L shaped" antennae</li> <li>• Front and back wings are of different size</li> </ul> |
|---|---|

## Indoor Air Problem – Volatile Organic Compounds



### BEWARE OF CURTAINS, SOFAS AND ANY OTHER FURNITURE YOU BROUGHT IN!

Chemical substances are also released from curtains, sofas and any other furniture you brought in.



### EVEN FLOORING NEEDS ATTENTION!

Though natural-material-made flooring looks safe, chemical substances like gloss wax may still be emitted.



### WALL AND FLOORING, WHICH OCCUPY MOST OF THE AREA, ARE THE BIGGEST ENEMY OF CLEAN AIR!

Materials like adhesives used on walls and/or flooring, will continue to release chemical substances during a long period of time.



### What is sick house?

Recently, many reports show that people are in poorer physical condition. It is because of high living density and usage of building/interior materials which emit chemical substances in either newly-built or reformed houses, and thus causing indoor air pollution.

There are different symptoms; however, many of them are not yet clarified including their occurrence mechanism. Besides, since combined factors are also considerable, it is called "Sick House Syndrome".

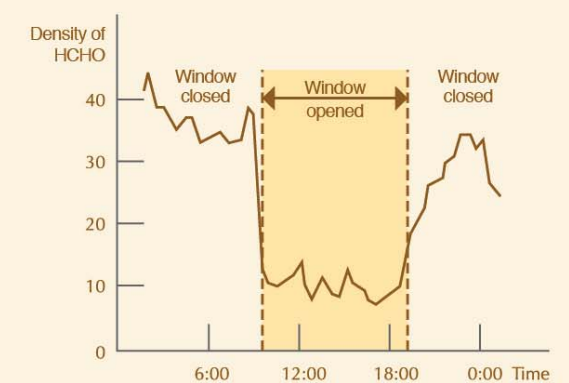
#### SYMPTOMS OF SICK HOUSE SYNDROME!

Common symptoms are mainly sore eyes! throat, nausea, feeling unwell, skin irritation, headache, dizziness, breathing trouble and so on. Furthermore, chemical substances like Formaldehyde are causes of Pollinosis, and can even lead to deterioration of allergic illness.

### Density Variation of Formaldehyde (HCHO)

Indoor Formaldehyde density was measured.

When windows are opened, density decreases rapidly. When windows are closed, density then starts to increase again.



(Source: "Information of Health and Residence", Environmental Hygiene Section, Health and Welfare Department, Osaka Prefecture) Formaldehyde: It is considered to be the main chemical substance causing the "Sick House Syndrome". (Main source: building materials, furniture, heat machines, smoking, etc.)



## Indoor Air Problem – Allergy (Pollen)



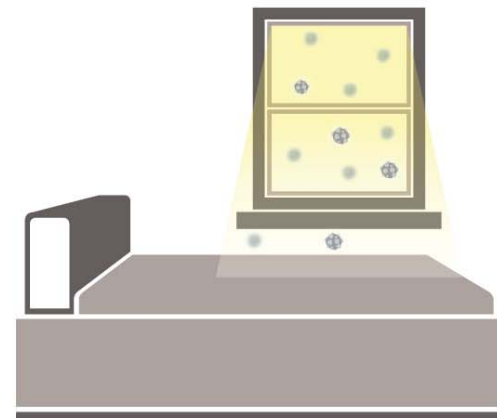
### A LOT OF POLLEN EXISTS BETWEEN FABRIC

Pollen sticks onto our clothing whenever we go outdoors, or just simply when we do laundry outside our house.



### HANGING QUILTS OUTSIDE CAN AFFECT OUR SLEEP

It is better to hang bedding outside to avoid mites or mold. However, as clothing, pollen will stick to quilts, and finally affect our healthy sleep.



It is said that 1 out of 5 Japanese are suffering from pollinosis. And among them approximately 80% are allergic to Cedar Pollen.



### The Lowering age of pollinosis patients

Recently allergy amongst children has increased. Increased breeding of mites caused by high residential density, air pollution, environmental hormone and food additives are considered as the major reasons.

Atopic Dermatitis and Asthma are the most obvious illnesses, while pollinosis in children around one year old, and thus showing the lowering patient age tendency.

### Little knowledge

#### WHY POLLINOSIS IS LESS FOUND IN ELDERLY?

In 1960 (10 years after the war), there was no sign of in Japan. Pollinosis is found less on elderly nowadays, not just because of the decreased amount of cedar pollen, but also the eating habits and living environment of Japanese at the time are found to be effective in order to avoid allergic tendency.

In addition, even though immunity decreases as people grow older, allergic reaction to pollen will also become weaker and thus less serious situations are found in elderly compared to those of a younger age.

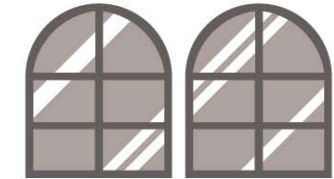
(Source: Sparkling Health Memo (Hay Fever) News Corporation Ltd., Takeda Pharmaceutical Industrial Corporation Ltd.)

## Indoor Air Problem – Dew Condensation



### WINDOW FULL OF WATERDROP IS WONDERLAND FOR DEW CONDENSATION!

Waterdrops on window glass which is formed by dew condensation will drip down, and may further soak through sash groove, curtain and even flooring.



### BEWARE OF DEW CONDENSATION IN CLOSET!

No airflow and moisture would stay in closed closet piled up with things such as quilts. As a result, dew condensation happens easily, and will wet quilt or clothing inside.



Mold is surely created in places where dew condensation happens. Mold will then become nutrient for Mites to breed.



### What is Dew Condensation?

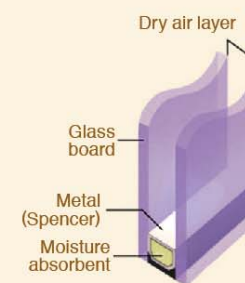
Due to high living density, airflow is lessened that steam emerged indoor is not completely discharged or not well dried up; as a result, dew condensation is formed. (When warm and humid air contacts with cold surface, air will become waterdrops).

### The Relationship between Temperature and Humidity which makes Dew Condensation possible

The higher the temperature, the more moisture is captured. On the other hand, the lower the temperature, the less moisture will be captured. The chart below shows moisture which is possible to be captured in air under different humidity and its relevant temperature.

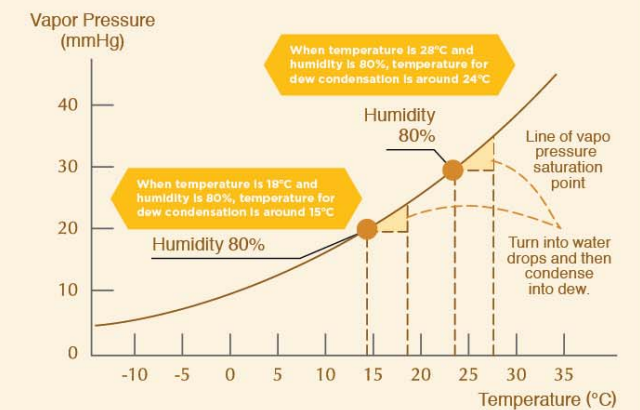
### Little Knowledge

#### DO YOU KNOW WHAT DOUBLE GLASS IS?



Double glass isolates outdoor cold air and thus makes dew difficult to be condensed. The secret behind an air layer which is sealed within 2 pieces of glass.

The same principle is found in pots, where heat movement is prevented by creating an air layer between indoor and outdoor.



(Source: ADS Project Research Laboratory Company Limited)



# What is Ventilation?

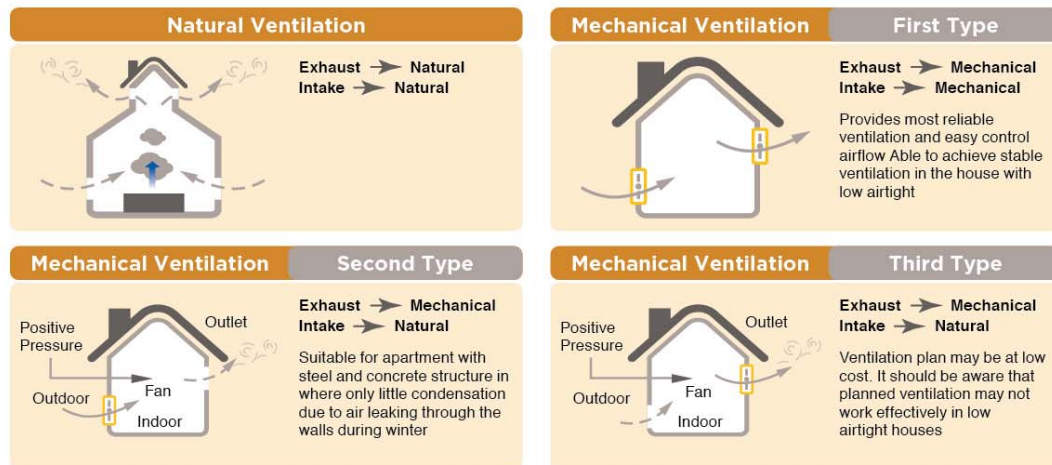
Ventilation is a system for exhaust of polluted air and supply of fresh air that creates a circulation flow of air.

With an effective ventilation plan, clean air is drawn indoor while contaminated air is removed from the house to provide a healthy and comfortable environment for the occupants.



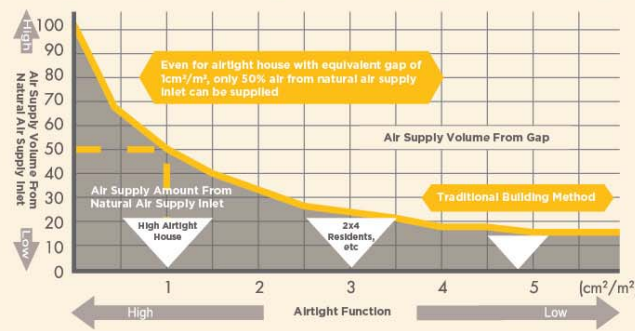
## It is necessary to have a ventilation plan to facilitate airflow circulation

No matter how effective the ventilation equipment is, ventilation cannot be held thoroughly if the path of airflow is blocked. It is essential to provide sufficient supply air in order to exert the ability of ventilation fan.



## Nature of Natural air supply inlet (Third Type Ventilation)

Relationship Between Airtight And Air Supply Volume From Gap



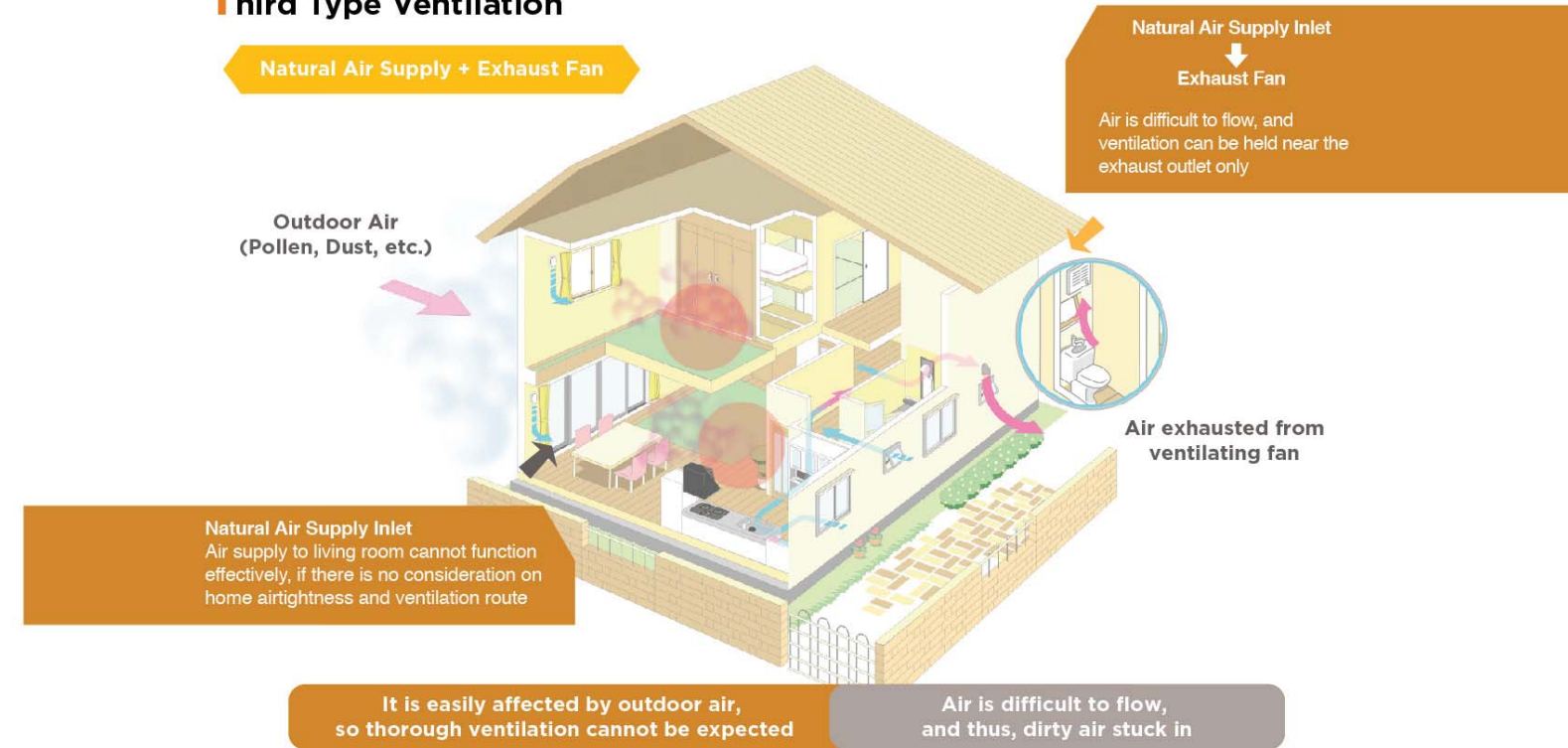
There are several types of ventilation, and both first and third type ventilation are mostly applied by common households.

For the first type, air is supplied and exhausted by mechanical operation, while the third type, air is supplied naturally and its supply amount varies according to the level of airtight of the house.

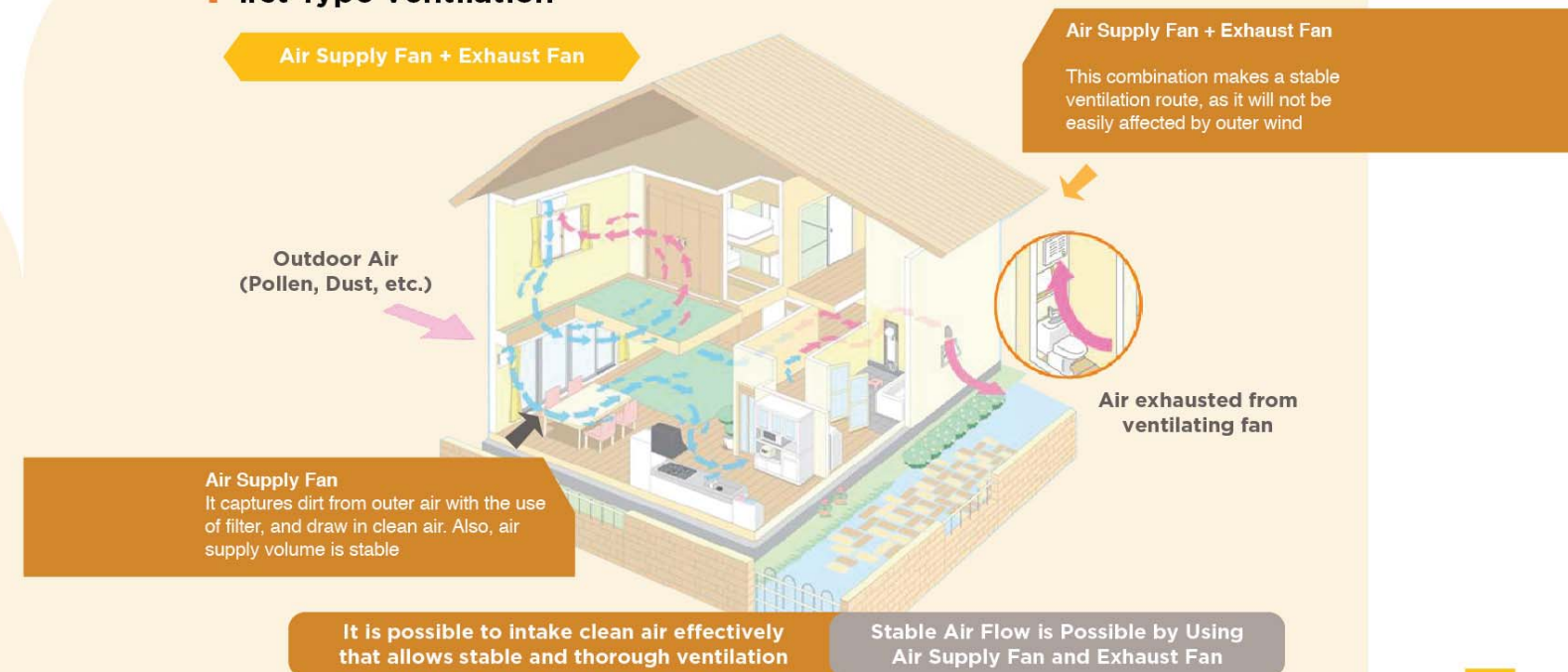
Nowadays, it is difficult to have effective air supply through natural air supply inlet. Therefore, the first type ventilation plan is recommended for all households.

# What is Ventilation?

## Third Type Ventilation



## First Type Ventilation

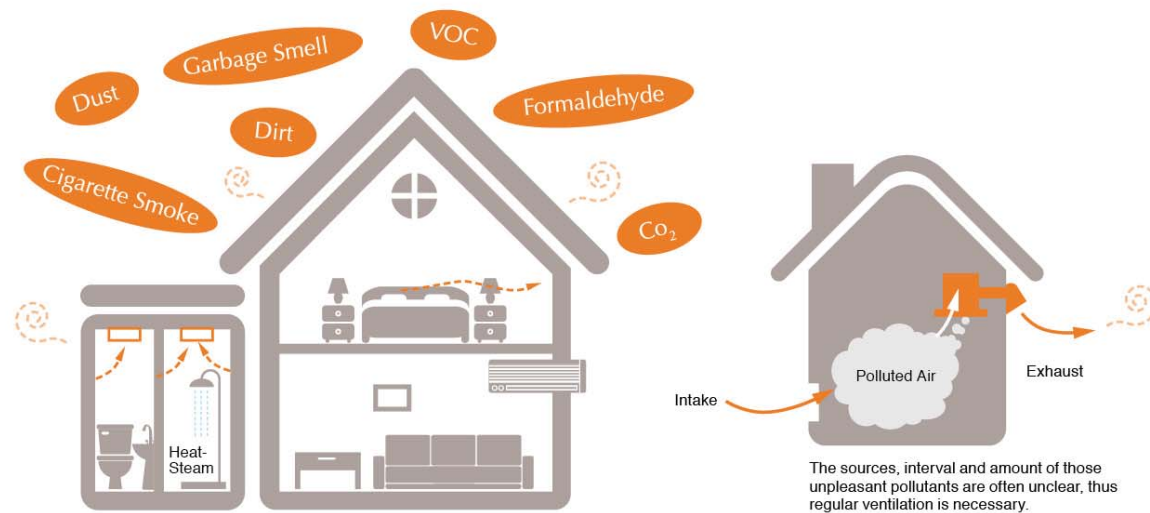




## 24-hour Ventilation (Whole House Ventilation)

Inside the house there are lot of pollutants caused by various sources while the doors and windows are closed to retain the expected temperature. It is difficult to maintain sufficient airflow inside the house that indoor air gets contaminated easily. That is why a whole house regular ventilation (24-hour ventilation system) is necessary.

Inside a house, there are CO<sub>2</sub> from breathing, water vapor, formaldehyde and VOC released from building materials and furniture, dust from clothes and fabrics, odors from smoking and cooking, etc.



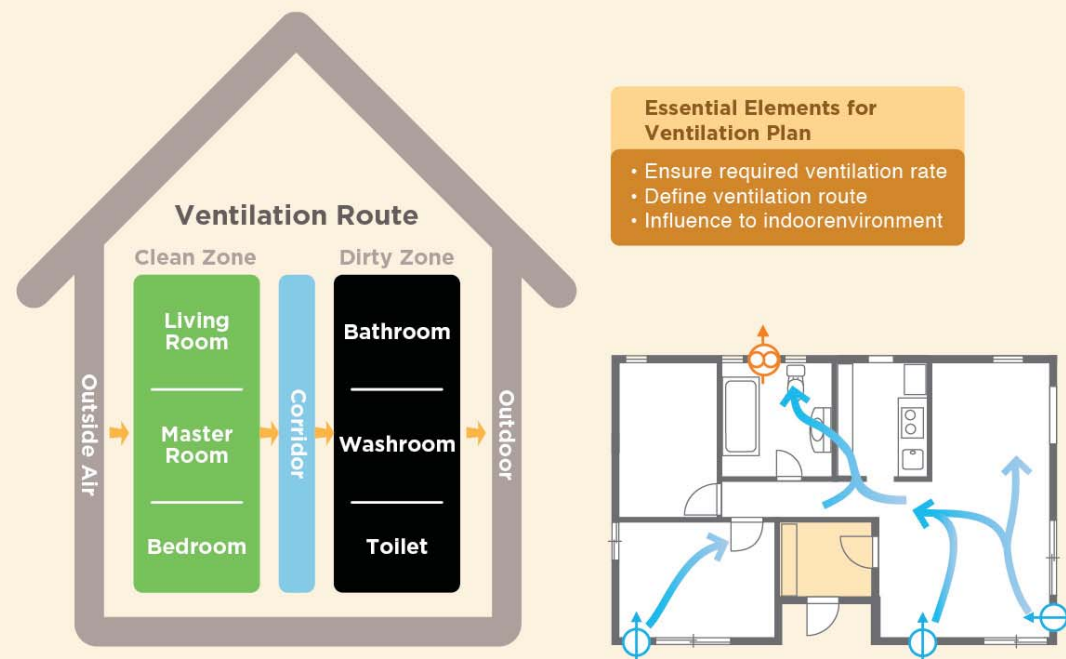
## Intermittent Ventilation

Aside from the regular ventilation to keep continuous air movement at the minimum airflow for occupied rooms, there is often a need of larger ventilation rate in response to specific pollutant sources such as cooking, smoking, or large number of people, etc.

<p><b>Toilet</b> In addition to spot ventilation as required for specified use, low airflow for regular whole house ventilation is desirable to expel residual odor</p> <p><b>Air Change Per Hour = 5~10</b></p>	<p><b>Bathroom</b> Due to insufficient ventilation, residual moisture leads to mold formation. Prolong the operation of ventilating fan to ensure the moisture is exhausted</p> <p><b>Air Change Per Hour = 5~10</b></p>	<p><b>Bedroom / Child Room</b> As for countermeasure of Sick House Syndrome, 0.5 ACH of regular ventilation is required</p> <p><b>Air Change Per Hour = 2~4</b></p>	
<p>A relatively larger air volume is required to quickly remove the occasional bad smells or gases. After the ventilation for specific purpose is completed, this operation should be stopped.</p>			
<p><b>Kitchen</b> The route of regular whole house ventilation would be affected by using of range hood. Thus, range hood with interlockcontrolled air intake shutter or synchronously exhaust-intake is recommended</p> <p><b>Air Change Per Hour = 15</b></p>	<p><b>Living Room / Dining Room</b> Smoking cigarette raises CO<sub>2</sub> levels dramatically that polluted air should be exhausted quickly. Table cooking generates smoke, moisture, heat, waste gas and odor, which need to be removed</p> <p><b>Air Change Per Hour = 3~6</b></p>		

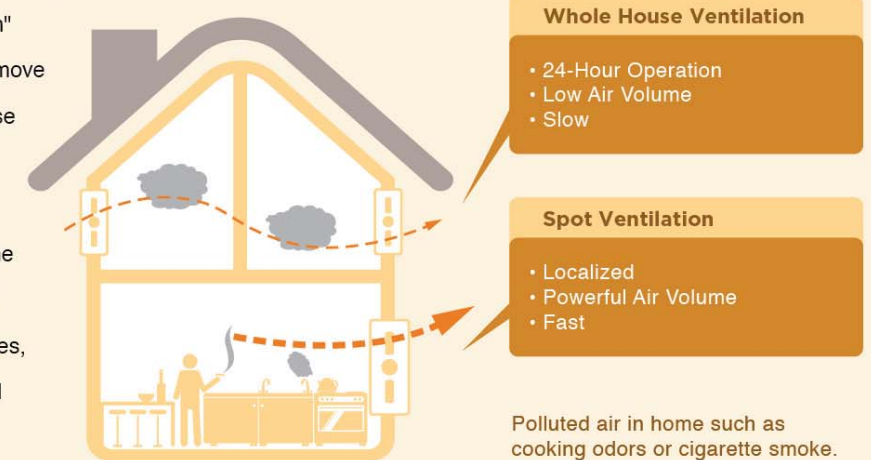
### Formation of the Ventilation Route

Since houses are very airtight nowadays, it is difficult to bring in fresh air while polluted air may stagnate indoor. A 24-hour ventilation plan is needed to create air flow throughout the house for maintaining a healthy and pleasant indoor air.



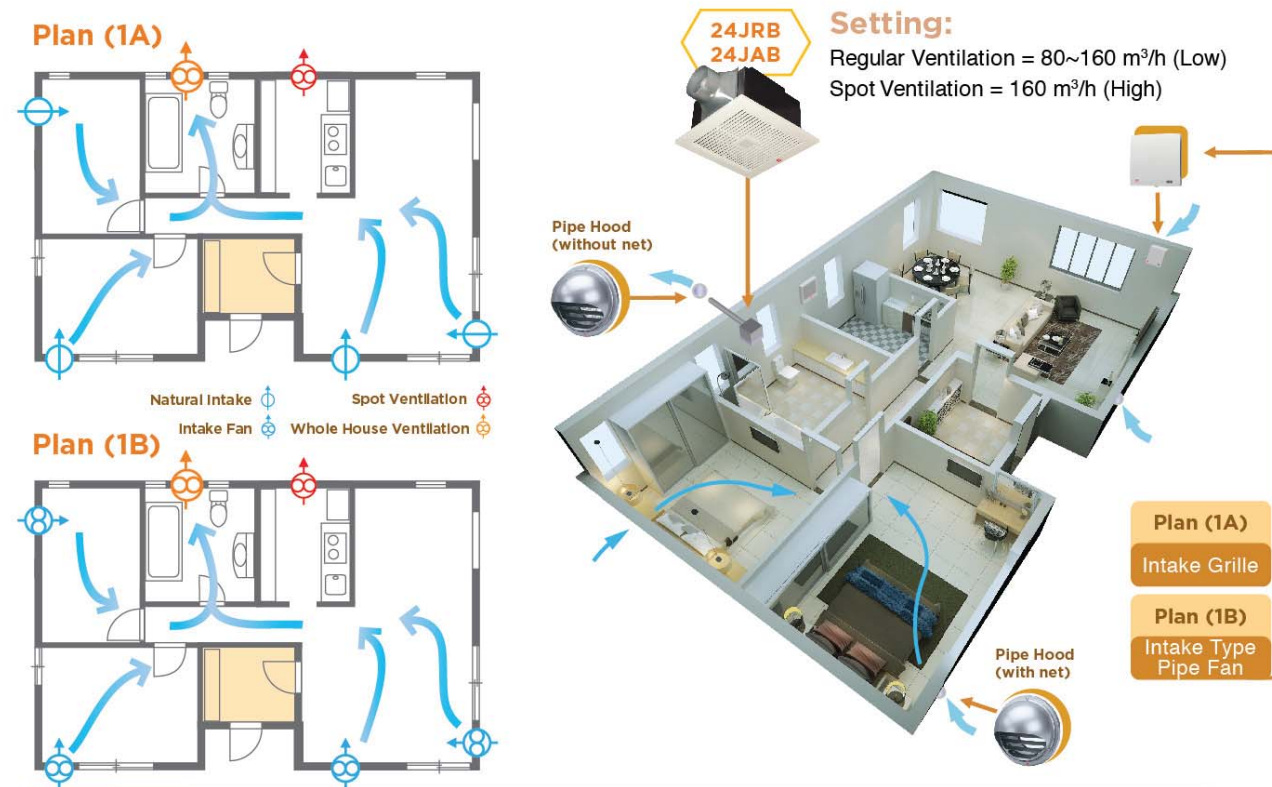
### Whole House Vs Spot Ventilation

"Whole House Ventilation" brings in fresh air and remove polluted air from the house constantly over 24-hour period, while "Spot Ventilation" focuses on the removal of concentrated pollutants from the sources, such as smoke and smell during cooking.



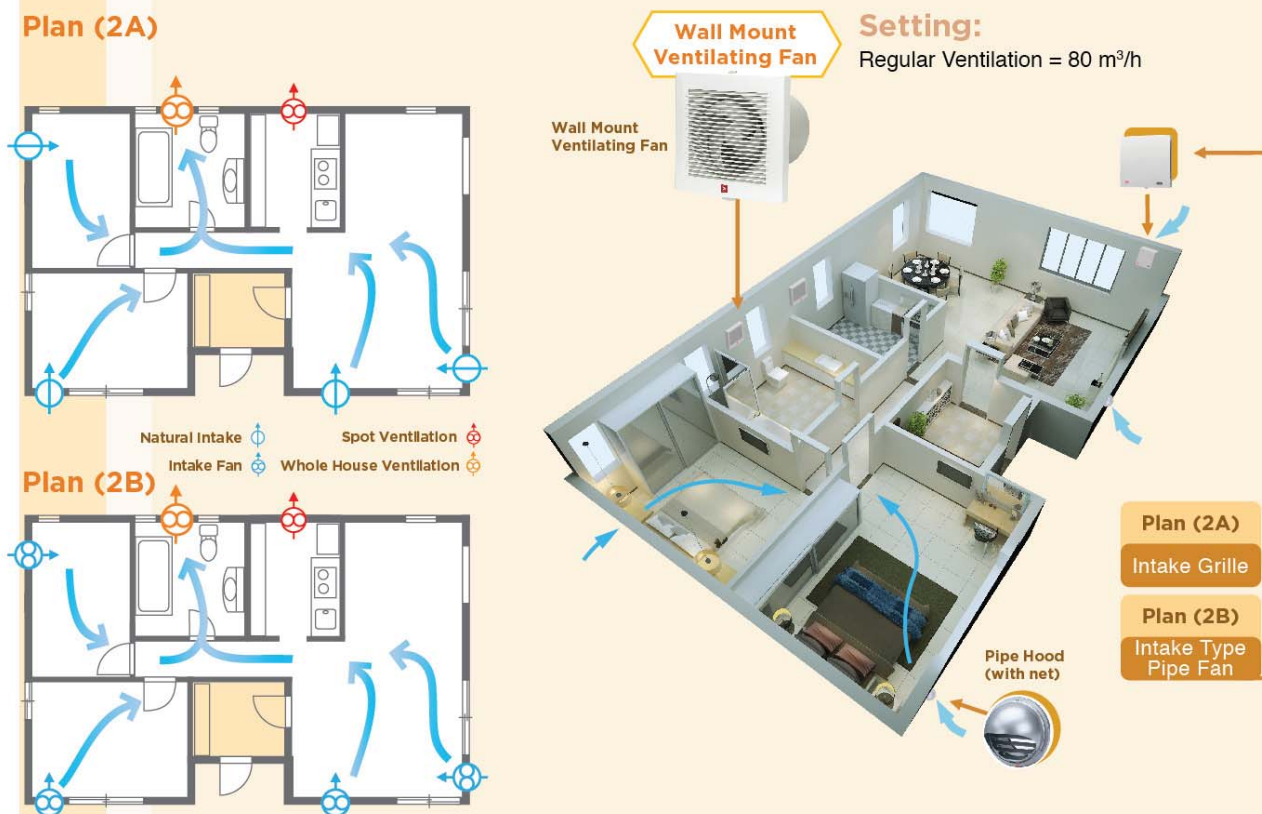
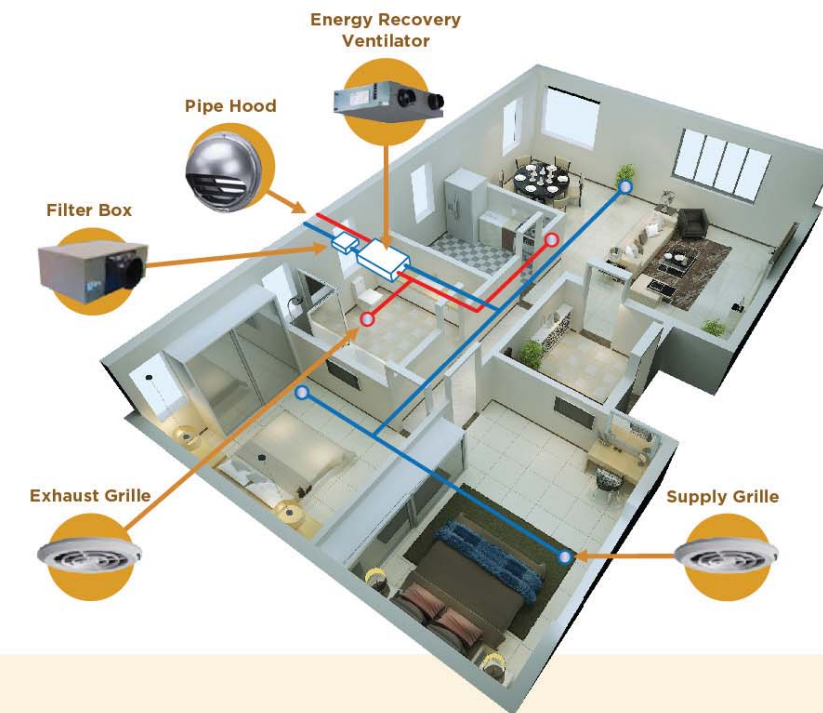


## Example of 24-Hour Ventilation

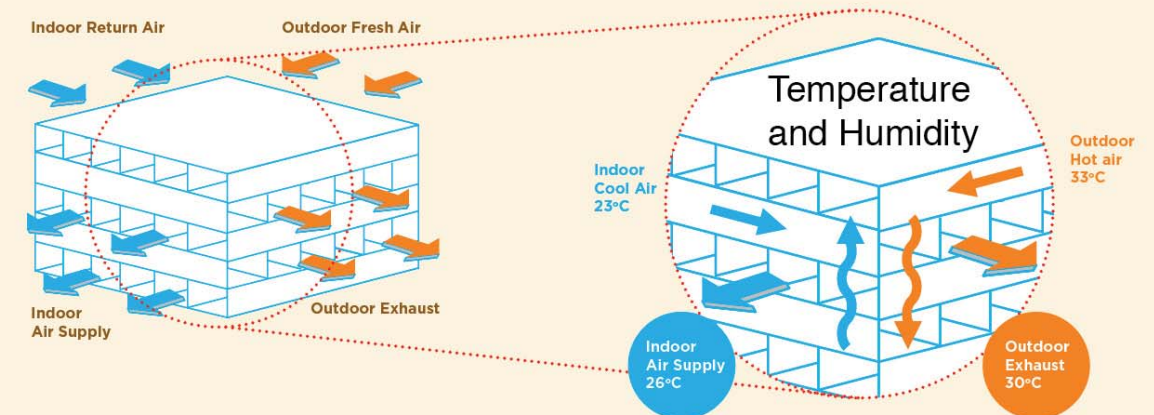


## Example of 24-Hour Ventilation With Energy Saving

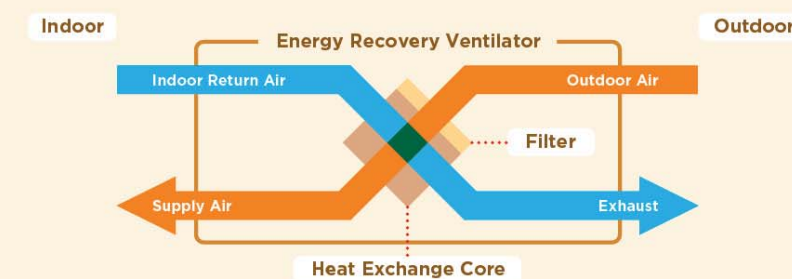
During ventilation, warm or cool indoor air is exhausted from the house, while fresh air is drawn in. It increases air conditioner loading and energy loss as well. By using energy recovery ventilator, outdoor air supplied into the room is cooled down by conditioned indoor air inside the ventilator in Summer and vice versa in Winter. It allows the temperature of supplied air is close to that of indoor that reduces the air conditioning load dramatically.



### Inside of Heat Exchange Core (diagram)

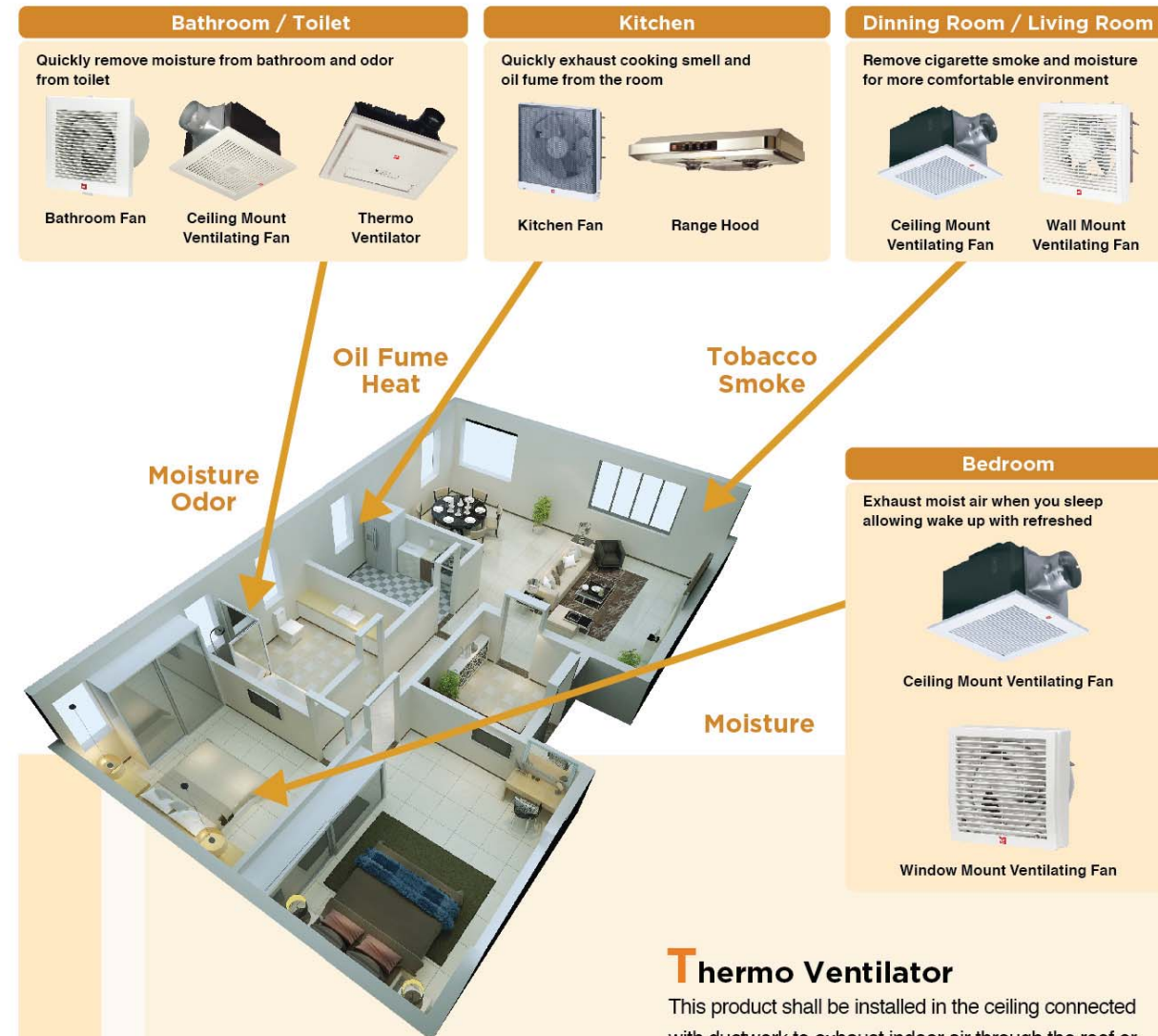


### Principle of Heat Exchange





## Example of Spot Ventilation



### Ceiling Mount Ventilating Fan

This fan shall be installed in the ceiling connected with ductwork, by which indoor air is exhausted either through the roof or the exterior wall. Since they are mainly mounted inside the ceiling, the interior is not damaged.

### Kitchen Fan / Wall Mount Type Ventilating Fan

This fan shall be installed in and exhaust air through outside wall. Equipped outside shutters will open when the fan is on and vice versa. The perforated filter with hydrophobic coating of Kitchen Fan is competent in collecting oil and easy-clean.

### Thermo Ventilator

This product shall be installed in the ceiling connected with ductwork to exhaust indoor air through the roof or the wall. It features in multi-functional such as heating, clothes drying, ventilation and air circulation.

### Window Mount Ventilating Fan

This fan shall be installed in and exhaust air through a glass plate. Installation can be done indoor by one person only that saves the installation cost of making wall opening.

### Range Hood

This product shall be hung on the wall over the cooking surface to maximize exhaust effectiveness. Ductwork is connected to exhaust polluted air through the roof or the exterior wall.

## Sizing of Ventilating Fan

Properly sized ventilation in homes helps to ensure healthy indoor air quality. Both intermittent (spot) and 24-hour (whole house) ventilation should be considered. Selection of ventilating fan depends on two factors, application and performance.

To cope with different activities in the rooms, guides are recommended to determine the Ventilation Rate (Air Change Per Hour - ACH) for particular applications. Table 1.1 shows the Ventilation Rate, which is based on the research by scientists. As the application is determined, the calculation would be interpreted as following equation:

$$\text{Required Air Volume} = \text{Air Change Per Hour (ACH)} \times \text{Room Area} \times \text{Ceiling Height}$$

### Ventilation Rate (Spot Ventilation)

Location	Air Change Per Hour
Bathroom	5
Toilet	5
Kitchen	15
Living Room	6
Reading Room	6

### Example

Location	Bathroom	Kitchen
Air Change Per Hour	5	15
Room Area	10 sq.m.	12 sq.m.
Ceiling Height	2.4m	2.4m
Required Air Change	5 x 10 x 2.4 = 120 m <sup>3</sup> /h	5 x 12 x 2.4 = 432 m <sup>3</sup> /h

For 24-hour ventilation, ventilation rate 0.5 ACH is recommended

After the required air volume is calculated, select a fan with at least the value obtained from the appropriate fan types.

Ductwork increases static pressure, and reduces the airflow performance of the fan. In case duct connected fan types are chosen, factors of static pressure should be taken in account. Please refer the catalogues for further information.

In fact, there are different calculation methods for required air volume proposed by various authorities. Take this guide as reference, local regulation and requirement concerning with ventilation should be observed

### Example

ASHRAE Standard 62.2-2010  
For 24-hour ventilation (whole house ventilation)

$$\text{Required Air Volume [L/s]} = 0.05A + 3.5(N+1)$$

A = floor area [m<sup>2</sup>]  
N = number of bedrooms

### Ventilation Air Requirement [L/s]

Floor Area(A) [m <sup>2</sup> ]	Number of Bedroom(N)				
	0-1	2-3	4-5	6-7	> 7
139	14	21	28	35	42
279	21	28	35	42	50
418	28	35	42	50	57
557	35	42	50	57	64
697	42	50	57	64	71
> 697	50	57	64	71	78



## Direct Current (DC) Ceiling Mount Ventilating Fan

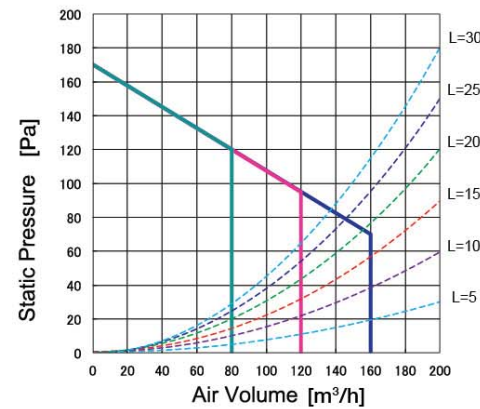
Recommended For 24-hour Ventilation  
(Whole House Ventilation)



- 1, DC (Direct Current) motor
- 2, Constant air flow
- 3, Variable air volume
- 4, Delay timer
- 5, Auto operation by motion sensor (24JRB only)
- 6, Resonance-Noise Absorption structure
- 7, Taper blade sirocco fan

Air Volume [m³/h]	0 Pa	160
	51 Pa	160
	63 Pa	160
RPM [min <sup>-1</sup> ]		725
Consumption [W]		7.9
Noise [dB(A)]		31
Weight [kg]		3.6
Installation Space [mm]		240 x 240
Duct Diameter [mm]		100

Note: Values are representative characteristic value at 220V, 50/60Hz



## Ceiling Mount Ventilating Fan

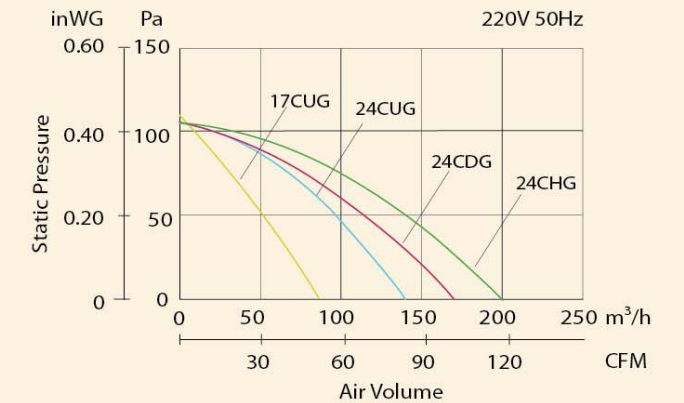
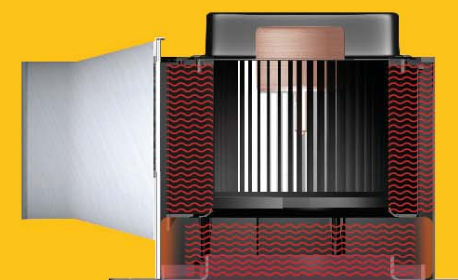


- 1, Super low noise design
- 2, Long life ball bearing motor
- 3, Taper blade sirocco fan
- 4, Resonance-Noise-Absorption Structure
- 5, Reverse flow prevention shutter
- 6, Pre-installed power cord

### Resonance-Noise-Absorption Structure

These fans adopt distinctive design of "Resonance-Noise-Absorption Structure". It minimize the transmission of noise from the blower to exterior, reduces the operation noise to incredibly low levels and accordingly create a tranquil and silent environment for you.

By the "Double Chamber" Structure, noise is effectively absorbed and reduced between the double orifice and casing.

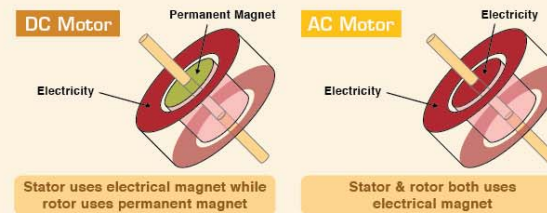


### Smart Operation

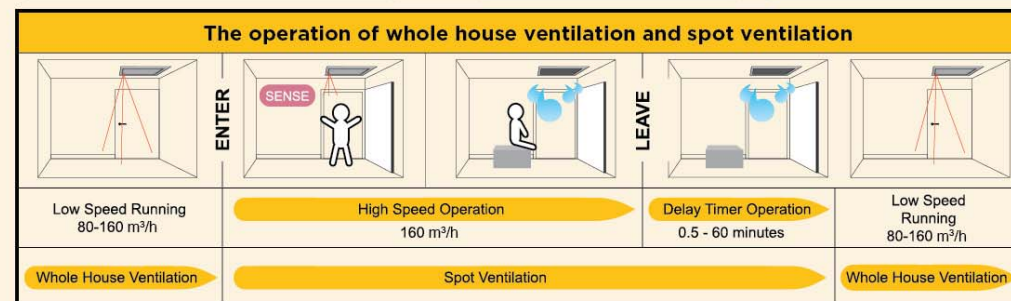
The fan runs at preset low speed (80, 120, 160 m³/h or stop) at usual and will be elevated to high speed (160 m³/h) as triggered via the Hi/Lo switch or the motion sensor. When the switch is reset or there is not any motion detected for certain duration, the fan continues run at high speed for 15 minutes to exhaust residual pollutants. Then it will switch to the preset low speed automatically.

### DC (Direct Current) Motor

The fans adopted with Direct Current (DC) Motor can reduce power consumption in order to save energy. Besides, temperature rise of DC motor is comparatively lower than Alternative Current (AC) Motor that lifetime of DC motor is longer than AC motor accordingly.



### Example of 24JRB



Model No.	[Hz]	Air Volume		Consumption [W]	RPM [min <sup>-1</sup> ]	Noise [dB(A)]	Weight [kg]	Duct Size [mm]
		[m³/h]	[CFM]					
17CUG	50	85	50	8.5	750	23.5	1.9	∅100
	60	85	50	10	770	26		
24CUG	50	140	82	11	615	26	2.8	∅100
	60	140	82	15.5	615	28		
24CDG	50	170	100	14.5	700	29.5	2.8	∅100
	60	170	100	16.5	700	31.5		
24CHG	50	200	118	18	760	33.5	2.8	∅100
	60	190	112	22	730			

Note: RPM data is for reference only, values may vary subject to different conditions

Test Condition

- Air volume, electric characteristic and noise are specified at the static pressure of 0 Pa
- The values of noise level is A weighted average sound pressure level, the mean value are measured by our company, within 3+ to 7- dB tolerance
- The values of noise level are measured at 1 m apart from the side of fan body when ducts are connected on both inlet and outlet side
- The values of air volume are the mid-points of results measured by our company, within ±10% tolerance



## Kitchen Fan (Wall Mount Type)



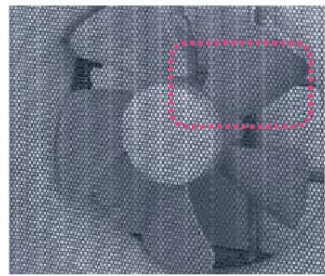
25AUFA

Air Volume [m³/h]	835
RPM [min⁻¹]	1,100
Consumption [W]	34
Noise [dB(A)]	42
Weight [kg]	2.8
Installation [mm]	300 x 300

Note: Values measured at 220V 50Hz

- 1, Perforated aluminum filter for oil catching
- 2, Hydrophobic coating for easy clean (filter)
- 3, Advanced blade design
- 4, Large capacity oil cup
- 5, Oil indicator
- 6, Automatic shutter
- 7, High air volume under actual usage (20 Pa)

### Hydrophobic Coating



"Hydrophobic Coating" is basically a paint composed of fluorine compound particles that have small affinity with water or oil.

This material has low surface tension allowing oil droplets falling on without adhering to the material.

### Hydrophobic Coating

Oil Droplet

Hydrophobic Coating  
Galvanized Steel

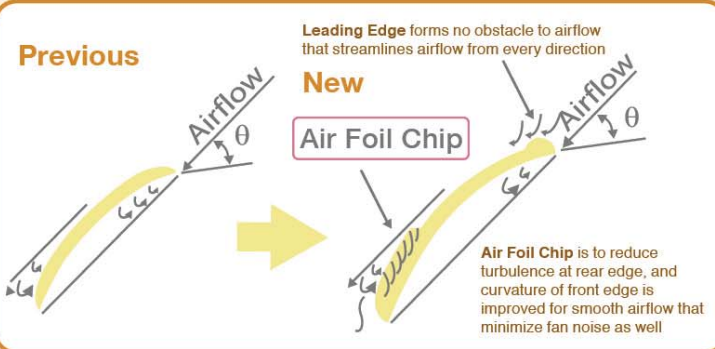
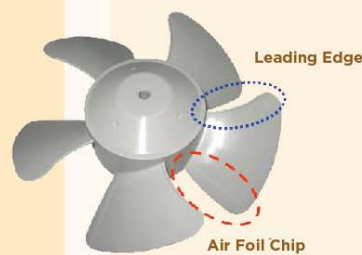
Oil droplets form spherical shape when falling on the material that can prevent adhering to the surface.

### Ordinary Coating

Oil  
Other Ordinary Coating  
Galvanized Steel

Oil spread out and stick firmly on the surface of the ordinary coating

### Advanced Blade Design



## Wall mount Ventilating Fan



Reversible Series

Reversible Louver Series

- 1, Reversible
- 2, On-off and reverse operated by pull cord switch
- 3, HP Condenser motor with thermal cut-off
- 4, Well lubricated bearing for long life operation
- 5, Advanced blade design (except 30 model)
- 6, Shutter operated by pull cord
- 7, Front louver with blind shutter (reversible louver series only)

### Reversible Series

Specifications	20RGF				25RGF				30RGF			
	Exhaust		Intake		Exhaust		Intake		Exhaust		Intake	
Hz	50	60	50	60	50	60	50	60	50	60	50	60
Air Volume	[m³/h]		405		495		645		1,165		800	
	[CFM]		238		269		347		686		471	
Consumption [W]	20	25	16	17	29	34	20	24	31	33	24	24
RPM [min-1]	1,290	1,440	1,100	1,070	1,120	1,145	900	995	990	995	905	810
Noise [dB(A)]	36	39	46	48	38	39	45	44	39	38	43	42
Weight [kg]	2.2				2.4				2.8			
Installation space [mm]	250 x 250				300 x 300				350 x 350			

Specifications	20RGFT				25RGFT				30RGFT			
	Exhaust		Intake		Exhaust		Intake		Exhaust		Intake	
Hz	50	60	50	60	50	60	50	60	50	60	50	60
Air Volume	[m³/h]		405		495		560		1,165		700	
	[CFM]		238		269		330		686		412	
Consumption [W]	20	24	15	17	27	31	21	23	31	38	24	26
RPM [min-1]	1,260	1,410	1,150	1,140	1,090	1,110	1,010	970	885	800	840	810
Noise [dB(A)]	36	39	46	46	38	39	45	44	39	38	43	42
Weight [kg]	2.2				2.4				2.8			
Installation space [mm]	250 x 250				300 x 300				350 x 350			

Note: The value in Specification table are representative characteristic value at 220V, 50/60Hz RPM data is for reference only. Values may vary subject to different conditions.

### Reversible Louver Series

Specifications	20RLF				25RLF				30RLE			
	Exhaust		Intake		Exhaust		Intake		Exhaust		Intake	
Hz	50	60	50	60	50	60	50	60	50	60	50	60
Air Volume	[m³/h]		385		475		575		990		730	
	[CFM]		227		269		338		583		430	
Consumption [W]	20	25	17	17	29	34	20	24	31	33	24	24
RPM [min-1]	1,275	1,290	1,225	1,145	1,060	1,060	1,020	970	876	835	850	776
Noise [dB(A)]	29	43	46	49	41	41	45	43	44	43	43	44
Weight [kg]	2.4				2.7				3.1			
Installation space [mm]	250 x 250				300 x 300				350 x 350			

Specifications	20RLFT				25RLFT				30RLET			
	Exhaust		Intake		Exhaust		Intake		Exhaust		Intake	
Hz	50	60	50	60	50	60	50	60	50	60	50	60
Air Volume	[m³/h]		340		430		530		990		600	
	[CFM]		200		249		311		583		353	
Consumption [W]	20	24	15	17	29	33	21	23.5	31	38	25	26
RPM [min-1]	1,240	1,290	1,190	1,180	1,100	1,100	1,035	1,035	890	880	770	770
Noise [dB(A)]	39	43	46	46	43	43	45	44.5	44	43	43	44
Weight [kg]	2.4				2.7				3.1			
Installation space [mm]	250 x 250				300 x 300				350 x 350			

Note: The value in Specification table are representative characteristic value at 220V, 50/60Hz RPM data is for reference only. Values may vary subject to different conditions.



## Wall Mount Ventilating Fan



Automatic Shutter Series

Automatic Shutter Louver Series

- 1, HP Condenser motor with thermal cutt-off
- 2, Well Inbricated bearing for long life operation
- 3, Advanced blade design (except 30 model)
- 4, Automatic shutter
- 5, Single Speed

### Automatic Shutter Series

Specifications	20AUH		25AUH		30AUH		20AUHT		25AUHT		30AUHT		
Hz	50	60	50	60	50	60	50	60	50	60	50	60	
Consumption [W]	22	29	29	33	29	33	20	24	27	31	31	38	
RPM [min-1]	1,245	1,400	1,125	1,125	1,030	950	1,250	1,400	1,070	1,125	1,000	1,000	
Air Volume	[m³/h]	580	650	920	940	1,200	1,140	580	650	920	940	1,200	1,140
	[CFM]	341	383	541	553	706	671	341	383	541	553	706	671
Noise [dB(A)]	38	42	39	39	39	38	37.5	41.5	39	39	39	38	
Weight [kg]	2.0		2.4		2.7		2.0		2.4		2.7		
Installation space [mm]	250 x 250		300 x 300		350 x 350		250 x 250		300 x 300		350 x 350		

Note: The value in Specification table are representative characteristic value at 220V, 50/60Hz  
RPM data is for reference only. Values may vary subject to different conditions.

### Automatic Shutter Louver Series

Specifications	20ALH		25ALH		30ALF		20ALHT		25ALHT		30ALFT		
Hz	50	60	50	60	50	60	50	60	50	60	50	60	
Consumption [W]	22	29	29	33	29	33	20	24	27	36	31	38	
RPM [min-1]	1,210	1,340	1,055	1,050	905	835	1,190	1,340	1,060	1,110	800	880	
Air Volume	[m³/h]	546	600	835	846	935	915	545	600	835	846	935	915
	[CFM]	321	353	491	498	550	539	321	353	491	498	550	539
Noise [dB(A)]	40	44	43	43	43	43	40	44	43	43	43	43	
Weight [kg]	2.2		2.7		3.1		3.2		2.7		3.1		
Installation space [mm]	250 x 250		300 x 300		350 x 350		250 x 250		300 x 300		350 x 350		

Note: The value in Specification table are representative characteristic value at 220V, 50/60Hz  
RPM data is for reference only. Values may vary subject to different conditions.

## Window Mount Ventilating Fan



15WHCT  
20WHCT



15WAA  
20WAA



15WUD  
20WUD

- 1, Condenser motor with thermal cut-off
- 2, Well lubricated bearing for long life operation
- 3, High Performance Propeller fan
- 4, Electrically operated Shutter
- 5, Detachable front louver

- 1, Automatic shutter
- 2, High Performance Condenser motor with thermal cut-off
- 3, Well Lubricated bearing for long life operation
- 4, Advanced blade design

- 1, HP condenser motor with thermal cutoff
- 2, Well lubricated bearing for long life operation
- 3, Advanced blade design
- 4, Shutter operated by pull cord
- 5, Metallic shutter axis

Model No.	[Hz]	Consumption [w]	Air Volume		Noise [dB(A)]	Weight [kg]	Installation size [mm]
			[m³/h]	[CFM]			
15WHCT	50	13	230	135	43	1.4	ø186 - ø188
	60	13	230	135	44		
20WHCT	50	20	445	262	42	2.6	ø247 - ø250
	60	22	480	262	45		
15WAA	50	14	210	124	43	0.9	ø186 - ø188
	60	18	222	131	44		
20WAA	50	15	380	212	42	1.4	ø247 - ø250
	60	17	380	212	42		
15WUD	50	8	210	124	35	0.9	ø186 - ø188
	60	9	198	117	34		
20WUD	50	16	360	212	32	1.1	ø247 - ø250
	60	19	360	212	31		

Note: The value in Specification table are representative characteristic value at 220V, 50/60Hz.

## Bathroom Fan



Pipe Hood Series



Shutter Series

### Pipe Hood Series

Specifications	10EGKA		15EGKA		10EGSA		15EGSA		
Hz	50	60	50	60	50	60	50	60	
Consumption [W]	5.5	4.4	6.2	8.5	5.5	4.4	6.2	8.5	
RPM [min-1]	2,706	2,888	2,329	2,647	2,706	2,888	2,329	2,647	
Air Volume	[m³/h]	75	80	160	180	75	80	150	175
	[CFM]	44	47	94	106	44	47	88	103
Noise [dB(A)]	33	34	34	38	35	36	36	40	
Weight [kg]	1.2		1.5		0.9		1.1		
Installation space [mm]	ø135 ± 5		ø180 ± 5		ø120 - ø125		ø165 - ø170		

Note: The value in Specification table are representative characteristic value at 220V, 50/60Hz  
RPM data is for reference only. Values may vary subject to different conditions.

### Shutter Series

## Range Hood



90HQUA

- 1, 2-motor design with individually operation
- 2, Sirocco fan adopted
- 3, 2-speed selection
- 4, Rocker switch
- 5, Easy detachable for cleaning
- 6, Slim design with 115mm body thickness

	Hi	Lo
Air Volume [m³/h]	785	484
RPM [min-1]	993	570
Consumption [W]	152	75
Noise [dB(A)]	52	38
Weight [kg]	18	
Product Width [mm]	900	
Duct Diameter [mm]	150	

Values measured at 220V 50Hz