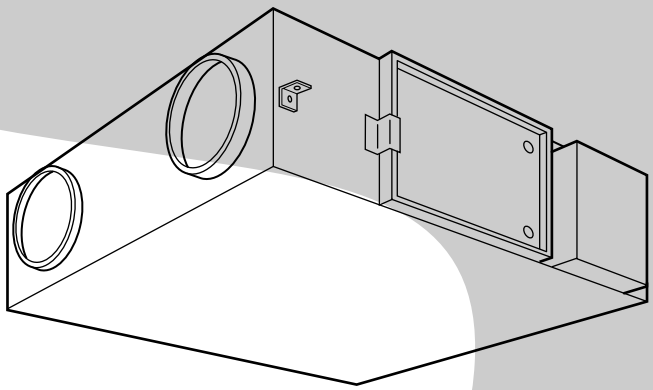
TOSHIBA

FILE NO. A06-003

SERVICE MANUAL

HEAT EXCHANGE VENTILATORS

VN-250TE
VN-350TE
VN-500TE
VN-800TE
VN-1KTAE



VN-500TE

PRINTED IN JAPAN, Mar.,2006 ToMo

CONTENTS

1. SAFETY CAUTIONS

The important contents concerned to the safety are described on the ventilator body and in this Service manual.

Preserve the described items after understanding clearly the following contents (indications/illustration symbols) and reading this manual thoroughly.

■ Explanation of indications

Indication	Meaning
⚠ **DANGER**	Indicates the contents which a danger such as death or serious injury is caused in emergency on the repair engineers or the surrounding third party by an incorrect work.
⚠ **WARNING**	Indicates the contents which a possibility such as death or serious injury is caused on the repair engineers or the surrounding third party by an incorrect work, or on the customers by a trouble of the products.
⚠ **CAUTION**	Indicates the contents which occurrence of injury (*) or damage of property is supposed on the repair engineers or the surrounding third party by an incorrect work, or on the customers by a trouble of the products.

* Damage of property : expanded damage concerned to property/household effects or domestic animals/pets

■ Explanation of illustration symbols

Illustration symbol	Meaning
	Indicates prohibition (Never do it.). The concrete contents of prohibition are indicated with illustrations or descriptions near the illustration symbol.
	Indicates forced work (Necessarily do it.). The concrete contents of forced work are indicated with illustrations or descriptions near the illustration symbol.
	Indicates cautions (including danger/warning). The concrete contents of cautions are indicated with illustrations or descriptions near the illustration symbol.

1-1. Warning and Caution Exclusive in Service Work

⚠ WARNING

- **Be sure to ask the customers not to let children close to the work place.**
  The tools or disassembled parts may cause an injury on children.
- **Be sure to turn off the breaker before work when power-ON is unnecessary such as a case of disassembling.**
  If doing so, an electric shock may be caused.
- **Use the substitute parts corresponded to the model for repair. And do not modify the products.**
  It causes an abnormal operation or a trouble resulted in leakage or fire, that is a cause of customers' disaster.
- **For connection of the cut lead cables, connect the cables with application terminals, direct the closed end side upward, and then apply the draining process.**
  If the post-process of connection is not carried out, a cause of customers' disaster such as leakage or fire generates.
- **After the work, check the insulation resistance between live part (pin of SL terminal) and non-current carrying part (motor frame) using a insulation megger (500V) and confirm 10MW or more is kept.**
  If the insulation resistance is not confirmed, a cause of customers' disaster such as leakage or fire generates.

⚠ CAUTION

- **Use the protective materials such as gloves, etc. for check/repair inside of the unit.**
  If touching inside of the unit with bare hands, an injury may be caused.

1-2. DANGER/WARNING/CAUTION Described in Owner's Manual

⚠ DANGER

- **Do not use as an air circulators for open-type burners (heaters).**
  When gas or oil stoves are used in the home, separate equipment for circulating the air should be used.

⚠ WARNING

- **When any abnormal condition (scorching smell or others) is found, stop the operation immediately and keep the exclusive circuit breaker "OFF".**
  If you continue the operation without removing the cause, it could cause an electric shock or a fire.
  - When the system needs a repair, consult your dealer.
- **When the system is checked and the power cable undergoes maintenance, stop the operation, and switch the exclusive circuit breaker "OFF".**
  The internal fan is revolving at high speeds and can cause serious injury. And when using a stepladder, etc., make sure to fix it properly.
- **The external air intake opening should be positioned away from the exhaust openings of combustion gases etc.**
  The intake of such gasses could lead to a lack of oxygen in the room.
- **If there is combustible gas leakage from other appliances, ventilate the room by opening windows.**
  If operation were to be attempted in such a situation, sparking at electrical contact points could cause an explosion.
- **Netting or something similar should be provided at the external air intake opening to prevent birds etc. interfering with the unit.**
  Nests or other foreign objects should be removed. That could lead to a lack of oxygen in the room.
- **If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.**
- **The external air intake opening should not be positioned where discharged air may directly enter it.**
  A situation like this will lead to the room being contaminated and this may pose a health risk.
- **When Heat Exchange Ventilators are relocated, contact your dealer or a professional installer.**
  Improper practice of installation could cause a drop of the unit, a water leakage, an electric shock or a fire.
  - Ask the sales office or the engineering shop to perform the work.
- **Don't push a finger or a stick into the open-air inlet or the exhaust outlet.**
  A fan with a high rpm will injure you.
- **Modification of the system is strictly prohibited.**
  Improper practice of repair could cause a water leakage, an electric shock or a fire.
  - When the system needs a repair, consult your dealer.

⚠ CAUTION

- **If Heat Exchange Ventilators are not used for a long period of time, keep the exclusive circuit breaker "OFF" for safety reasons.**
  If the power is left on, any build-up of dust could cause a heat generation or a fire.
- **The system should never be used for any other purposes than intended such as for preservation of foods, flora and fauna, precision devices or work of art.**
  • It could cause deterioration of foods or other problems.
- **Install at a stable place of sufficient strength.**
  Please note that there might be some places not strong enough to install due the structure of building.
- **Provide an exclusive circuit breaker that can completely break contacts on all the poles by more than 3mm through direct connection to the power terminals.**
  Depending upon the environment for installation, it becomes necessary to install an earth leakage breaker. Unless the earth leakage breaker is installed, it could cause an electric shock.
  • Ask the sales office or the engineering shop to perform the work.
- **Never fail to install the unit inside the heat insulting walls or, in other words, in the space insulated from the open air.**
  If you install it outside or in the space equivalent to the open-air conditions, dew is condensed inside the body in the winter season.
- **The filter should be cleaned regularly.**
  Dust or dirt building-up on it can lead to a lack of oxygen in the room.
- **Use gloves when cleaning the filter or heat exchange element.**
  Doing so will reduce any possibility of injury.
- **It is strictly prohibited to place a container of combustible gas or liquid near Heat Exchange Ventilators or to spray it directly with the gas or liquid.**
  It could cause a fire.
- **Do not use outside the rated voltage.**
  It could cause a fire or an electric shock.
- **Combustion apparatus should not be placed allowing a direct exposure to wind of Heat Exchange Ventilators.**
  Incomplete combustion could occur on the apparatus.
- **Don't put a container of water on Heat Exchange Ventilators.**
  When water spills, it is likely to enter inside the unit and degrade electric insulation, possibly resulting in an electric shock.
- **Don't incline Heat Exchange Ventilators when taking them out.**
  Otherwise, water remaining inside is likely to drop and wet the furniture or other property.
  • Ask the sales office or the engineering shop to perform the work.
- **Do not install in locations where harmful or corrosive gasses may be present (i.e. acidic, alkali, organic solvent, paint gasses etc. from machinery or factories)**
  Installation in such a location could cause a gas-poisoning and a fire.
- **Do not install in locations where oily smoke or soot may be present.**
  There is a possibility that oil will adhere to the filter, heat exchange element etc. and make operation impossible.
- **Do not install in locations with high humidity, such as close to bathroom etc.**
  Installation in such a location could cause a breakdown.
- **Don't use benzene or metal brush when cleaning the filter and heat exchange element.**
  Otherwise, the unit will get unfit for use.
- **Don't blow directly against animals or plants.**
  Likely to cause bad effect on animals and plants.
- **Do not wash Heat Exchange Ventilators with water.**
  It could cause an electric shock.
- **Do not handle switches with a wet hand.**
  It could cause an electric shock.

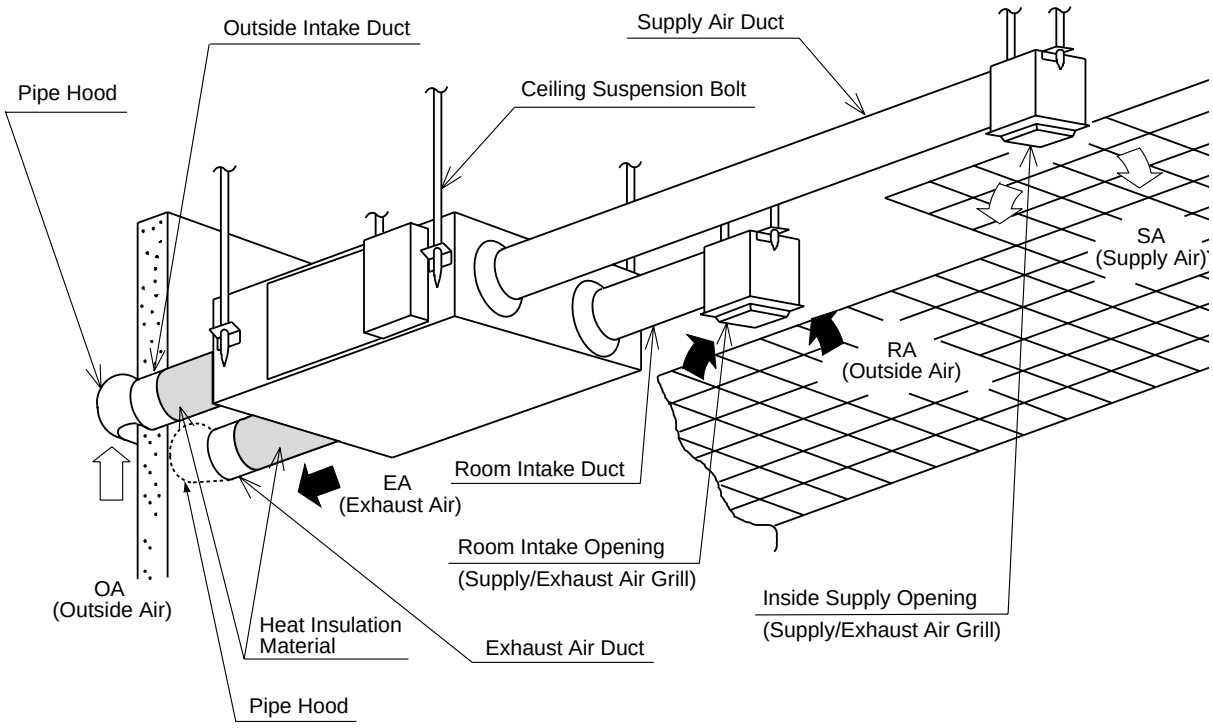
1-3. WARNING/CAUTION Described in Installation Manual

⚠ WARNING	
	Never fail to ask the sales office from which you bought the unit or the installing service shop to install the unit. If you install it by yourself, any inappropriate installing works would cause an electric shock or a fire.
	Carry out the installing works accurately in line with this installation manual. Improper practice of installation could cause an electric shocks or a fire.
	Choose the installing place where is endurable in quality as well as in weight, then install the unit accurately with adequate strength and completeness of installation in accordance with the installation manual. Otherwise, it is likely to cause an electric shock, a fire, a drop of the unit, thus causing the injury on the human body.
❗	Carry out electrical work in accordance with the laws and regulations prevailing in the country concerned, technical standard and explanation for work, and make absolutely sure that an exclusive circuit is used. Any insufficient capacity of power circuit and improper work can result in electric shock and fire hazard.
	The external air intake opening should be positioned away from the exhaust openings of combustion gases etc. The intake of such gases could cause a lack of oxygen in the room.
	Netting or something similar should be provided at the external air intake opening to prevent birds etc. interfering with the unit. Nests or other foreign objects should be removed. That could cause a lack of oxygen in the room.
	When the system is checked and the power cable undergoes maintenance, stop the operation, and switch the exclusive circuit breaker “OFF”. Otherwise, it could cause an electric shock.
⏚	Carry out the GND work. Never connect the GND wire to a gas pipe, a water supply pipe, a lightning conductor, a GND line of a telephone, etc. An incomplete GND wire is likely to cause an electric shock.
⚠ CAUTION	
	Provide an exclusive circuit breaker that can completely break contacts on all the poles by more than 3mm through direct connection to the power terminals. Depending upon the environment for installation, it becomes necessary to install an earth leakage breaker.
	When you want to pierce the metal duct through the metal lath or the wire lath or the metal plate of the wooden facility, do not forget to insulate electrically between the duct and the wall. Otherwise, it would cause an electric shock or an electric leakage.
	Don’t use other parts than specified (including the auxiliary parts) for installing works. If you do not use the specified parts, it is likely to cause a drop of the unit, a fire, an electric shock, etc.
❗	Install the outdoor duct in a falling gradient toward the outside so as to prevent water from coming in. If it is not installed so, the building is likely to be flooded, wetting the household effects.
	Heat-insulate the outdoor duct (including the indoor side, if necessary) to prevent dewing. If heat insulation is not adequate, water likely goes indoor and wets the household properties.
	When it is high humid and high temperature inside the ceiling, a ventilation system must be installed inside the ceiling. Otherwise, it could cause a fire or an electric leakage.
	Connect the power line and the connecting line with accuracy using the specified cables and fix them firmly so as not to put the outer stress of the cables on the pin connecting area. Incomplete connection or fixing is likely to cause a heat generation or a fire.
	Install the power line and the connecting line with accuracy so the power source cover may not float. If the installation of the power source cover is inappropriate, the pin connection area is likely to cause a heat generation, a fire and an electric shock due to dust or powder.
	Never install the unit near the place where there is a fear of leakage of an inflammable gas. If gas happens to leak and stays around the unit, it is likely to cause a fire.
	Don’t use the unit at the other voltages than the rated one. It could cause a fire or an electric shock.
	Do not install the unit in locations with large amounts of oily smoke, such as food preparation areas. It could cause a fire.
⃠	Don’t install the unit at the place of a high temperature or a flame. It could cause a heat generation or a fire.
	Do not install in locations where harmful or corrosive gasses may be present (i.e. acidic, alkali, organic solvent, paint gasses etc. from machinery or factories). Installation in such a location could cause a gas-poisoning and a fire.
	Do not install in locations with high humidity, such as close to bathroom etc. It could cause an electric shock or an electric leakage etc.

2. TECHNICAL POINTS (PERFORMANCE)

- **Energy-saving ventilation to save the cooling/heating cost because the heat energy (outside air load) to be lost by ventilation is effectively recovered.**
- **Compact construction to downside the cooling/heating equipment with size corresponding to heat energy amount to be recovered because the outside air load can be vastly decreased.**
- **By using the heat exchanger, humidity control effect which sucks the humidity approached to near the humidity in the room.**
- **Comfortable ventilation by simultaneous air suction/discharge which sucked air approached to the temperature in the room and the stable ventilation to be performed even in the high airtight room.**
- **Noise-proof effect to prevent entering of outside noise or flowing of noise to outside.**
- **Suction/discharge air system on straight line which is easy to be designed or installed.**
- **The high-level long filter is mounted to increase the effect of dust collection for removing. (Weight: 82%)**
- **Reverse installation up and down is possible, which 2 units use the same check port.**
- **Especially powerful notch is mounted, which can increase air volume and is selectable in the main unit.**
- **Only one check port is used for all the maintenance works.**

3. REFERENCE DRAWING FOR INSTALLATION



4. SPECIFICATIONS

<VN-250TE, VN-350TE>

Model				VN-250TE						VN-350TE					
Type				Concealed duct type											
Ventilation system				Heat exchange			Normal ventilation			Heat exchange			Normal ventilation		
Rating				50Hz 220 – 240V, 60Hz 220V											
Characteristics				Extra high	High	Low	Extra high	High	Low	Extra high	High	Low	Extra high	High	Low
	Current (A)		50Hz	0.48–0.5	0.46–0.48	0.37–0.39	0.47–0.5	0.46–0.48	0.37–0.39	0.63–0.65	0.59–0.6	0.56–0.57	0.61–0.63	0.57–0.6	0.54–0.56
			60Hz	0.59	0.55	0.39	0.59	0.55	0.39	0.85	0.75	0.67	0.83	0.74	0.67
	Power consumption (W)		50Hz	104–119	99–114	79–90	103–119	98–114	79–90	137–154	124–137	117–128	133–151	119–132	113–125
			60Hz	128	118	78	128	118	77	178	149	132	176	145	131
	Air volume (m^3/H)		50Hz	250	250	170	250	250	170	350	350	280	350	350	280
			60Hz	250	250	135	250	250	135	350	350	240	350	350	240
	Static pressure (pa)		50Hz	90	80	37	90	80	37	95	65	42	95	65	42
			60Hz	125	100	30	125	100	30	155	90	43	155	90	43
	Noise (dB)		50Hz	27–28	26–27	21–22	27–28	26.5–27.5	21.5–22.5	31–32	29–30	25–26	31–32	30–31	26–27
			60Hz	28	26	21	28	26.5	21.5	33	30	22	33	30	23
	Temp. exchange rate (%)		50Hz	75	75	77	—	—	—	75	75	77	—	—	—
			60Hz	75	75	78	—	—	—	75	75	79	—	—	—
	Enthalpy exchange rate (%)	In heating	50Hz	70	70	73	—	—	—	69	69	71	—	—	—
			60Hz	70	70	75	—	—	—	69	69	73	—	—	—
		In cooling	50Hz	63	63	66	—	—	—	66	66	69	—	—	—
			60Hz	63	63	68	—	—	—	66	66	71	—	—	—
Construction	Frame			Zinc iron plate											
	Motor			4-pole capacitor dielectric motor (E type)											
	Sirocco fan			ABS resin											
	Heat exchanger			Combustion-proof sheet											
	Filter			Nonwoven fabric (Collection effect weighing method 82%)											
	Adapter			ABS resin											
	Mounting pipe diam. (mm)			Ø150											
	External dimension (Length x Width x Height) (mm)			599 x 882 x 270						804 x 882 x 270					
	Product mass (kg)			29						37					
Package	Shape			Corrugated board package/ventilator											
	Dimension (Length x Width x Height) (mm)			335 x 1138 x 795						335 x 1138 x 1000					
	Mass (kg)			34						42					
	No. of stacked boxes			4											
	Accessory			Installation Manual: 1, Owner's Manual: 1											

<VN-500TE, VN-800TE>

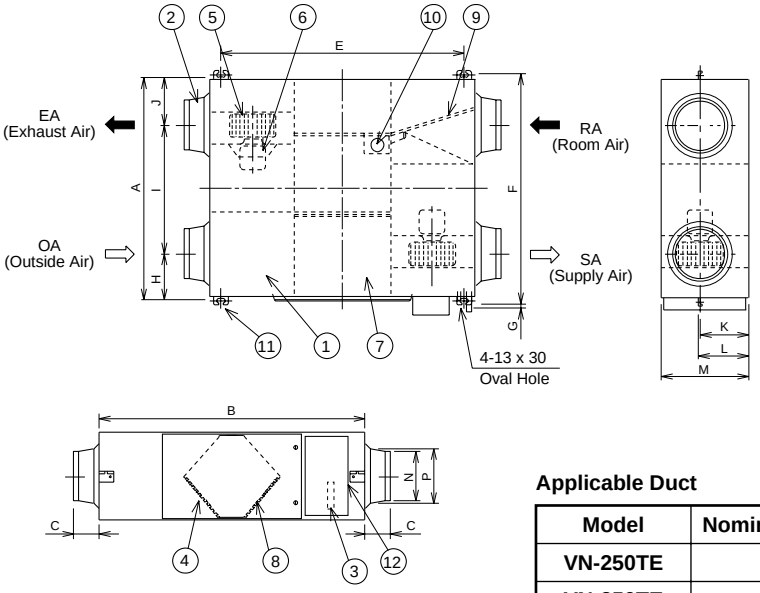
Model			VN-500TE						VN-800TE					
Type			Concealed duct type											
Ventilation system			Heat exchange			Normal ventilation			Heat exchange			Normal ventilation		
Rating			50Hz 220 – 240V, 60Hz 220V											
Characteristics			Extra high	High	Low	Extra high	High	Low	Extra high	High	Low	Extra high	High	Low
	Current (A)	50Hz	0.86–0.9	0.79–0.81	0.72–0.73	0.84–0.88	0.76–0.77	0.71–0.73	1.51–1.54	1.48–1.5	1.44–1.46	1.47–1.5	1.45–1.48	1.41–1.43
		60Hz	1.14	1.0	0.81	1.12	0.96	0.8	2.05	1.92	1.68	2.04	1.87	1.68
	Power consumption (W)	50Hz	188–214	169–188	151–166	184–210	161–182	145–164	316–347	309–329	302–327	309–337	300–325	297–316
		60Hz	244	202	162	243	196	161	424	391	347	417	387	346
	Air volume (m^3/H)	50Hz	500	500	370	500	500	370	800	800	650	800	800	650
		60Hz	500	500	310	500	500	310	800	800	575	800	800	575
	Static pressure (pa)	50Hz	105	70	38	105	70	38	140	110	70	140	110	70
		60Hz	165	85	33	165	85	33	190	100	50	190	100	50
	Noise (dB)	50Hz	33–34	31–32	25–26	34–35	32–33	26.5–27.5	38–39	36.5–37.5	32–34	38.5–39.5	37–38	33–35
		60Hz	35	31	23	36	33	24	39	36	31	39.5	37	31
	Temp. exchange rate (%)	50Hz	75	75	77	—	—	—	75	75	76	—	—	—
		60Hz	75	75	79	—	—	—	75	75	77	—	—	—
	Enthalpy exchange rate (%) In heating	50Hz	67	67	71	—	—	—	71	71	74	—	—	—
		60Hz	67	67	74	—	—	—	71	71	75	—	—	—
	Enthalpy exchange rate (%) In cooling	50Hz	62	62	67	—	—	—	65	65	68	—	—	—
		60Hz	62	62	69	—	—	—	65	65	69	—	—	—
Construction	Frame		Zinc iron plate											
	Motor		4-pole capacitor dielectric motor (E type)											
	Sirocco fan		ABS resin											
	Heat exchanger		Combustion-proof sheet											
	Filter		Nonwoven fabric (Collection effect weighing method 82%)											
	Adapter		Zinc iron plate											
	Mounting pipe diam. (mm)		Ø200						Ø250					
	External dimension (Length x Width x Height) (mm)		904 x 962 x 270						884 x 1322 x 388					
	Product mass (kg)		43						71					
Package	Shape		Corrugated board package/ventilator											
	Dimension (Length x Width x Height) (mm)		335 x 1218 x 1100						453 x 1538 x 1075					
	Mass (kg)		48						79					
	No. of stacked boxes		4						3					
	Accessory		Installation Manual: 1, Owner's Manual: 1											

<VN-1KTAE>

Model			VN-1KTAE					
	Type		Concealed duct type					
	Ventilation system		Heat exchange			Normal ventilation		
	Rating		50Hz 220 – 240V					
Characteristics			Extra high	High	Low	Extra high	High	Low
	Current	(A)	1.97–2.04	1.85–1.93	1.68–1.76	1.95–2.03	1.84–1.92	1.67–1.74
	Power consumption	(W)	399–445	360–399	332–367	392–438	358–392	329–362
	Air volume	(m^3/H)	1000	1000	810	1000	1000	810
	Static pressure	(pa)	90	55	35	90	55	35
	Noise	(dB)	37.5–38.5	36–37	31–33	38–39	36.5–37.5	31.5–33.5
	Temp. exchange rate	(%)	75	75	76	—	—	—
	Enthalpy exchange rate (%)	In heating	71	71	73	—	—	—
		In cooling	65	65	68	—	—	—
Construction	Frame		Zinc iron plate					
	Motor		4-pole capacitor dielectric motor (E type)					
	Sirocco fan		ABS resin					
	Heat exchanger		Combustion-proof sheet					
	Filter		Nonwoven fabric (Collection effect weighing method 82%)					
	Adapter		Zinc iron plate					
	Mounting pipe diam.	(mm)	Ø250					
	External dimension (Length x Width x Height)	(mm)	1134 x 1322 x 388					
	Product mass	(kg)	83					
Package	Shape		Corrugated board package/ventilator					
	Dimension (Length x Width x Height)	(mm)	453 x 1538 x 1325					
	Mass	(kg)	91					
	No. of stacked boxes		3					
	Accessory		Installation Manual: 1, Owner's Manual: 1					

5. NAME AND DIMENSION OF EACH PARTS

<VN-250TE, VN-350TE, VN-500TE>



Number	Name	Quantity	Note
1	Frame	1	
2	Adapter	4	
3	Terminal	1	
4	Inspection Cover	1	
5	Fan Sirocco	2	
6	Motor Fan	2	
7	Heat Exchanger	2	Note)
8	Filter	2	
9	Damper	1	
10	Motor Damper	1	
11	Ceiling Suspension Fixture	4	
12	Electric Parts Lid	1	

Note) Model VN-250TE has one Heat Exchange.

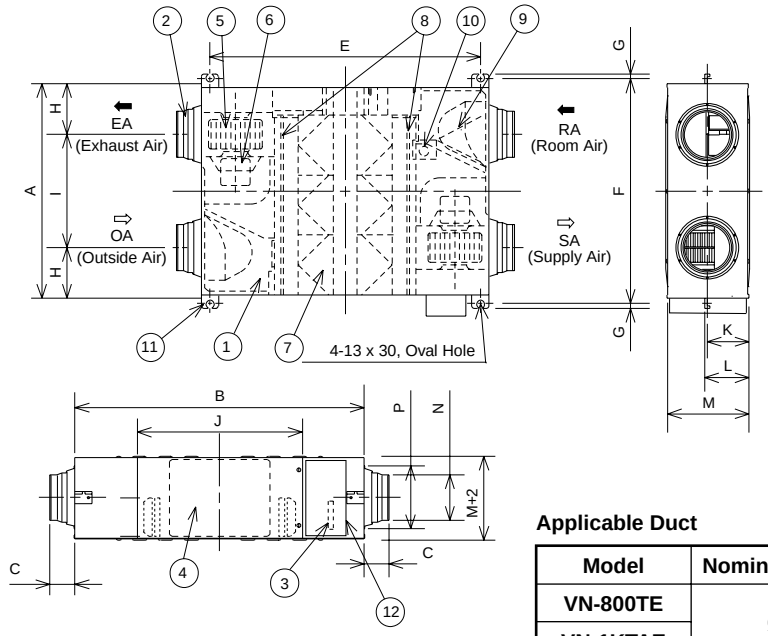
Applicable Duct

Model	Nominal Diameter
VN-250TE	Ø150
VN-350TE	Ø200
VN-500TE	

Unit: mm

Model	A	B	C	E	F	G	H	I	J	K	L	M	N	P
VN-250TE	599	882	95	810	655	19	142	315	142	135	159	270	Ø144	Ø164
VN-350TE	804	882	95	810	860	19	162	480	162	135	159	270	Ø144	Ø164
VN-500TE	904	962	107	890	960	19	202	500	202	135	159	70	Ø194	Ø210

<VN-800TE, VN-1KTAE>



Number	Name	Quantity	Note
1	Frame	1	
2	Adapter	4	
3	Terminal	1	
4	Inspection Cover	1	
5	Fan Sirocco	2	
6	Motor Fan	2	
7	Heat Exchanger	3	Note)
8	Filter	2	
9	Damper	1	
10	Motor Damper	1	
11	Ceiling Suspension Fixture	4	
12	Electric Parts Lid	1	

Note) Model VN-1KTAE has one Heat Exchange.

Applicable Duct

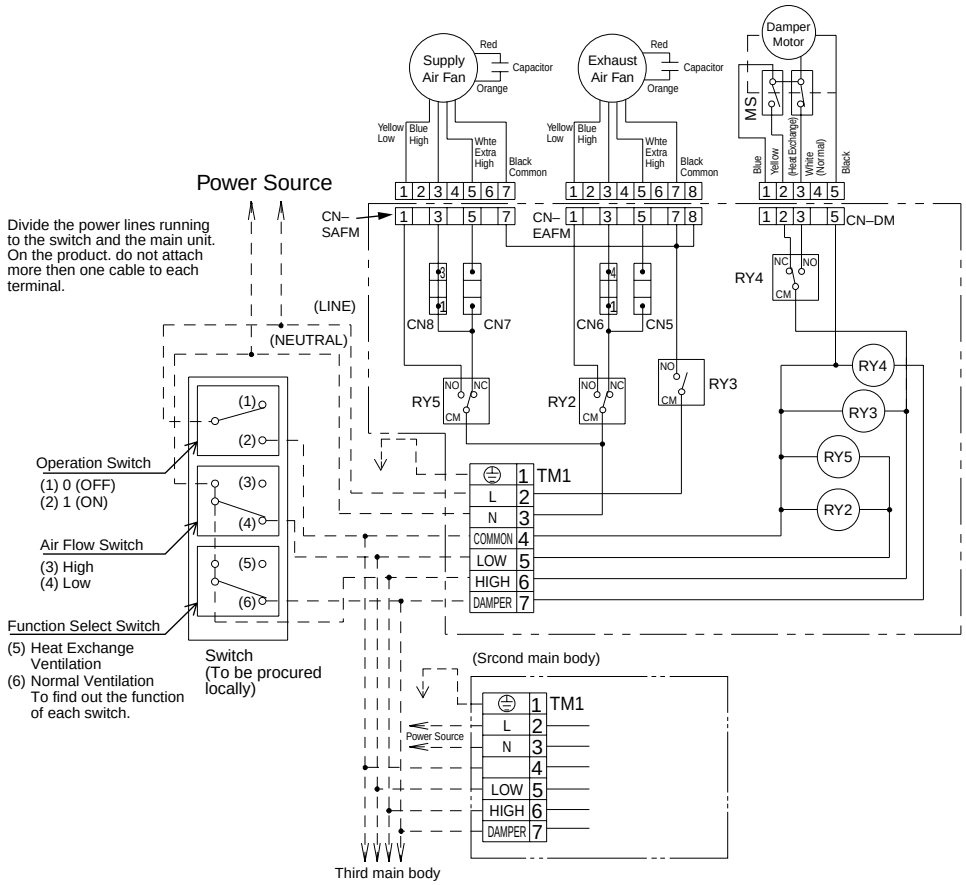
Model	Nominal Diameter
VN-800TE	Ø250
VN-1KTAE	

Unit: mm

Model	A	B	C	E	F	G	H	I	J	K	L	M	N	P
VN-800TE	884	1322	85	1250	940	19	228	428	612	194	218	388	Ø245	Ø258
VN-1KTAE	1134	1322	85	1250	1190	19	228	678	612	194	218	388	Ø242	Ø258

6. WIRING DIAGRAM

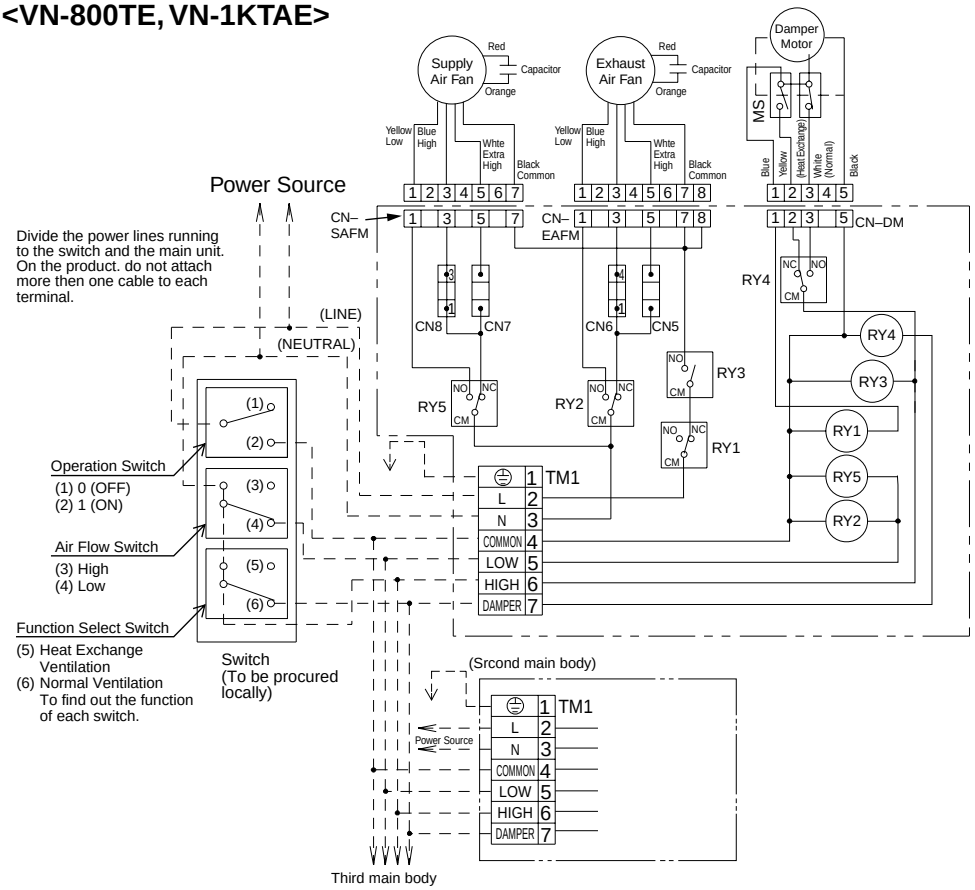
<VN-250TE, VN-350TE, VN-500TE>



Model	Power Source
VN-250TE	220-240V~50Hz/ 220V~60Hz
VN-350TE	
VN-500TE	

Model	Capacitor
VN-250TE	2.0µF 450VAC
VN-350TE	3.0µF 450VAC
VN-500TE	3.5µF 450VAC

<VN-800TE, VN-1KTAE>



Model	Power Source
VN-800TE	220-240V~50Hz/ 220V~60Hz
VN-1KTAE	220-240V~50Hz/

Model	Capacitor
VN-800TE	8.0µF 450VAC
VN-1KTAE	10.0µF 450VAC

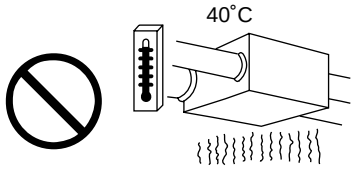
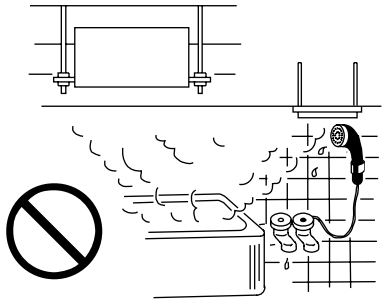
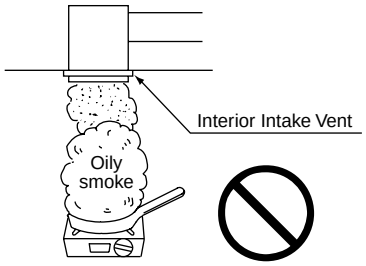
7. OWNER'S MANUAL (EXTRACT)

7-1. Specific Caution Items

7-1-1. Checking Location of Installation

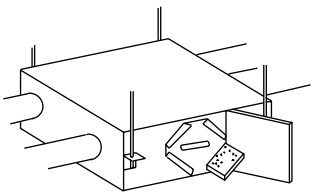
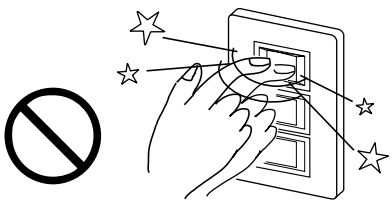
This Energy Recovery Ventilators have been designed especially for use in offices, conference rooms, etc.

Please check to ensure that neither the main unit nor the inlet-outlet grill are installed in any of the following locations.

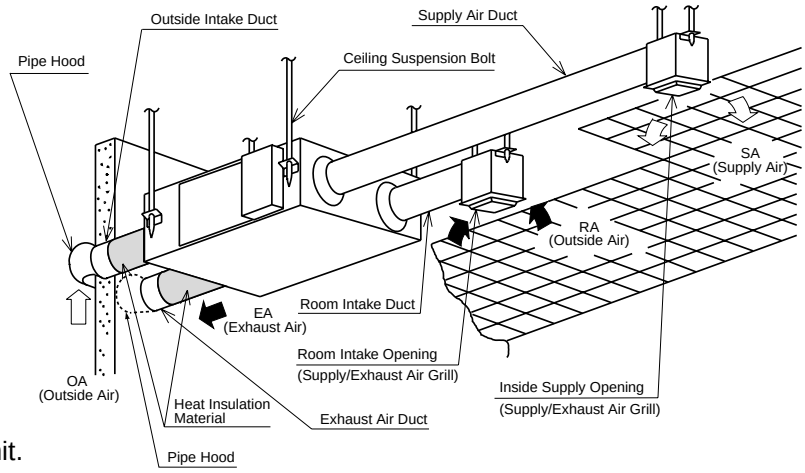
Locations exposed to high temperatures or direct flame. Avoid installing the Heat Exchange Ventilators or the inlet-outlet grill in locations which reach temperatures of 40°C or above. Usage under high temperature conditions may cause distortion of the filter or Heat Exchanger or motor burn-out. 	Locations with high humidity. Do not install in high humidity locations such as bathrooms. Doing so may cause a breakdown of the unit or an electric shock. 	Locations with large amounts of oily smoke, such as food preparation areas. The unit will become inoperable if the filter or Heat Exchanger become clogged with oil. 
Make sure that access is provided so that filter and Heat Exchanger maintenance and periodic spot checks of the unit can be easily carried out. (Refer to the Model Installation for its space)	Do not install the unit in locations such as machinery or chemical plants where it will be exposed to noxious gases containing acids, alkali, organic solvents, paint fumes, etc., to gases containing corrosive ingredients, or where dust or oil mist will be produced.	

If there are any problems concerning the location or installation of the unit, please consult either store from which it was purchased or the agent who installed it.

7-1-2. When Using

Always be sure to use a filter. Failure to do so may cause dust and dirt to build up on the heat exchange element, lowering its efficiency and rendering it inoperable. 	Operate the switch with certainty. In particular, suddenly turning the switch on and off will not only cause improper operation of the unit, but will also obversely affect the relay inside the switch, and may damage it. 

7-2. Model Installation



Note that when installing a unit body upside down, its printed indication is in a reversed position.

7-2-1. Method of Use

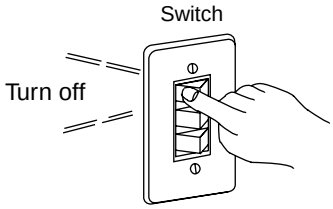
- Use the operation switch to operate the unit.
  0 (OFF) ..... the unit stop.
  1 (ON) ..... the unit operates.
- Use the Air Flow switch to set to the desired air flow.
  High ..... Turns to high air volume.
  Low ..... Turns to low air volume.
- Use the Function Select switch to set the ventilation mode.
  Heat Exchange Ventilation Mode ..... Open air is thermal-exchange with room air to bring it closer to a room temperature and humidity, before taking it in the room.
  Normal Ventilation Mode ..... To intake open air as it is.

7-3. Maintenance Method

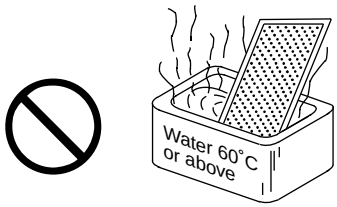
In order to prevent the reduced effectiveness of your Heat Exchange Ventilators, be sure to clean dirt and dust from the filter and Heat Exchanger at regular intervals.

CAUTION

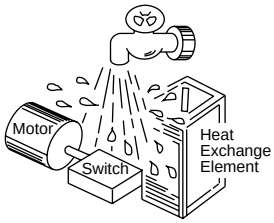
Be sure to turn the power off, and to keep the exclusive breaker off before carrying out maintenance activities.



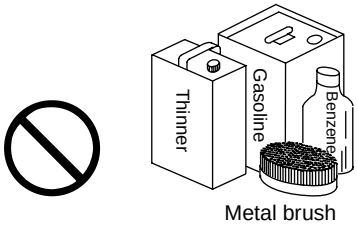
Do not immerse the filter or other resin components in water 60°C or above.



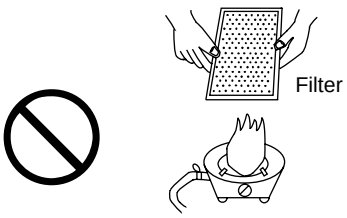
Never use water on the motor, the switch, or the Heat Exchanger.



Do not use the following items for cleaning.

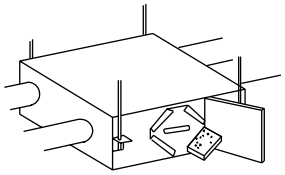


Avoid using heat to dry the filter, as it may cause changes in shape or quality.



Always be sure to use a filter.

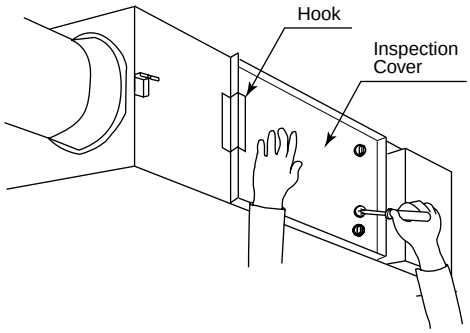
Failure to do so may cause dust and dirt to build up on the Heat Exchanger, lowering its efficiency and rendering it inoperable.

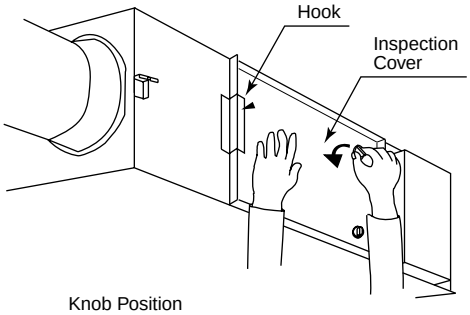


7-4. Maintenance Method

7-4-1. Model VN-250TE/VN-350TE/VN-500TE

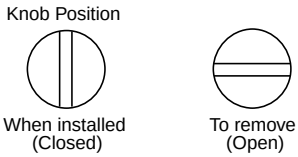
- **Stop the operation and keep the exclusive breaker "OFF".**
- **Cleaning the filter (When required)**
  1) Enter the ceiling from the Inspection Opening for the Heat Exchange Ventilators, and remove the screw on the inspection cover.
  2) Holding the Inspection Cover, turn two pieces of knob for 90° and remove the cover.
  3) There is a filter below the Heat Exchanger at two places, respectively. Pull it toward you.
  4) Either lightly strike the removed filter with your hand or vacuum it with a vacuum cleaner to remove the dirt.
     If it is very dirty, swish it back and forth in a solution of luke-warm water and dish-washing (neutral) detergent.
  5) Install the filter after thoroughly allowing it to dry naturally.



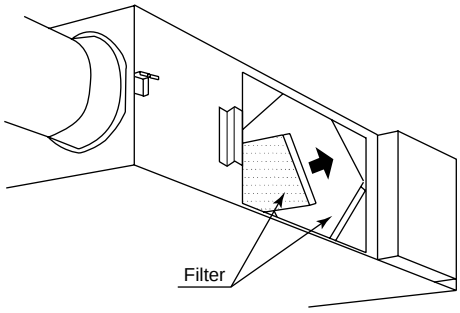


CAUTION

Avoid using heat to dry the filter, as this may cause changes in the shape or quality of the filter.



- **Whenever the filter was damaged, order the sales shop or the engineering office. (Separately sold)**
- **Cleaning the Heat Exchanger.**
  (If you find it too much stained, clean it.)
  1) Remove the filters.
  2) Remove the two Heat Exchanger from the unit.
     (Model VN-250TE has one Heat Exchange.)

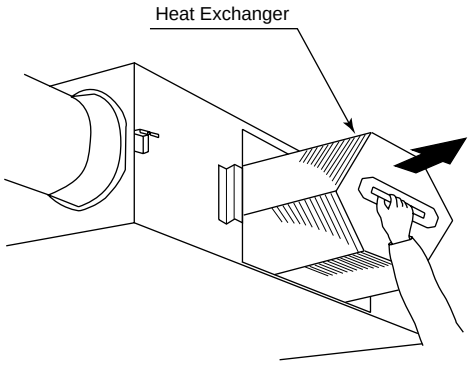


CAUTION

- The weight of the Heat Exchanger is as shown in the table below.

  Hold it firmly to ensure that you do not drop it.

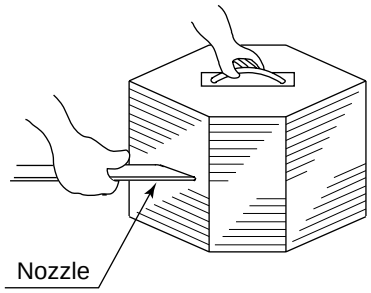
Model	Weight (kg/piece)	Pieces to be used
VN-250TE	4.5	1
VN-350TE	3.4	2
VN-500TE	3.7	2



3) Use a vacuum cleaner to remove dust and dirt from the element's surface.

CAUTION

- Use a brush attachment on the vacuum cleaner nozzle.
  Clean with a light, brushing action.
  Avoid using a hard nozzle as it may disfigure the heat exchange foils.
- Never use water to clean the Heat Exchanger.

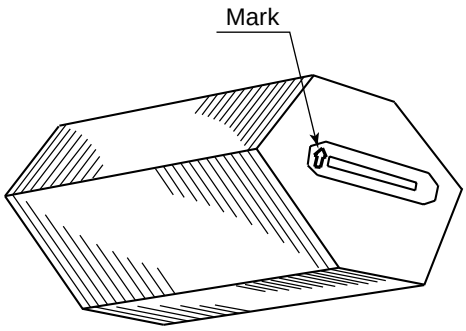


- **Whenever the Heat Exchanger was damaged, order the sales shop or the engineering office. (Separately sold)**

4) When cleaning is completed, return the Heat Exchanger and filter to their former positions, and close the Inspection cover and tighten the screw.

CAUTION

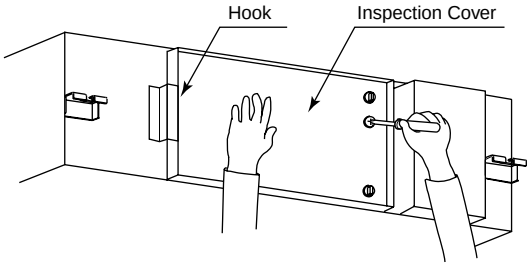
- Make absolutely sure to install the filter with an indication of " 熱交換素子側 " turned to wart the Heat Exchanger side.
  Failure to do so will lead to clogging of the Heat Exchanger foils and reduced performance.
- Insert the heat exchanger right side up, with the label marked ⇧ facing toward you.

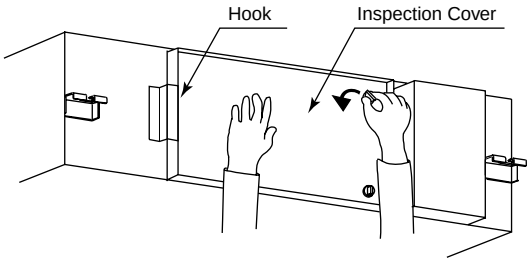


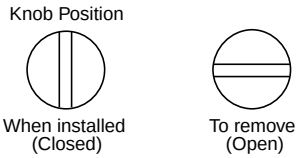
7-4-2. Model VN-800TE/VN-1KTAE

- **Stop the operation and keep the exclusive breaker "OFF".**

- **Cleaning the filter (When required)**
  1) Enter the ceiling from the Inspection Opening for the Heat Exchange Ventilators, and remove the screw on the inspection cover.
  2) Holding the Inspection Cover, turn two pieces of knob for 90° and remove the cover.
  3) There is a filter at two places, respectively. Pull it toward you.
  4) Either lightly strike the removed filter with your hand or vacuum it with a vacuum cleaner to remove the dirt. If it is very dirty, swish it back and forth in a solution of lukewarm water and dish-washing (neutral) detergent.
  5) Install the filter after thoroughly allowing it to dry naturally. (Install them to fit well with the grooved rail)





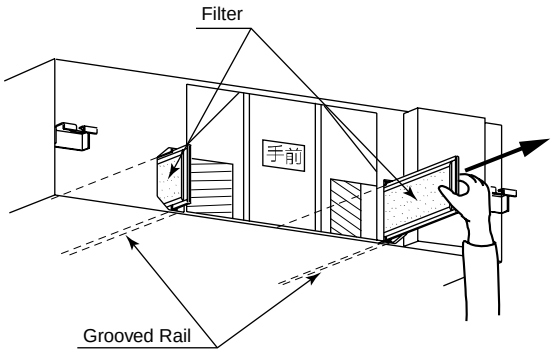


CAUTION

Avoid using heat to dry the filter, as this may cause changes in the shape or quality of the filter.

- **Whenever the filter was damaged, order the sales shop or the engineering office. (Separately sold)**

- **Cleaning the Heat Exchanger. (If you find it too much stained, clean it.)**
  1) Remove the four Heat Exchanger from the unit. (Model VN-800TE has three Heat Exchange.)

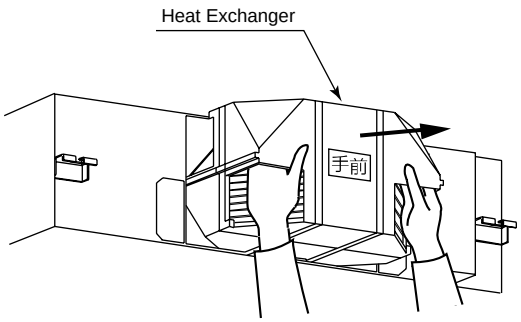


CAUTION

- The weight of the Heat Exchanger is as shown in the table below.

  Hold it firmly to ensure that you do not drop it.

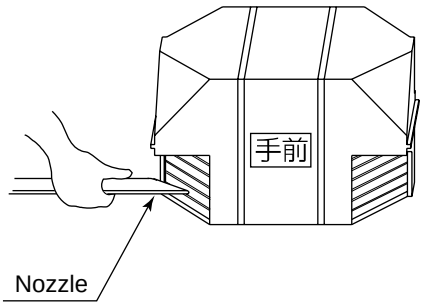
Model	Weight (kg/piece)	Pieces to be used
VN-800TE	4.0	3
VN-1KTAE	4.0	4



2) Use a vacuum cleaner to remove dust and dirt from the element's surface.

CAUTION

- Use a brush attachment on the vacuum cleaner nozzle.
  Clean with a light, brushing action.
  Avoid using a hard nozzle as it may disfigure the heat exchange foils.
- Never use water to clean the Heat Exchanger.

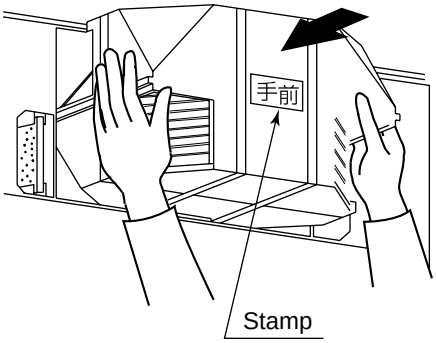


- **Whenever the Heat Exchanger was damaged, order the sales shop or the engineering office. (Separately sold)**

3) When cleaning is completed, return the Heat Exchanger and filter to their former positions, and close the Inspection cover and tighten the screw.

CAUTION

- Make absolutely sure to install the filter with an indication of " 熱交換素子側 " turned toward the Heat Exchanger side.
  Failure to do so will lead to clogging of the Heat Exchanger foils and reduced performance.
- Please insert so that the stamp " 手前 " to be toward you.



7-5. After-sales Service

- **Request for Spot Checks**

To ensure safe, correct usage, we suggest that you consider a maintenance contract.
For details, inquire at the store where you bought your unit, or at the agent which installed it.

- **If You Think It's Broken**

Examine the unit as shown in the table below, and if you find any irregularities, shut it off immediately and contact the store where you bought your unit or the agent who installed it to request servicing (or consultation).

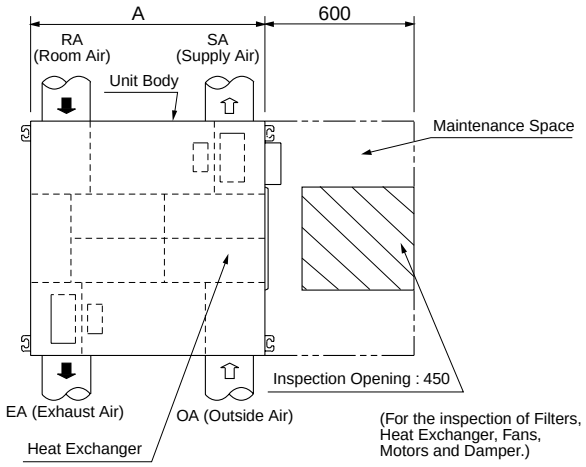
Symptom	Where to look
• No activity, even when the switch is on. • No air comes out.	• Is the fuse blown or the breaker tripped? • Is the power out? • Check whether or not there is dust on the filters and the Heat Exchanger. (Clean it according to the Maintenance Method mentioned.)

8. INSTALLATION MANUAL (EXTRACT)

8-1. Cautions for Operation

Never fail to make the inspection opening at the specific place on the ceiling so you can perform the constant cleaning or the equipment checking of filter and Heat Exchanger.

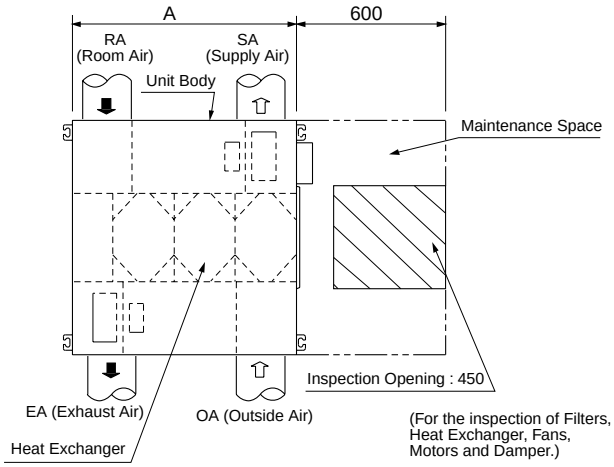
- **The inspection opening shown below is necessary to clean the Heat Exchanger and the filter as required. If not cleaned, they are likely to get clogged, resulting in degradation of performance.**



Note) Model VN-250TE has one Heat Exchange.

Unit : mm

Model	A
VN-250TE	599
VN-350TE	804
VN-500TE	904

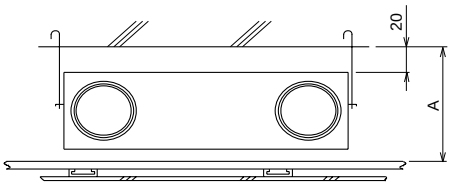


Note) Model VN-1KTAE has four Heat Exchange.

Unit : mm

Model	A
VN-800TE	884
VN-1KTAE	1134

- **This Energy Recovery Ventilators should be installed at the place where a larger space than the sizes shown below can be secured for the ceiling space.**

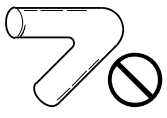


Unit : mm

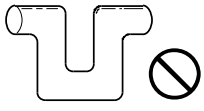
Model	Ceiling Space A	Model	Ceiling Space A
VN-250TE	320	**VN-800TE**	440
VN-350TE		**VN-1KTAE**	
VN-500TE			

- **Don't install it near the water-heater.**
- **Refrain from the following duct installing works.**

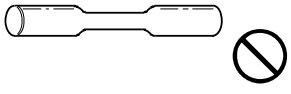
(1) Excessive bending



(2) Multi-times bending



(3) Making the connecting duct smaller



- **Do not use in bathrooms or food preparation areas etc.**

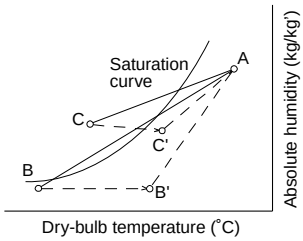
  If you use the unit at the place of much soot and high humidity, the filter or the Heat Exchanger gets clogged and disables you to use it.

- **Use the Heat Exchange Ventilators in the ambient temperature of 40°C or less.**

  Never install the unit at the place where the flame likely reaches directly the unit. If you use it at the atmosphere of more than 40°C for hours, it is likely to cause deterioration or deformation or damage of the resin part.

- **Be careful of dewing and frosting.**

  As shown in the figure to the right, suppose a high temp. absorbing air condition A and a low temp absorbing air condition B are plotted on the air line figure, then a high temp air A is heat-exchanged by the unit and goes out of the saturation curve as shown by Point C. In this case, the unit will be dewed or frosted. To avoid this, you are required to heat a low temp air B up to B' so as to get C' below the saturation curve, before using the unit.

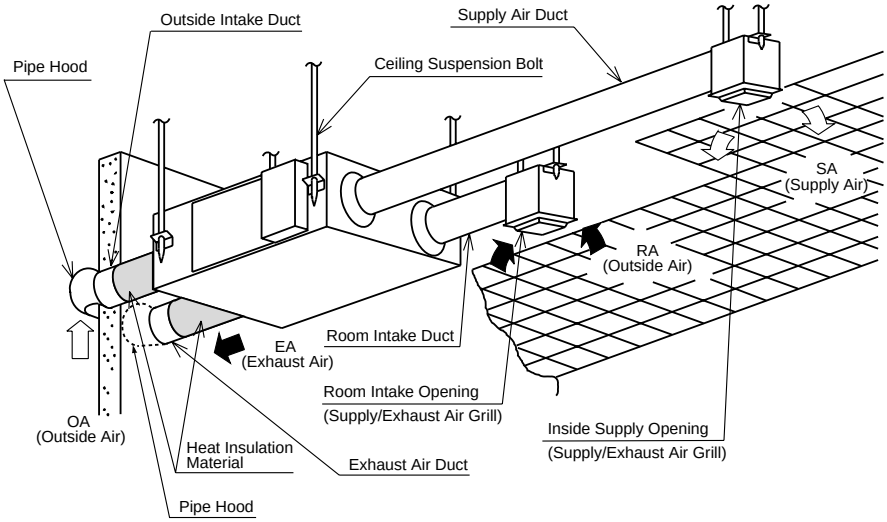


8-2. Local Procurements

- **Switches are to be locally procured.**

  We recommend that you use a switch having more than 3mm distance to break contact and more than 15A rated current.

8-3. Reference Sketch



Use conditions

Outdoor air conditions : Temperature range –10°C~40°C, relative humidity 85% or less

Indoor air conditions : Temperature range –10°C~40°C, relative humidity 85% or less

Installation requirements: Same as the indoor air conditions

- Indoor air here means air in air-conditioned living rooms. Its use in refrigerators or other places where temperature can fluctuate greatly is prohibited even if a temperature range is acceptable.

Example: Indoor air conditions

During cooling period : Temperature 27°C, relative humidity 50%

During heating period : Temperature 20°C, relative humidity 40%

8-4. Installation Method

8-4-1. Model Installation

- You are required to prepare the ceiling suspension bolts, nuts and washers.
- Install the unit firmly and horizontally enough to support its weight. (Fig. 1)
- If you do not fit it firmly, it is not only dangerous but also easily vibrated.
  If it is not fitted horizontally, the damper unit becomes defective in operation.

CAUTION

- When you are required to be cautious on prevention of vibration, we recommend you to use the anti-vibration ceiling suspension fixtures.
- Never fail to make an inspection opening with 450 mm or more at the place shown on the paragraph of “Cautions For Operation”, so that you can inspect filters, Heat Exchanger, power source and motors.

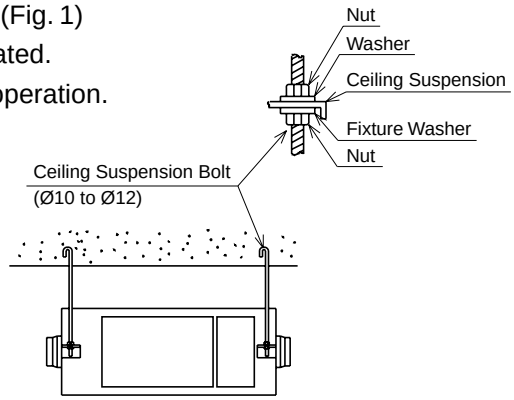


Fig. 1

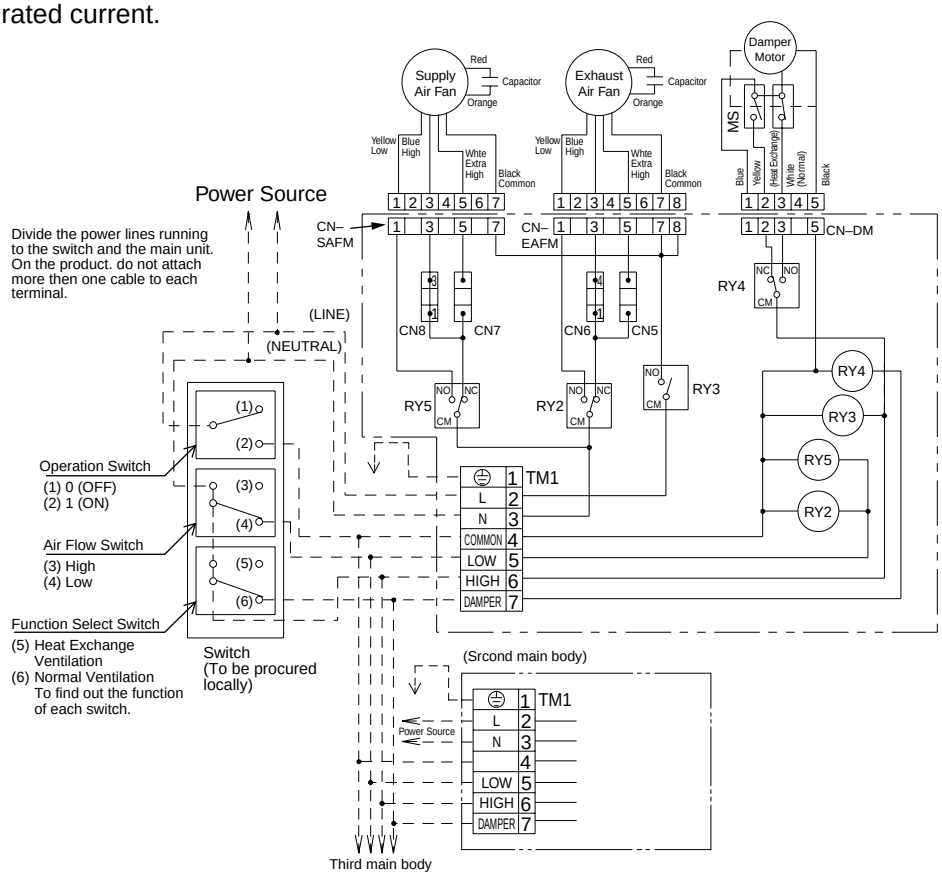
8-4-2. Cautions on Installing The Unit Body Upside Down

- Re-fit the ceiling suspension fixture in an opposite side. (If they are left as it is, the foolproof function of ceiling suspension bolts do not work and will cause the danger of dropping of the unit.)
- Printed indication is in a reversed position.
  In particular, be careful of the arrow mark [⇧] showing the direction of inserting a Heat Exchange.

8-5. Electric Works

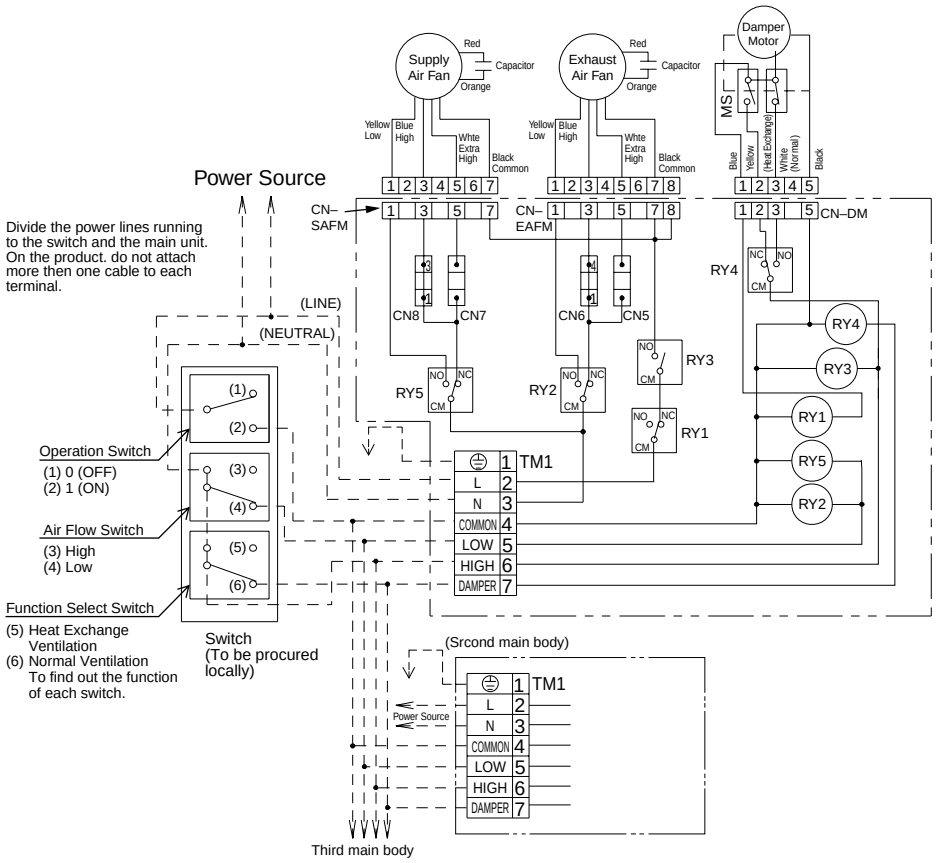
Have a specialized working contractor perform wiring in accordance with the laws and regulations of the country concerned.

- Connect the broken lines in the wiring diagram.
- We recommend that you use a switch having more than 3 mm distance to break contact and more than 15A rated current.



Model	Power Source
VN-250TE	220-240V~50Hz/ 220V~60Hz
VN-350TE	
VN-500TE	

Model	Capacitor
VN-250TE	2.0µF 450VAC
VN-350TE	3.0µF 450VAC
VN-500TE	3.5µF 450VAC

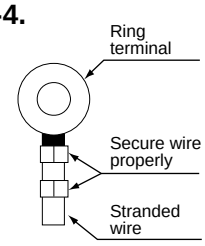


Model	Power Source
VN-800TE	220-240V~50Hz/ 220V~60Hz
VN-1KTAE	220-240V~50Hz

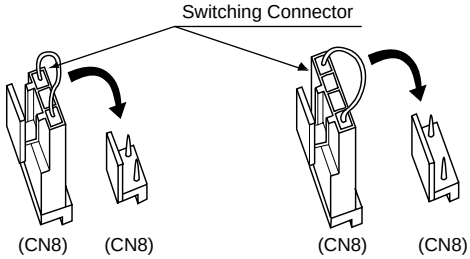
Model	Capacitor
VN-800TE	8.0µF 450VAC
VN-1KTAE	10.0µF 450VAC

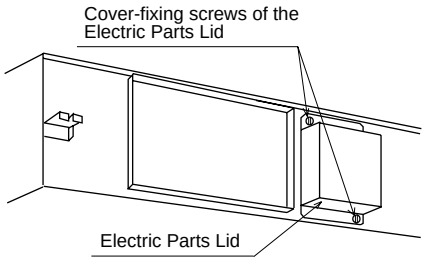
- **Use the polyvinyl chloride insulated and sheathed cables for fixed wiring having 1.6 mm to 2.0 mm in diameter or 2.0 mm² to 3.1 mm² in conformity with IEC 60227-4.**

  (Carry out the work based on the laws, regulations and technical standards of the country concerned.)



- **Follow the following steps for wiring.**
  - Unfasten two cover-fixing screws of the electrical equipment box, open the box cover, and then connect wiring firmly.
  - Fit the cables from the terminal firmly with a cord clamber.
- **When you need much airflow or a duct is long, change the wire connection from High to Extra High.**
  - Unfasten two cover-fixing screws of the electrical equipment box and open the box cover.
  - Change CN6 to CN5 and CN8 to CN7 inside the Electric Parts Lid.
- **It is possible to operate up to 10 units from one switch set.**





CAUTION

- Use the power source corresponding to the name plate. Using a different power source may cause the motor to burn out.
- Carry out grounding work according to the laws and regulations of the country concerned and the technical standard.
- After completion of wiring, check again there are no wrong wirings before power ON.

8-6. Duct Installation

- Wind the junction of an adaptor and a duct with an aluminum tape firmly to prevent any air leakage.
- The room intake opening should be positioned as far as possible from the inside supply opening.
- Use the specified ducts. (See the Name and Dimension of Each Part.)
- Install two outdoor ducts so they will be in the down gradient toward outside to prevent water from coming in. (Gradient: 1/100~1/50) (Fig. 2)
- Never fail to heat-insulate two outdoor ducts (including outside air and exhaust air duct) to prevent dewing. (Material: Glass Wool, Thickness-25mm) (Fig. 2)
- When you want to pierce the metal duct through the metal lath or the wire lath or the metal plate of the wooden facility, do not forget to insulate electrically between the duct and the wall.
  (Refer to the laws and regulations of the country concerned and the technical standard.)

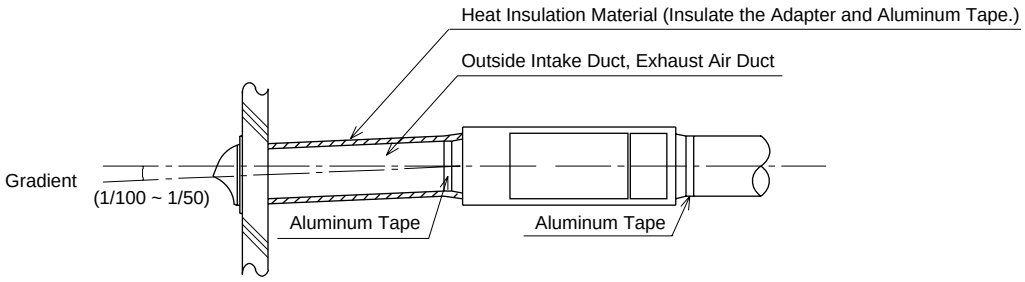


Fig. 2

8-7. Pilot Running

- On completion of installing works, never fail to check wirings and perform a pilot running.
- After completion of wiring, power ON and perform a pilot run according to the following steps for checking a airflow condition and a damper operation.
- Check the opening and closing of a damper by opening the inspection cover of the side of the unit.
- Model VN-800TE, VN-1KTAE, two Fan Motors are stopped during an operation of the damper.

	Each switch setting		**Checking items**	
	Function Select Switch	Air Flow Switch	Airflow condition	Damper
1	Heat Exchange	High (Extra High)	Check if the air from inside supply opening and the one from room intake opening are set to High (Extra High) and to Low, respectively	Open (A Damper is beyond)
		Low		
2	Normal Ventilation	High (Extra High)		Close (A Damper is near)
		Low		

- In case that any abnormality occurs in a pilot running, its conceivable cause would be a wrong wiring.
  Don't lose time to switch the exclusive breaker to OFF and re-wire correctly.
  Otherwise, it is likely to cause an electric shock.

9. HOW TO DIAGNOSE THE TROUBLE

<VN-250TE, VN-350TE, VN-500TE, VN-800TE, VN-1KTAE>

Phenomenon	Check point	Cause	Measures
Motor fan does not revolve.	• Wall switch	Connection failure, Incorrect connection	• Replace wall switch. Correct connection.
	• Lead wire	Wire disconnection	• Replace motor fan.
	• Connecting section	Contact failure	• Connect surely. (Assembly of electric parts stool, Fan)
	• Motor fan	Motor revolution section (Bearing) is locked.	• Replace motor fan.
		Motor winding or temp. fuse is disconnected.	
	• Turning section of fan sirocco	Turning section of fan sirocco is locked.	• Remove locked part.
	• Capacitor	Capacitor trouble	• Replace capacitor.
	• Relay	Relay trouble	• Replace relay.
	• Power supply	Abnormal power is applied.	• Check power supply.
	• Terminal block of wall (Assembly of electric parts stool)	Miswiring	• Re-wire according to the wiring diagram.
Abnormal sound is heard from inside the main unit.	• Motor fan	Electromagnetic sound (Buzzing of motor)	• Replace motor fan.
		Bearing failure	
	• Fan sirocco	Incomplete attachment of fan sirocco	• Attach fan sirocco firmly.
		Suction of foreign matter	• Remove foreign matter.
		Deformed fan sirocco	• Replace fan sirocco.
	• Screws of each part of main unit	Loosening of screw (Resonance due to incomplete tightening)	• Tighten screw firmly.
	• Filter	Clogging of filter	• Clean filter.
	• Heat exchanger	Clogging of heat exchanger	• Clean heat exchanger
Motor fan revolution is weak.	• Capacitor	Capacitor failure	• Replace capacitor.
Damper does not open/ close.	• Wall switch	Contact failure	• Ensure contact.
	• Lead wire	Contact failure	• Ensure contact.
	• Motor damper	Winding of motor damper is disconnected.	• Replace motor damper.
	• Damper	Catching at sliding section	• Correct catching.
	• Connector assembly	Contact failure	• Replace connector assembly.

10. HOW TO REPLACE THE MAIN PARTS

WARNING ⚠

 Turn off the power supply.	• **Be sure to turn off the power supply of distribution panel, power board, and etc. before the work when power-ON is unnecessary such as a case of disassembling.** Otherwise an electric shock may be caused even if the wall switch is turned off because it is a single cut switch.
 Prohibition of modification.	• **Do not modify the product.** Also do not use the disassembled, modified or repaired parts. Otherwise it causes a fire, electric shock or injury.
 Use appropriate repair parts.	• **Use the substitute parts corresponded to the model for repair.** It causes an abnormal operation or a trouble resulting in leakage or fire, that is a cause of customers' disaster.

CAUTION ⚠

 Use gloves.	• **Use the protective materials such as gloves, etc. for check/repair inside the unit.** If touching inside the unit with bare hands, an injury may be caused.

Position/Part	Replace/Assembly procedure	Description

WARNING

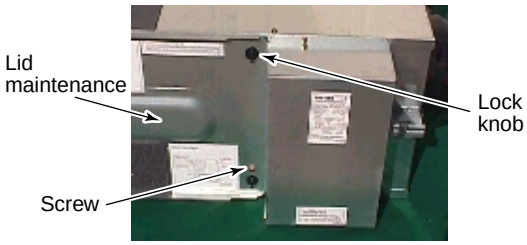
Turn off the power supply.

- **Be sure to turn off the power supply of distribution panel, power board, and etc. before the work when power-ON is unnecessary such as a case of disassembling.**
  Otherwise an electric shock may be caused even if the wall switch is turned off because it is a single cut switch.

- Filter 1), 2)
- Heat exchanger 1), 3)
- Fan sirocco 1) to 8)
- Motor fan 1) to 9)
- Damper 1), 2), 3),10), 11)
- Capacitor 12), 13), 14), 15)
- P.C. board assembly (including terminal block and relay) 12) to 16)

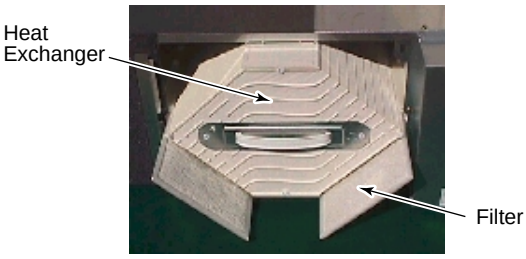
1) Remove the screw, turn the lock knob by 90°, and then remove the lid maintenance.

The figure is for VN-250TE. The configuration differs according to the model.

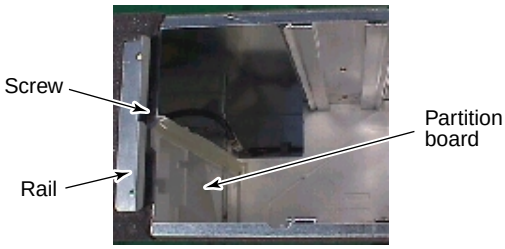


2) Remove the filter.
3) Remove the Heat Exchanger.

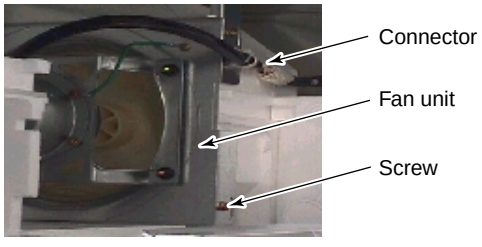
> The weight of the heat exchanger is 3 to 7kg.
> Hold the Heat Exchanger hard without dropping it.



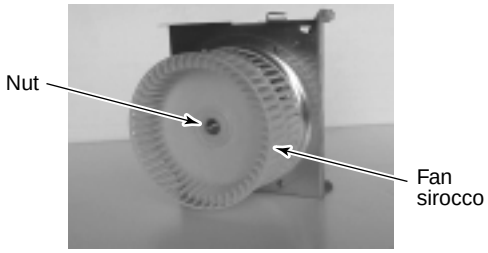
4) Remove the screw and the rail.
5) Remove the partition board.

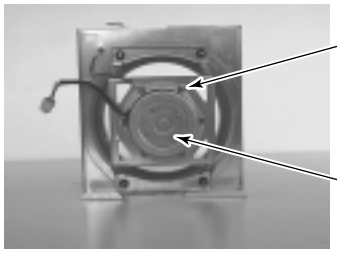
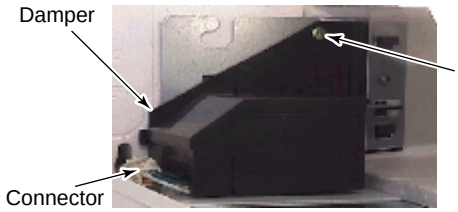
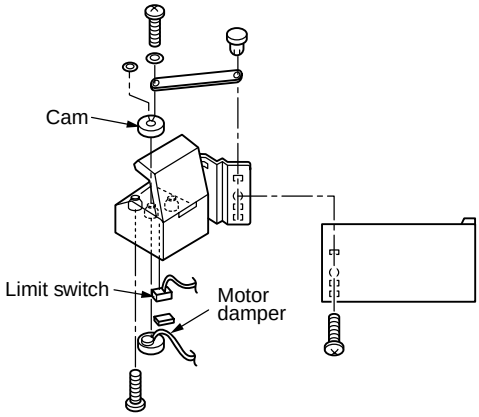
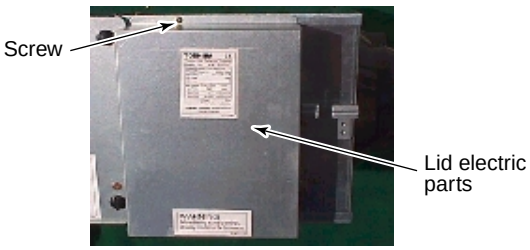
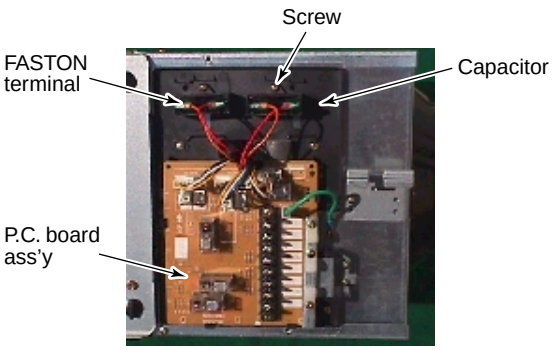


6) Remove the connector.
7) Remove the screw fixing the fan unit.



8) Remove the nut and the fan sirocco.



Position/Part	Replace/Assembly procedure	Description
	9) Remove the screw fixing the motor fan to remove the motor fan.	
	10) Remove the connector of the damper ass'y. 11) Remove the fixing screw of the damper ass'y and slide the damper leftward to remove it.	 **Damper ass'y disassembling** 
	12) Remove the screw of the lid electric parts.	
	13) Open the lid electric parts. 14) Remove FASTON terminal connected to the capacitor. 15) Remove the screw to remove the capacitor. 16) Remove the connector and P.C. board ass'y. Perform wiring correctly according to the wiring diagram.	
Mounting	Perform mounting in the reverse procedure of removal.	

11. CHECK WHEN REPAIR WORK COMPLETED

WARNING ⚠

 Check after repair work	• **After repair work, check whether there is a trouble or not referring to the check points.** If the check is not performed, a fire, an electric shock or an injury occurs. Before check, turn off the power supply of the distribution panel and power board.
	• **After repair work, perform a test run to check whether there is smoke/ abnormal sound or not.** If the check is not performed, a fire, an electric shock or an injury occurs.
 Check after reinstallation	• **After reinstallation, check the following items.** • The earth wire is correctly connected. • The power supply cord is not pinched in the product. • The installation is stable without inclination or wavering. If the check is not performed, a fire, an electric shock or an injury occurs.

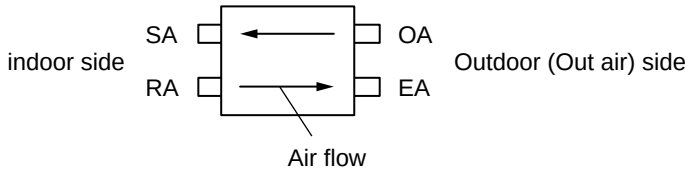
[Check Point]

When the product was repaired (replacement of parts, etc.), be sure to perform a test run and check there is no trouble on the following items.

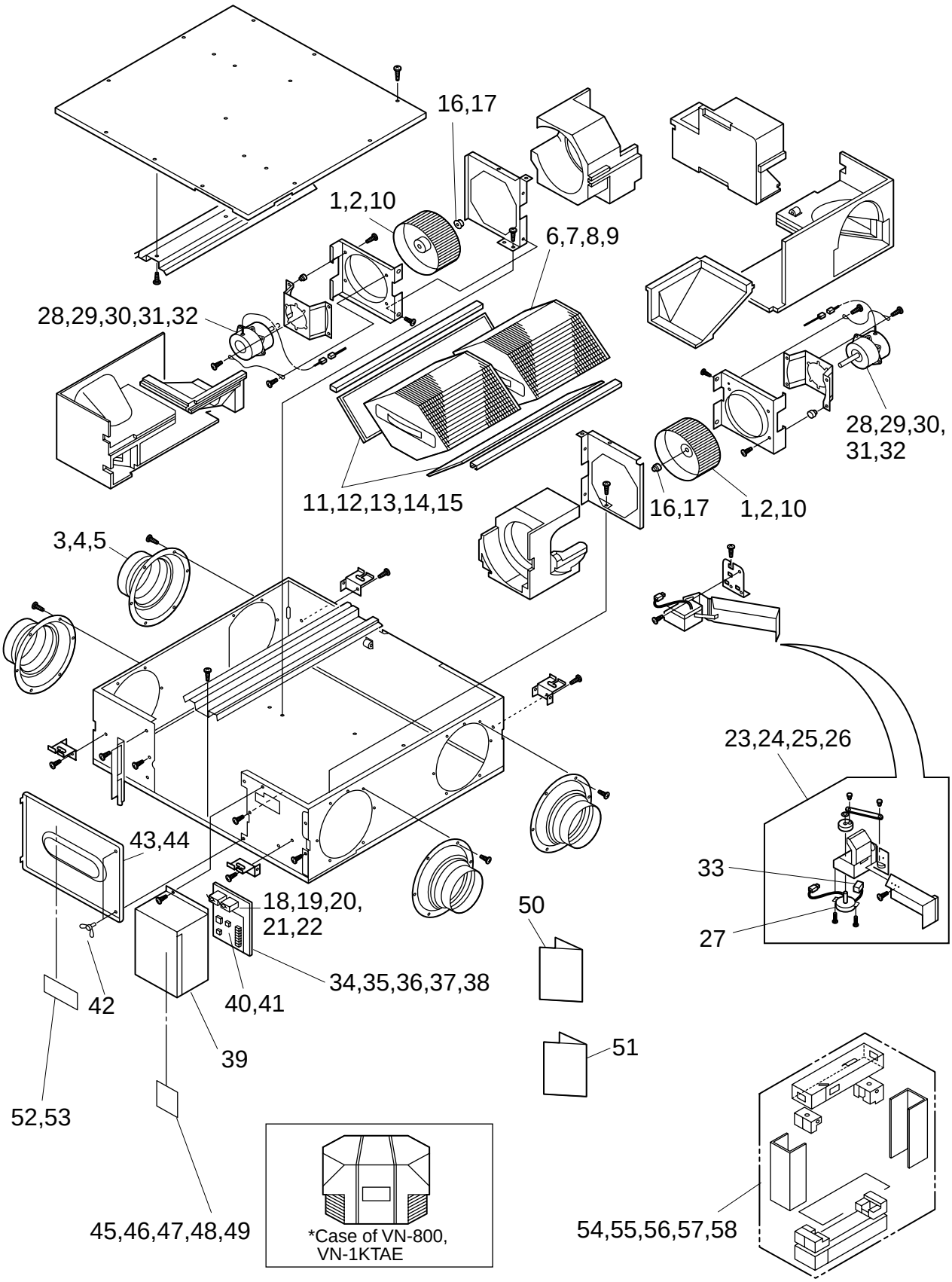
Item	Check/Judgment	Measuring device/ Sub-material
(1) Insulation resistance	When measuring the insulation resistance between the common pin of the terminal and the metal section of the main unit under condition that the power supply cord is not connected, the insulation resistance keeps 10MΩ or more. Especially check the following cases sufficiently. • When the electric parts were replaced. • Articles used at place with high humidity. • Products used for 5 years or more.	DC500V megger
(2) Parts specified to safety	If a part other than specified part is used, replace it with the specified one.	
(3) Process on lead wire	Check whether there is slack or excessive tension of the lead wire or not. Check the lead wire is connected firmly and the binding process is surely performed.	
(4) Tightening of screws	Check the screws are surely tightened.	
(5) Removal of foreign matters in the unit	Check whether soldering chip, wire wastes, screws, and etc. are remained or not in the unit. And check there is no accumulation of dust in the unit.	
(6) Check power supply cable.	Check the damage of the terminal block. Check whether the specified power supply cable is used or not.	
(7) Check mounting status.	Check strength of the product mounting section. There is no loosening of the mounting nut, etc.	

12. Q & A FOR HEAT EXCHANGE VENTILATORS

(Users are responsible for the following contents.)

Question	Answer
◆ **Fan does not operate.**	• **Is the electric wiring securely performed?** For this model, the terminal block for connection of cables is provided to the side of the main unit. The connecting works between the power supply and the switch and between the switch and the main unit are performed by the special dealers. Incorrect cabling from the specified switch and the switches disables to adjust the air volume. Therefore, check the cable connection.
◆ **Fan does not ventilate (suction air).**	• **Are not the various filters clogged with dust, etc.?** Perform cleaning described in Owner's Manual. • **Is not the heat exchanger clogged with dust, etc.?** Especially in case that the mounting direction of the product is incorrect (indoor side and outdoor side), dust, etc. is clogged in a short time because the indoor air and outdoor air do not pass through the filter but flow directly in the heat exchanger. 
◆ **Drop of heat exchange effect**	• **Does not generate the dew condensation on the heat exchanger?** In the heat exchange, the temperature difference between indoor and outdoor is widened. Therefore, in the heat exchanger, the dew condensation generates according to some conditions of temperature and humidity, and the dew condensation/freezing generates according to some conditions of outdoor air. In these cases, the status returns to the original status when temperature of the outdoor air ascends and thaws. For the measures, heating of air at low-temperature side is necessary as described in Installation Manual.
◆ **Water drops on the ceiling surface.**	• **Are thermal insulation process applied to 2 duct pipes (Air suction OA and air discharge EA) at outdoor side?** Be sure to apply thermal insulation because the temperature difference between indoor and outdoor is widened and the dew condensation may generate according to some conditions of temperature and humidity. • **Is the product installed horizontally?** If the product is slanted, various troubles may be caused.
◆ **Dew condensation generates on surface of the main unit.**	• **Is not the ventilator operated with the normal ventilation in the winter season?** If the ventilator is operated with the normal ventilation in the winter season, the surface of the main unit is cooled with the outdoor air resulting in dew condensation on the surface.

13. EXPLODED VIEWS AND PARTS LIST



Location No.	Part No.	Description
1	41120433	Fan, Sirocco (VN-250TE, VN-350TE)
2	41120434	Fan, Sirocco (VN-800TE, VN-1KTAE)
3	41118431	Adaptor (VN-250TE, VN-350TE)
4	41118432	Adaptor (VN-500TE)
5	41118448	Adaptor (VN-800TE, VN-1KTAE)
6	41114829	Heat Exchanger (VN-350TE)
7	41114830	Heat Exchanger (VN-250TE)
8	41114831	Heat Exchanger (VN-500TE)
9	41114840	Heat Exchanger (VN-800TE, VN-1KTAE)
10	41120445	Fan, Sirocco (VN-500TE)
11	41114833	Filter (VN-250TE)
12	41114834	Filter (VN-350TE)
13	41114835	Filter (VN-500TE)
14	41114845	Filter (VN-800TE)
15	41114846	Filter (VN-1KTAE)
16	41118433	Nut, Dome Cap (VN-250TE, VN-350TE, VN-500TE)
17	41118451	Nut, Dome Cap (VN-800TE, VN-1KTAE)
18	41171265	Capacitor, 2MFD, 450V (VN-250TE)
19	41171266	Capacitor, 3MFD, 450V (VN-350TE)
20	41171267	Capacitor, 3.5MFD, 450V (VN-500TE)
21	41171268	Capacitor, 8MFD, 450V (VN-800TE)
22	41171269	Capacitor, 10MFD, 450V (VN-1KTAE)
23	41118531	Damper Ass'y (VN-250TE)
24	41118532	Damper Ass'y (VN-350TE, VN-500TE)
25	41118533	Damper Ass'y (VN-800TE)
26	41118534	Damper Ass'y (VN-1KTAE)
27	41179475	Motor, Damper, AC 220–240V
28	41150975	Motor, Fan, AC 220–240V, 50/60Hz (VN-250TE)
29	41150976	Motor, Fan, AC 220–240V, 50/60Hz (VN-350TE)
30	41150977	Motor, Fan, AC 220–240V, 50/60Hz (VN-500TE)
31	41150978	Motor, Fan, AC 220–240V, 50/60Hz (VN-800TE)
32	41150979	Motor, Fan, AC 220–240V, 50/60Hz (VN-1KTAE)
33	41170448	Switch, Limit
34	41179476	Wire, Ass'y (VN-250TE)
35	41179477	Wire, Ass'y (VN-350TE)
36	41179478	Wire, Ass'y (VN-500TE)
37	41179479	Wire, Ass'y (VN-800TE)
38	41179480	Wire, Ass'y (VN-1KTAE)
39	41112561	Lid, Electric Parts
40	41170449	P.C. Board Ass'y (VN-250TE, VN-350TE, VN-500TE)
41	41170450	P.C. Board Ass'y (VN-800TE, VN-1KTAE)
42	41112593	Thumbscrew
43	41112594	Lid, Maintenance (VN-250TE, VN-350TE, VN-500TE)
44	41112595	Lid, Maintenance (VN-800TE, VN-1KTAE)
45	41116889	Name Plate (VN-250TE)
46	41116890	Name Plate (VN-350TE)
47	41116891	Name Plate (VN-500TE)
48	41116892	Name Plate (VN-800TE)
49	41116893	Name Plate (VN-1KTAE)
50	4118S497	Owner's Manual
51	4118S498	Installation Manual
52	4118S499	Wiring Diagram (VN-250TE, VN-350TE, VN-500TE)
53	4118S500	Wiring Diagram (VN-800TE, VN-1KTAE)
54	4119B478	Packing (VN-250TE)
55	4119B479	Packing (VN-350TE)
56	4119B480	Packing (VN-500TE)
57	4119B481	Packing (VN-800TE)
58	4119B482	Packing (VN-1KTAE)

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