TOSHIBA

Leading Innovation

FILE No. A10-021

Air to Air Heat Exchanger

SERVICE MANUAL

Concealed microcomputer control type

Model name:

VN-M150HE
VN-M250HE
VN-M350HE
VN-M500HE
VN-M650HE
VN-M800HE
VN-M1000HE

Contents

Original instruction

Please read carefully through these instructions that contain important information which complies with the "Machinery" Directive (Directive 2006/42/EC), and ensure that you understand them.
Some of the details provided in these instructions differ from the service manual, and the instructions provided here take precedence.

Generic Denomination: Air to Air Heat Exchanger

Definition of Qualified Installer or Qualified Service Person
The Air to Air Heat Exchanger must be installed, maintained, repaired and removed by a qualified installer or qualified service person. When any of these jobs is to be done, ask a qualified installer or qualified service person to do them for you.
A qualified installer or qualified service person is an agent who has the qualifications and knowledge described in the table below.

Agent	Qualifications and knowledge which the agent must have
Qualified installer	• The qualified installer is a person who installs, maintains, relocates and removes the Air to Air Heat Exchanger made by Toshiba Carrier Corporation. He or she has been trained to install, maintain, relocate and remove the Air to Air Heat Exchanger made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations. • The qualified installer who is allowed to do the electrical work involved in installation, relocation and removal has the qualifications pertaining to this electrical work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to electrical work on the Air to Air Heat Exchanger made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified installer who is allowed to work at heights has been trained in matters relating to working at heights with the Air to Air Heat Exchanger made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.
Qualified service person	• The qualified service person is a person who installs, repairs, maintains, relocates and removes the Air to Air Heat Exchanger made by Toshiba Carrier Corporation. He or she has been trained to install, repair, maintain, relocate and remove the Air to Air Heat Exchanger made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations. • The qualified service person who is allowed to do the electrical work involved in installation, repair, relocation and removal has the qualifications pertaining to this electrical work as stipulated by the local laws and regulations, and he or she is a person who has been trained in matters relating to electrical work on the Air to Air Heat Exchanger made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work. • The qualified service person who is allowed to work at heights has been trained in matters relating to working at heights with the Air to Air Heat Exchanger made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.

Definition of Protective Gear

When the Air to Air Heat Exchanger is to be transported, installed, maintained, repaired or removed, wear protective gloves and 'safety' work clothing.

In addition to such normal protective gear, wear the protective gear described below when undertaking the special work detailed in the table below.

Failure to wear the proper protective gear is dangerous because you will be more susceptible to injury, burns, electric shocks and other injuries.

Work undertaken	Protective gear worn
All types of work	Protective gloves 'Safety' working clothing
Electrical-related work	Gloves to provide protection for electricians and from heat
Work done at heights (50 cm or more)	Helmets for use in industry
Transportation of heavy objects	Shoes with additional protective toe cap

The important contents concerned to the safety are described on the product itself and on this Service Manual. Please read this Service Manual after understanding the described items thoroughly in the following contents (Indications/Illustrated marks), and keep them.

[Explanation of indications]

Indication	Explanation
⚠ **DANGER**	Indicates contents assumed that an imminent danger causing a death or serious injury of the repair engineers and the third parties when an incorrect work has been executed.
⚠ **WARNING**	Indicates possibilities assumed that a danger causing a death or serious injury of the repair engineers, the third parties, and the users due to troubles of the product after work when an incorrect work has been executed.
⚠ **CAUTION**	Indicates contents assumed that an injury or property damage (*) may be caused on the repair engineers, the third parties, and the users due to troubles of the product after work when an incorrect work has been executed.

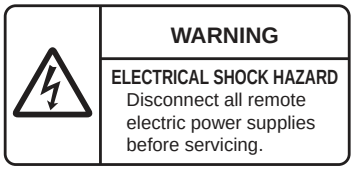
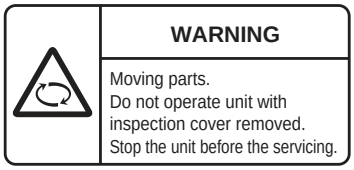
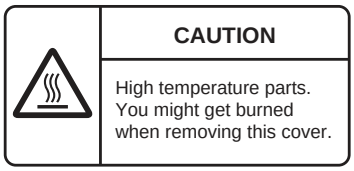
* Property damage: Enlarged damage concerned to property, furniture, and domestic animal/pet

[Explanation of illustrated marks]

Mark	Explanation
	Indicates prohibited items (Forbidden items to do) The sentences near an illustrated mark describe the concrete prohibited contents.
	Indicates mandatory items (Compulsory items to do) The sentences near an illustrated mark describe the concrete mandatory contents.
	Indicates cautions (Including danger/warning) The sentences or illustration near or in an illustrated mark describe the concrete cautious contents.

Warning Indications on the Air to Air Heat Exchanger Unit

[Confirmation of warning label on the main unit]
Confirm that labels are indicated on the specified positions.
If removing the label during parts replace, stick it as the original.

Warning indication	Description
	**WARNING** **ELECTRICAL SHOCK HAZARD** Disconnect all remote electric power supplies before servicing.
	**WARNING** Moving parts. Do not operate unit with inspection cover removed. Stop the unit before the servicing.
	**CAUTION** High temperature parts. You might get burned when removing this cover.

Precautions for Safety

The manufacturer shall not assume any liability for the damage caused by not observing the description of this manual.

⚠ DANGER

 Turn off breaker.	Before carrying out the installation, maintenance, repair or removal work, be sure to set the circuit breaker for Air to Air Heat Exchanger to the OFF position. Otherwise, electric shocks may result.
	Before opening the electrical control cover or inspection cover of the Air to Air Heat Exchanger, set the circuit breaker to the OFF position. Failure to set the circuit breaker to the OFF position may result in electric shocks through contact with the interior parts. Only a qualified installer (*1) or qualified service person (*1) is allowed to remove the electrical control cover or inspection cover of the Air to Air Heat Exchanger and do the work required.
	When cleaning the filter or heat exchange element of the Air to Air Heat Exchanger, set the circuit breaker to OFF without fail, and place a “Work in progress” sign near the circuit breaker before proceeding with the work.
	When you have noticed that some kind of trouble (such as when an error display has appeared, there is a smell of burning, abnormal sounds are heard, water is leaking) has occurred in the Air to Air Heat Exchanger, do not touch the Air to Air Heat Exchanger yourself but set the circuit breaker to the OFF position, and contact a qualified service person. Take steps to ensure that the power will not be turned on (by marking “out of service” near the circuit breaker, for instance) until qualified service person arrives. Continuing to use the Air to Air Heat Exchanger in the trouble status may cause mechanical problems to escalate or result in electric shocks or other failure.
 Electric shock hazard	When you access inside of the electrical control cover to repair electric parts, wait for about five minutes after turning off the breaker. Do not start repairing immediately.Otherwise you may get electric shock by touching terminals of high-voltage capacitors. Natural discharge of the capacitor takes about five minutes.
 Prohibition	Place a “Work in progress” sign near the circuit breaker while the installation, maintenance, repair or removal work is being carried out. There is a danger of electric shocks if the circuit breaker is set to ON by mistake.
	Before operating the Air to Air Heat Exchanger after having completed the work, check that the electrical control cover and inspection cover are closed, and set the circuit breaker to the ON position. You may receive an electric shock if the power is turned on without first conducting these checks.
 Stay on protection	If, in the course of carrying out repairs, it becomes absolutely necessary to check out the electrical parts with the electrical control cover and inspection cover removed in order to find out exactly where the trouble lies, wear insulated heat-resistant gloves, insulated boots and insulated work overalls, and take care to avoid touching any live parts. You may receive an electric shock if you fail to heed this warning. Only qualified service person (*1) is allowed to do this kind of work.

⚠ WARNING

General	Before starting to repair the Air to Air Heat Exchanger, read carefully through the Service Manual, and repair the Air to Air Heat Exchanger by following its instructions.
	Only qualified service person (*1) is allowed to repair the Air to Air Heat Exchanger. Repair of the Air to Air Heat Exchanger by unqualified person may give rise to a fire, electric shocks, injury, water leaks and/or other problems.
	Only a qualified installer (*1) or qualified service person (*1) is allowed to carry out the electrical work of the Air to Air Heat Exchanger. Under no circumstances must this work be done by an unqualified individual since failure to carry out the work properly may result in electric shocks and/or electrical leaks.
	Wear protective gloves and safety work clothing during installation, servicing and removal.
	When repairing the electrical parts or undertaking other electrical jobs, wear gloves to provide protection for electricians and from heat. Failure to wear this protective gear may result in burn.
	Electrical wiring work shall be conducted according to law and regulation in the community and installation manual. Failure to do so may result in electrocution or short circuit.
	Only a qualified installer (*1) or qualified service person (*1) is allowed to undertake work at heights using a stand of 50 cm or more or to remove the electrical control cover or inspection cover of the Air to Air Heat Exchanger to undertake work.
	When working at heights, use a ladder which complies with the ISO 14122 standard, and follow the procedure in the ladder's instructions. Also wear a helmet for use in industry as protective gear to undertake the work.
	When working at heights, put a sign in place so that no-one will approach the work location, before proceeding with the work. Parts and other objects may fall from above, possibly injuring a person below.
	When executing address setting, test run, or troubleshooting through the checking window on the electric parts box, put on insulated gloves to provide protection from electric shock. Otherwise you may receive an electric shock.
	Use a hand track or forklift to carry the unit. When carrying it by human power, have four persons or more; otherwise, you may strain your back.
	When transporting the Air to Air Heat Exchanger, wear shoes with protective toe caps, protective gloves and other protective clothing.
	When transporting the Air to Air Heat Exchanger, do not take hold of the bands around the packing carton. You may injure yourself if the bands should break.
	Use wiring that meets the specifications in the Installation Manual and the stipulations in the local regulations and laws. Use of wiring which does not meet the specifications may give rise to electric shocks, electrical leakage, smoking and/or a fire.
	Exchange to parts specified in service manual, which meet the specification or listed in parts list of service manual. Failure to use specified parts may result in electrical shock, smoke, and/or fire.
	Confirm whether there is a risk of the Air to Air Heat Exchanger falling down during maintenance or repairing work. Inspect the Air to Air Heat Exchanger unit for any falling hazard of the unit before maintenance or repair.
	Before you open the Supply/Exhaust air grill, set the circuit breaker to the OFF position. Otherwise, your hand may be caught in the rotating parts inside and an injury may result.
Check earth wires.	After completing the repair or relocation work, check that the earth wires are connected properly.
	Be sure to connect earth wire. (Grounding work) Incomplete earthing causes an electric shock. Do not connect earth wires to gas pipes, water pipes, and lightning rods or earth wires for telephone wires.
Prohibition of modification.	Do not modify the products. Do not also disassemble or modify the parts. It may cause a fire, electric shock or injury.
Use specified parts.	When any of the electrical parts are to be replaced, ensure that the replacement parts satisfy the specifications given in the Service Manual (or use the parts contained on the parts list in the Service Manual). Use of any parts which do not satisfy the required specifications may give rise to electric shocks, smoking and/or a fire.

 Do not bring a child close to the equipment.	If, in the course of carrying out repairs, it becomes absolutely necessary to check out the electrical parts with the electrical control cover of one or more of the Air to Air Heat Exchanger removed in order to find out exactly where the trouble lies, put a sign in place so that no-one will approach the work location before proceeding with the work. Third-party individuals may enter the work site and receive electric shocks if this warning is not heeded.
 Insulating measures	Connect the cut-off lead wires with crimp contact, etc., put the closed end side upward and then apply a water-cut method, otherwise a leak or production of fire is caused at the users' side.
 Assembly/ Wiring	After repair work, surely assemble the disassembled parts, and connect and lead the removed wires as before. Perform the work so that the electrical control cover does not catch the inner wires. If incorrect assembly or incorrect wire connection was done, a disaster such as a leak or fire is caused at user's side.
 Insulator check	After the work has finished, be sure to use an insulation tester set (500V Megger) to check the resistance is 1MΩ or more between the charge section and the non-charge metal section (Earth position). If the resistance value is low, a disaster such as a leak or electric shock is caused at user's side.
 Check after repair	Once the repair work has been completed, check for the insulation resistance. Then perform a trial run to check that the Air to Air Heat Exchanger is running properly.
	After repair work has finished, check there is no trouble. If check is not executed, a fire, electric shock or injury may be caused. For a check, turn off the power breaker.
	After repair work (installation of electrical control cover and inspection cover) has finished, execute a test run to check there is no generation of smoke or abnormal sound. If check is not executed, a fire or an electric shock is caused. Before test run, install the electrical control cover and inspection cover.
	Be sure to fix the screws back which have been removed for installation or other purposes.
 Check after reinstallation	Only a qualified installer (*1) or qualified service person (*1) is allowed to relocate the Air to Air Heat Exchanger. It is dangerous for the Air to Air Heat Exchanger to be relocated by an unqualified individual since a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
	Check the following items after reinstallation. 1) The earth wire is correctly connected. 2) The power cord is not caught in the product. 3) There is no inclination or unsteadiness and the installation is stable. If check is not executed, a fire, an electric shock or an injury is caused.
 Installation	Only a qualified installer (*1) or qualified service person (*1) is allowed to install the Air to Air Heat Exchanger. If the Air to Air Heat Exchanger is installed by an unqualified individual, a fire, electric shocks, injury, water leakage, noise and/or vibration may result.
	Before starting to install the Air to Air Heat Exchanger, read carefully through the Installation Manual, and follow its instructions to install the Air to Air Heat Exchanger.
	Be sure to use the company-specified products for the separately purchased parts. Use of non-specified products may result in fire, electric shock, water leakage or other failure. Have the installation performed by a qualified installer.
	Do not supply power from the power terminal block equipped on the outdoor unit to another outdoor unit. Capacity overflow may occur on the terminal block and may result in fire.
	Do not install the Air to Air Heat Exchanger in a location that may be subject to a risk of expire to a combustible gas. If a combustible gas leaks and becomes concentrated around the unit, a fire may occur.
	Install the Air to Air Heat Exchanger at least 2.5 m above the floor level since otherwise the users may injure themselves or receive electric shocks if they poke their fingers or other objects into the Air to Air Heat Exchanger while the it is running.
	Install a circuit breaker that meets the specifications in the installation manual and the stipulations in the local regulations and laws.
	Install the circuit breaker where it can be easily accessed by agent.
	When installing a circuit breaker outdoors, install one which is designed to be used outdoors.
	Do not place any combustion appliance in a place where it is directly exposed to the wind of Air to Air Heat Exchanger, otherwise it may cause imperfect combustion.

Relocation

- Only a qualified installer (*1) or qualified service person (*1) is allowed to relocate the Air to Air Heat Exchanger. It is dangerous for the Air to Air Heat Exchanger to be relocated by an unqualified individual since a fire, electric shocks, injury, water leakage, noise and/or vibration may result.

(*1) Refer to the “Definition of Qualified Installer or Qualified Service Person.”

Specifications

Model	Sound power level (dBA)	Weight (kg)
VN-M150HE, M250HE	*	36
VN-M350HE	*	38
VN-M500HE, M650HE	*	53
VN-M800HE, M1000HE	*	70

* Under 70 dBA

Declaration of Incorporation of Partly Completed Machinery

Manufacturer: Toshiba Carrier Corporation
336 Tadehara, Fuji-shi, Shizuoka-ken 416-8521 JAPAN

Representative/
TCF holder: Toshiba Carrier UK Ltd.
Porsham Close, Belliver Industrial Estate,
PLYMOUTH, Devon, PL6 7DB.
United Kingdom

Hereby declares that the machinery described below:

Generic Denomination: Air to Air Heat Exchanger

Model/type: VN-M150HE
VN-M250HE
VN-M350HE
VN-M500HE
VN-M650HE
VN-M800HE
VN-M1000HE

Commercial name: TOSHIBA Air to Air Heat Exchanger

Complies with the provisions of the “Machinery” Directive (Directive 2006/42/EC) and the regulations transposing into national law.

Must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of Machinery Directive, where appropriate.

NOTE

This declaration becomes invalid if technical or operational modifications are introduced without the manufacturer’s consent.

1 Features

■ Main features

◆ Power saving ventilation

The cost of cooling and heating is reduced thanks to the unit efficiently retrieving thermal energy (outdoor air load) which has been lost during ordinary ventilation.

◆ Space saving

Significant reduction of outdoor air load and the ability to retrieve thermal energy enable the production of smaller air conditioning devices.

◆ Humidity control

When cooling, highly humid outdoor air is conditioned to near the humidity of the dehumidified (cooled) indoor air before being supplied.
When heating, moisture from the return air is transferred to the dry outdoor air before the outdoor air is supplied.

◆ Comfortable ventilation

Ventilation without big changes in temperature is realized.
In addition, stable ventilation is possible even in an air tight room due to simultaneous air intake and expulsion.

◆ Sound insulation

Air trunks and heat exchange elements provide sound insulation.
They reduce the incoming of outdoor noise and the outward flow of sounds indoor and help keep the office or shop, and their surroundings quiet.

◆ Easy installation

The linear air supplying/exhausting method enables simple design and installation.
Inverted installation is possible and only one inspection slot is required for two units.
A complete inspection is possible through a single inspection slot.

◆ Other

The filter has excellent dust filtering performance (mass spectrometry 82%).
The air volume can be switched between Extra High and High.
The ventilation balance of air supplying and air exhausting can be changed.
The filter inspection display function calculates the total running time and prompts you through the remote controller to inspect the filter.
The cold mode function automatically makes the air supplying motor run intermittently when the outdoor air temperature is -10°C or lower.
The timer function allows you to set the unit to start/stop operation at the specified time.
The separately sold central controller enables central control of 128 groups.
The separately sold wired remote controller enables group operation control of up to 8 units.
The unit can operate in cooperation with an air-conditioner (SMMS series, DI/SDI series).

■ About ventilation modes

The unit has three ventilation modes.

- Heat exchange mode
  Exchanging heat between the outdoor air and return air and making the temperature and humidity of the outdoor air closer to those of the return air before supplying it.
- Bypass mode
  Outdoor air is taken into a room as it is. This mode is mainly used in spring and summer.
- Automatic mode

1. For an Air to Air Heat Exchanger system
   The heat exchange mode and the bypass mode are automatically switched between following the information from the return air and outdoor air temperature sensors in the unit.
2. For an Air to Air Heat Exchanger system linked with air conditioners
   The heat exchange mode and the bypass mode are automatically switched between depending on the operation status of the air conditioner (cooling, heating, dry, fan, or temperature setting) and the information from the return air and outdoor air temperature sensors in the unit.

⚠ CAUTION

If the outdoor air temperature becomes about to 15°C or less in [Automatic mode] or [Bypass mode], the system will automatically start to run in [Heat exchange mode] regardless of the mode setting to prevent condensation in the Air to Air Heat Exchanger.

* The indication of the ventilation mode setting does not change.

2 Specifications

■ Concealed microcomputer control type

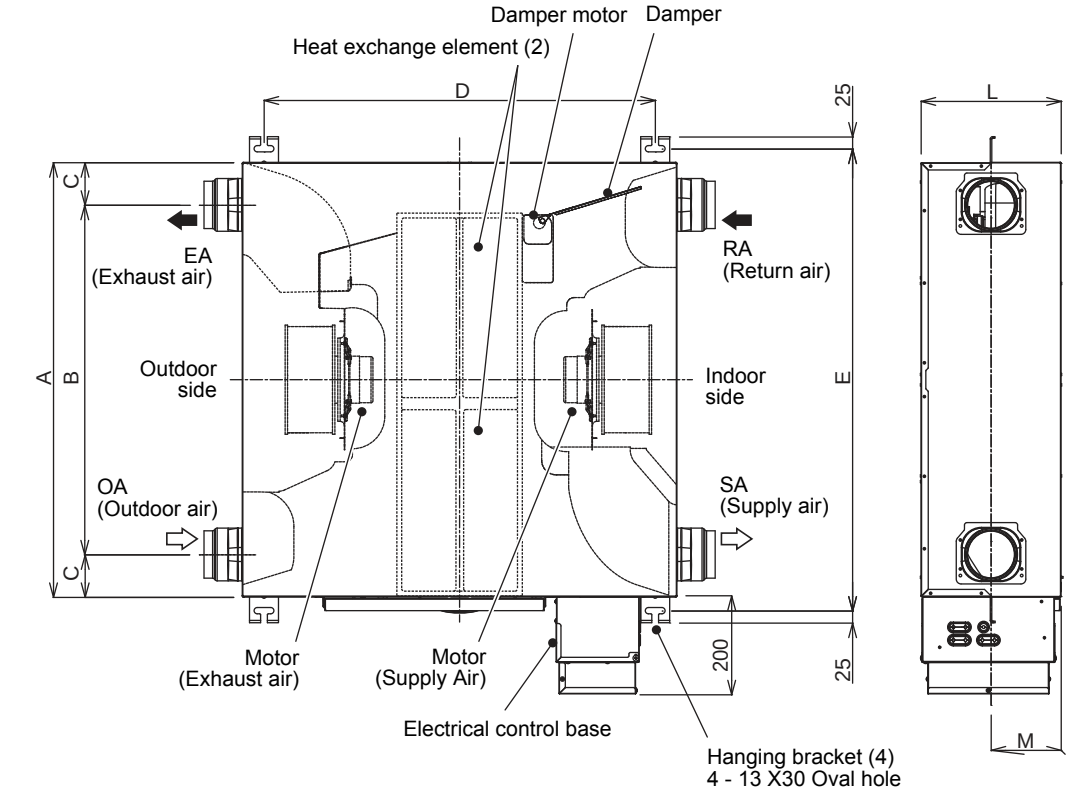
Item			Model No. / Fan Speed		VN-M150HE	VN-M250HE	VN-M350HE	VN-M500HE	VN-M650HE	VN-M800HE	VN-M1000HE
Type					Concealed type						
Power Supply (V)					Single phase 220-240V~,50Hz 220V~,60Hz						
Characteristics	Power consumption (W)	Heat Exchange Mode	(Extra high)	50Hz	68-78	123-138	165-182	214-238	262-290	360-383	532-569
				60Hz	76	131	209	260	307	446	622
			High	50Hz	59-67	99-111	135-145	176-192	240-258	339-353	494-538
				60Hz	65	105	162	206	283	408	589
			Low	50Hz	42-47	52-59	82-88	128-142	178-191	286-300	353-370
				60Hz	45	54	94	144	206	333	411
		Bypass Mode	(Extra high)	50Hz	68-78	123-138	165-182	214-238	262-290	360-383	532-569
				60Hz	76	131	209	260	307	446	622
			High	50Hz	59-67	99-111	135-145	176-192	240-258	339-353	494-538
				60Hz	65	105	162	206	283	408	589
			Low	50Hz	42-47	52-59	82-88	128-142	178-191	286-300	353-370
				60Hz	45	54	94	144	206	333	411
	Current (A)	Heat Exchange Mode	(Extra high)	50Hz	0.31-0.33	0.58-0.61	0.76-0.76	0.99-1.00	1.25-1.30	1.67-1.63	2.47-2.46
				60Hz	0.36	0.60	0.99	1.20	1.40	2.03	2.84
			High	50Hz	0.27-0.28	0.47-0.49	0.62-0.61	0.81-0.81	1.14-1.13	1.57-1.50	2.31-2.28
				60Hz	0.28	0.49	0.74	0.94	1.30	1.85	2.69
			Low	50Hz	0.20-0.20	0.25-0.26	0.38-0.37	0.59-0.60	1.25-1.30	1.31-1.27	1.62-1.57
				60Hz	0.20	0.25	0.43	0.66	0.95	1.52	1.87
		Bypass Mode	(Extra high)	50Hz	0.31-0.33	0.58-0.61	0.76-0.76	0.99-1.00	1.25-1.30	1.67-1.63	2.47-2.46
				60Hz	0.36	0.60	0.99	1.20	1.40	2.03	2.84
			High	50Hz	0.27-0.28	0.47-0.49	0.62-0.61	0.81-0.81	1.14-1.13	1.57-1.50	2.31-2.28
				60Hz	0.28	0.49	0.74	0.94	1.30	1.85	2.69
			Low	50Hz	0.20-0.20	0.25-0.26	0.38-0.37	0.59-0.60	1.25-1.30	1.31-1.27	1.62-1.57
				60Hz	0.20	0.25	0.43	0.66	0.95	1.52	1.87
	Maximum running Current (A)	Heat Exchange Mode	(Extra high)	50Hz	0.32-0.33	0.61-0.65	0.81-0.82	1.19-1.23	1.37-1.41	2.15-2.23	2.89-2.94
				60Hz	0.36	0.65	1.09	1.38	1.59	2.40	3.37
			High	50Hz	0.27-0.28	0.46-0.49	0.61-0.62	0.87-0.91	1.17-1.20	1.84-1.94	2.57-2.61
				60Hz	0.30	0.47	0.73	0.96	1.34	2.01	2.95
			Low	50Hz	0.20-0.21	0.25-0.26	0.42-0.44	0.64-0.68	0.90-0.95	1.49-1.58	1.85-1.87
				60Hz	0.21	0.25	0.45	0.68	0.98	1.59	1.96
		Bypass Mode	(Extra high)	50Hz	0.32-0.33	0.61-0.65	0.81-0.82	1.19-1.23	1.37-1.41	2.15-2.23	2.89-2.94
				60Hz	0.36	0.65	1.09	1.38	1.59	2.40	3.37
			High	50Hz	0.27-0.28	0.46-0.49	0.61-0.62	0.87-0.91	1.17-1.20	1.84-1.94	2.57-2.61
				60Hz	0.30	0.47	0.73	0.96	1.34	2.01	2.95
			Low	50Hz	0.20-0.21	0.25-0.26	0.42-0.44	0.64-0.68	0.90-0.95	1.49-1.58	1.85-1.87
				60Hz	0.21	0.25	0.45	0.68	0.98	1.59	1.96

Item			Model No. / Fan Speed		VN-M150HE	VN-M250HE	VN-M350HE	VN-M500HE	VN-M650HE	VN-M800HE	VN-M1000HE
Characteristics	Air Volume (m^3/h)		(Extra high)	50Hz	150	250	350	500	650	800	1000
				60Hz	150	250	350	500	650	800	1000
			High	50Hz	150	250	350	500	650	800	1000
				60Hz	150	250	350	500	650	800	1000
			Low	50Hz	110	155	210	390	520	700	755
				60Hz	110	155	210	390	520	700	755
	External Static Pressure (Pa)	Heat Exchange Mode	(Extra high)	50Hz	82-102	80-98	114-125	134-150	91-107	142-158	130-150
				60Hz	99	97	167	181	134	171	185
			High	50Hz	52-78	34-65	56-83	69-99	58-82	102-132	97-122
				60Hz	59	38	33	63	68	102	120
			Low	50Hz	47-64	28-40	65-94	62-92	61-96	76-112	84-127
				60Hz	46	22	39	44	52	58	55
		Bypass Mode	(Extra high)	50Hz	82-102	80-98	114-125	134-150	91-107	142-158	130-150
				60Hz	99	97	167	181	134	171	185
			High	50Hz	52-78	34-65	56-83	69-99	58-82	102-132	97-122
				60Hz	59	38	33	63	68	102	120
			Low	50Hz	47-64	28-40	65-94	62-92	61-96	76-112	84-127
				60Hz	46	22	39	44	52	58	55
	Sound pressure level (dB)	Heat Exchange Mode	(Extra high)	50Hz	26.0-28.0	29.5-30.0	34.0-35.0	32.5-34.0	34.0-36.0	37.0-38.5	39.5-40.5
				60Hz	27.5	31.5	35.5	33.5	35.5	38	41.5
			High	50Hz	24.0-25.5	25.0-27.0	30.0-32.0	29.5-31.0	33.0-34.0	35.5-37.0	38.5-40.0
				60Hz	24.5	25	29.5	29	34	35	39
			Low	50Hz	20.0-22.0	21.0-22.0	27.0-29.0	26.0-29.0	31.0-32.5	33.5-35.0	34.0-35.5
				60Hz	20	21	23.5	24.5	29.5	32.5	33.5
		Bypass Mode	(Extra high)	50Hz	26.0-28.0	29.5-30.0	34.0-35.0	32.5-34.0	34.0-36.0	37.0-38.5	39.5-40.5
				60Hz	27.5	31.5	35.5	33.5	35.5	38	41.5
			High	50Hz	24.0-25.5	25.0-27.0	30.0-32.0	29.5-31.0	33.0-34.0	35.5-37.0	38.5-40.0
				60Hz	24.5	25	29.5	29	34	35	39
			Low	50Hz	20.0-22.0	21.0-22.0	27.0-29.0	26.0-29.0	31.0-32.5	33.5-35.0	34.0-35.5
				60Hz	20	21	23.5	24.5	29.5	32.5	33.5
	Temperature Exchange Efficiency (%)		(Extra high)	50Hz	81.5	78	74.5	76.5	75	76.5	73.5
				60Hz	81.5	78	74.5	76.5	75	76.5	73.5
			High	50Hz	81.5	78	74.5	76.5	75	76.5	73.5
				60Hz	81.5	78	74.5	76.5	75	76.5	73.5
			Low	50Hz	83	81.5	79.5	78	76.5	77.5	77
				60Hz	83	81.5	79.5	78	76.5	77.5	77
	Enthalpy exchange Efficiency (%)	for heating	(Extra high)	50Hz	74.5	70	65	72	69.5	71	68.5
				60Hz	74.5	70	65	72	69.5	71	68.5
			High	50Hz	74.5	70	65	72	69.5	71	68.5
				60Hz	74.5	70	65	72	69.5	71	68.5
			Low	50Hz	76	74	71.5	73.5	71.5	71.5	71.5
				60Hz	76	74	71.5	73.5	71.5	71.5	71.5
		for cooling	(Extra high)	50Hz	69.5	65	60.5	64.5	61.5	64	60.5
				60Hz	69.5	65	60.5	64.5	61.5	64	60.5
			High	50Hz	69.5	65	60.5	64.5	61.5	64	60.5
				60Hz	69.5	65	60.5	64.5	61.5	64	60.5
			Low	50Hz	71	69	67	66.5	64	65.5	64.5
				60Hz	71	69	67	66.5	64	65.5	64.5

Item		Model No. / Fan Speed	VN-M150HE	VN-M250HE	VN-M350HE	VN-M500HE	VN-M650HE	VN-M800HE	VN-M1000HE
Construction	Frame		Zinc steel sheets						
	Motor		4-pole capacitor dielectric motor (E type)						
	Fan		PP resin						
	Heat exchanger		Special paper + Resin						
	Filter		Nonwoven fabric (Collection effect weighing method 82%)						
	Adapter		Zinc steel sheets						
	External dimensions (Length x Width x Height) (mm)		900 x 900 x 290			1140 x 1140 x 350		1189 x 1189 x 400	
	Product weight (kg)		36		38	53		70	
	Applicable duct nominal diameter (mm)		Ø100	Ø150		Ø200		Ø250	
Package	Shape		Corrugated board package						
	Dimensions (Length x Width x Height) (mm)		1394 x 362 x 932			1634 x 422 x 1172		1683 x 472 x 1221	
	Weight (kg)		42		45	61		79	
	No. of stacked boxes		3						
	Accessory		Adapter: 4, Screw: 16/24, Installation Manual: 1, Owner's Manual: 1						

* Sound Power Level is less than 70 dBA
* Sound pressure level of the product is the value which was measured at the acoustic room. Actually, in the established condition, that under go influence by the echoing of the room and so that become bigger than the display numerical value.
* The power consumption, the current and the exchange efficiency are values at the time of the mentioned air volume.
* Sound pressure level shall be measured 1.5m below the center of the unit.
* The temperature exchange efficiency averages that of when cooling and heating.

3 Model List

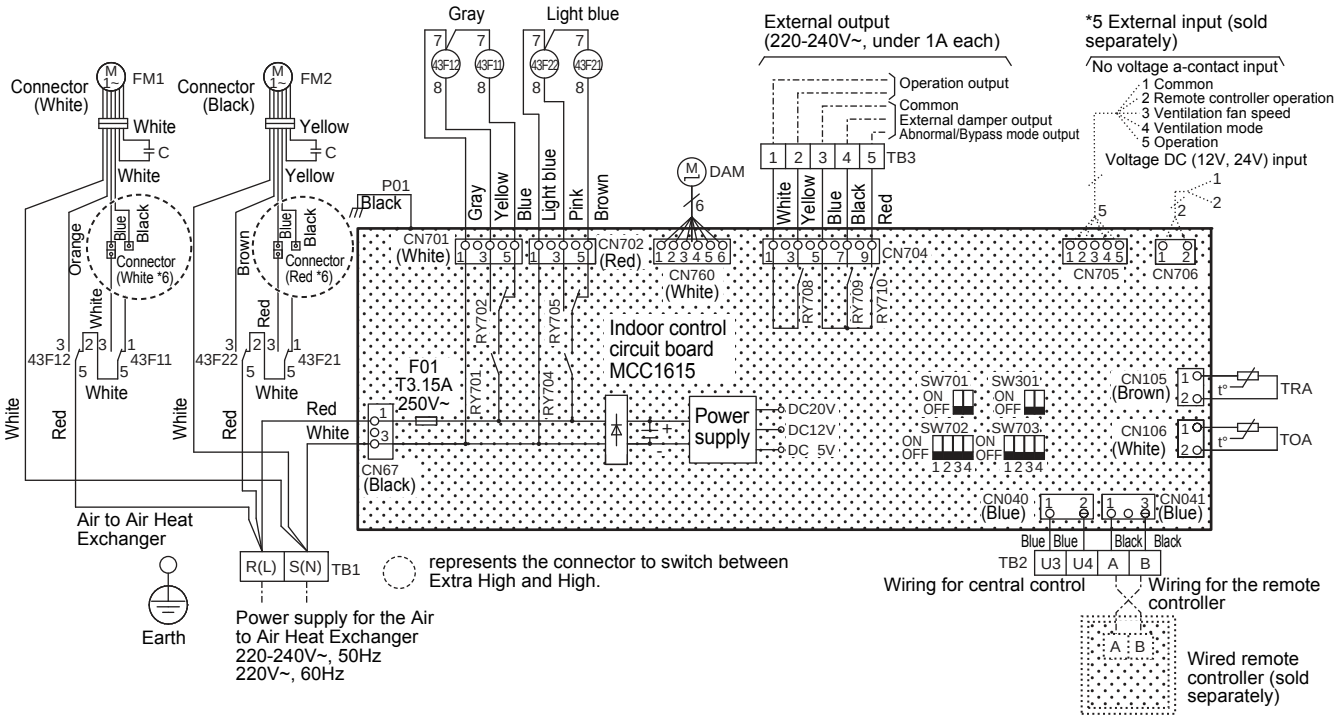


Unit: mm

Item	Count	Material	Remarks	Item	Count	Material	Remarks
Adapter	4	Galvanized steel sheet		Filter	4	Nonwoven fabric	Collecting efficiency (Mass Spectrometry): 82%
Electrical control cover	1			Damper	1		
Inspection cover	1	Galvanized steel sheet		Damper motor	1		
Motor (Exhaust air)	1			Hanging bracket	4	Galvanized steel sheet	
Motor (Supply air)	1			Electrical control base	1	Galvanized steel sheet	
Heat exchange element	2	Fire-resistant paper + Resin	Air to air heat exchanger	Fixing lever	1	SUS304	

Model name	A	B	C	D	E	F	G	H	I	J	K	L	M	Applicable duct nominal diameter
VN-M150HE	900	724	88	810	957	900	454	80	Ø98	Ø110	121	290	145	Ø100
VN-M250HE	900	670	115	810	957	900	454	97	Ø145	Ø158	162	290	145	Ø150
VN-M350HE	900	670	115	810	957	900	454	97	Ø145	Ø158	162	290	145	Ø150
VN-M500HE	1140	800	170	1050	1197	1140	454	80	Ø195	—	Ø212	350	175	Ø200
VN-M650HE	1140	800	170	1050	1197	1140	454	80	Ø195	—	Ø212	350	175	Ø200
VN-M800HE	1189	800	195	1099	1246	1189	454	85	Ø245	—	Ø262	400	200	Ø250
VN-M1000HE	1189	800	195	1099	1246	1189	454	85	Ø245	—	Ø262	400	200	Ø250

4 Connection diagram



Code	Part name
CN***	Connector
F01	Fuse
FM1	Air supplying motor
FM2	Air exhausting motor
DAM	Damper motor
TRA	TRA sensor

Code	Part name
TOA	TOA sensor
RY701, RY702	Relay for air supplying motor
RY704, RY705	Relay for air exhausting motor
TB1	Terminal block (power supply)
TB2	Terminal block (communication)
TB3	Terminal block (external output)

Code	Part name
SW301, SW701 SW702, SW703	DIP switch
43F11, 43F12	Relay for air supplying motor
43F21, 43F22	Relay for air exhausting motor

1. The dotted line represents a wire procured locally, and the dashed line represents an option sold separately.
2. ▭▭ represents a terminal block, —○— represents a connection terminal, and ▭○○▭ represents a connector on the printed circuit board.
3. ⏚ represents a protective earth.
4. ⋰⋰⋰ represents a printed circuit board.
5. Using a no voltage a-contact input of the external input (sold separately), the following operations are available:
   Between 1 and 2: Selecting the remote controller operation (Invalid/Valid)
   Between 1 and 3: Adjusting the ventilation fan speed (Low/High)
   Between 1 and 4: Selecting the ventilation mode (Bypass mode/Heat exchange mode)
   Between 1 and 5: Operation (ON/OFF)
   Use a microcurrent contact (DC12V, 1mA). In addition, ON/OFF operation is possible when using a voltage of DC12V or 24V.
6. Blue wire (High) is connected as factory default. To switch to “Extra High”, connect black wire’s connector instead of blue.
7. When the temperature of the outdoor air is below -10°C, the unit runs in the cold mode (the ventilator for air supply runs intermittently). The unit cannot run when the temperature of the outdoor air is below -15°C. The ventilator for air supply stops running and the ventilator for air exhaust also stops depending on the settings.
8. Even if “Bypass mode” is selected manually, the unit switches to “Heat exchange mode” automatically to prevent condensation when the temperature of the outdoor air is below 15°C. However, “Bypass mode” is still displayed.

5 Parts Rating

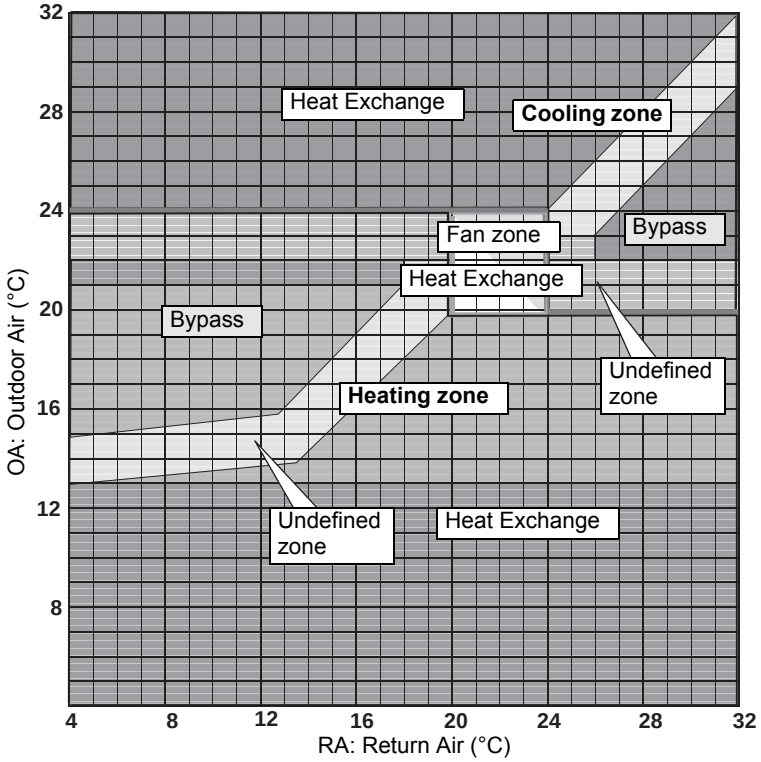
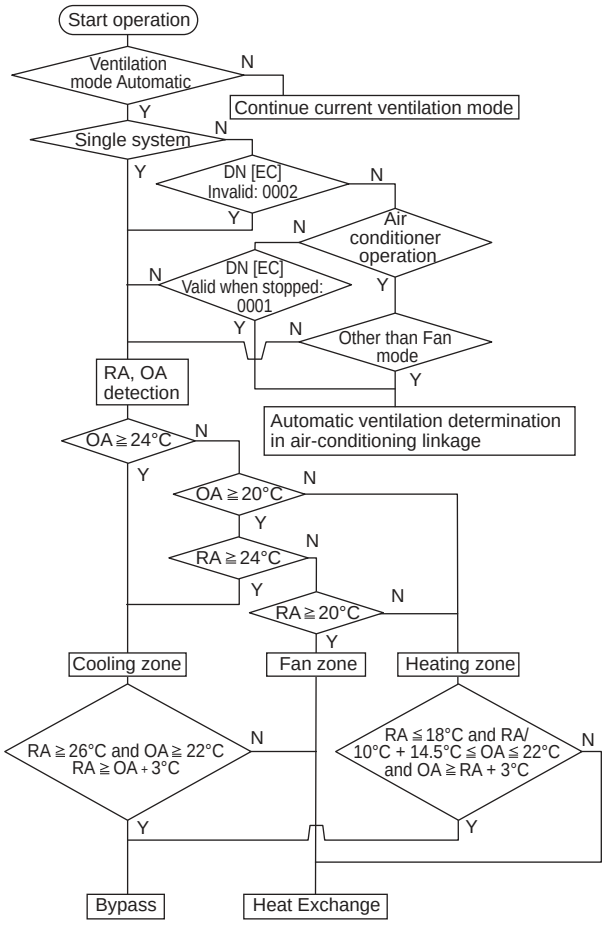
Model VN-M	150HE	250HE	350HE	500HE	650HE	800HE	1000HE
Running condenser for supply air fan motor	450V 1μF	450V 1μF	450V 3μF	450V 3μF	450V 3μF	450V 5μF	450V 10μF (5μF x 2)
Running condenser for exhaust air fan motor	450V 1μF	450V 1μF	450V 3μF	450V 3μF	450V 3μF	450V 5μF	450V 10μF (5μF x 2)
TOA sensor	Ø5 size lead wire length: 900mm vinyl tube (Blue)			Ø5 size lead wire length: 1040mm vinyl tube (Blue)			
TRA sensor	Ø5 size lead wire length: 1010mm non-migratory tube (Black)			Ø5 size lead wire length: 1270mm non-migratory tube (Black)			
Relay	LY-1F Rated voltage: AC220V/240V Rated load: 10A AC220V						
Damper motor	MP24ZN						

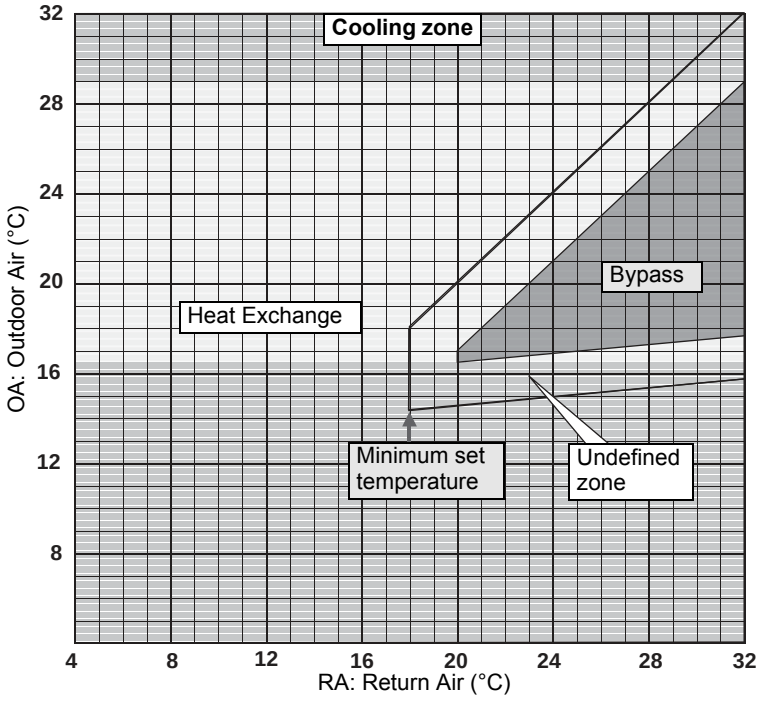
6 Control Outline

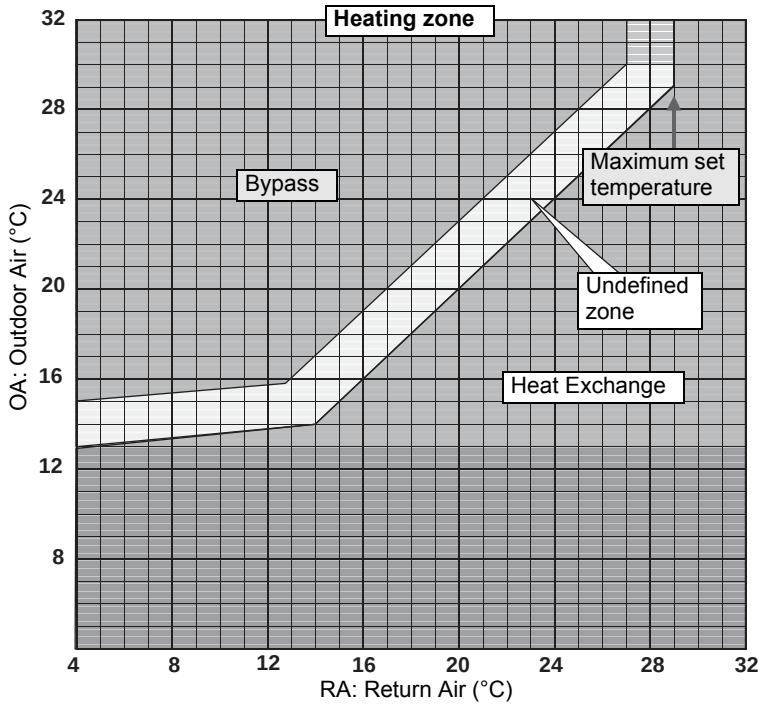
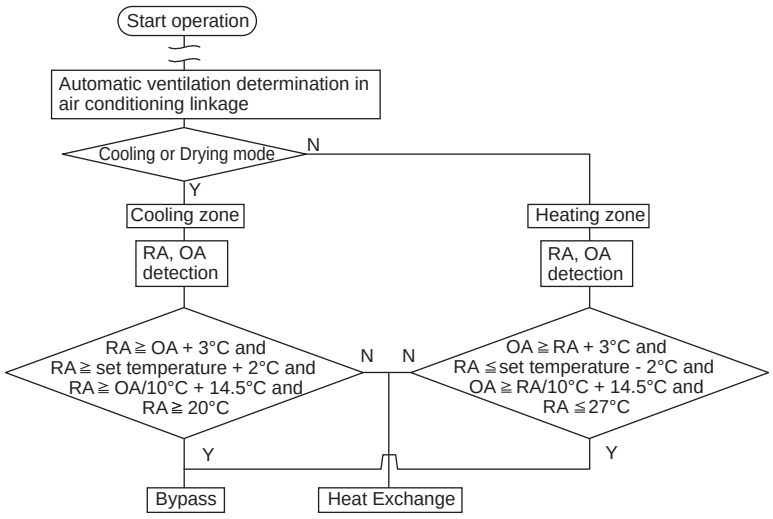
■ Air to Air Heat Exchanger

Control Specifications

NO.	Item	Specification outline	Remarks
1	When the power is reset	1. If the power supply is reset during the occurrence of an error, the check code is cleared. If an abnormal state continues even after the unit is restarted by pressing the [ON/OFF] button on the remote controller, the check code is redisplayed on the remote controller.	
2	Ventilation mode control	Air to Air Heat Exchanger system and Air to Air Heat Exchanger system linked with air conditioners 1) Ventilation mode control • The control method of the automatic mode is different depending on whether it is an Air to Air Heat Exchanger system or an Air to Air Heat Exchanger system linked with air conditioners. • There are three ventilation modes: Automatic, Heat Exchange, and Bypass. 2) When a system without a remote controller or RBC-AMT32E, RBC-AMS41E remote controller is used: • The ventilation mode can be changed with CODE No. (DN) [EA] of the DN setting. 3) Bypass mode control • If OA ≦ RA/10 + 12.5, the system automatically runs in Heat Exchange mode to prevent condensation. (For details, see the section “Cold Mode Control.”) • The display on the remote controller remains “Bypass” regardless of the ventilation mode in actual operation. • When operation starts in Bypass mode, the Heat Exchange mode is maintained for three minutes if the state before stop is Heat Exchange mode (cold mode control). 1. Air to Air Heat Exchanger system 1) Automatic mode control • One of the following three zones is selected by the TOA and TRA sensors: Cooling zone, Fan zone, Heating zone • Automatic ventilation control is performed in the Cooling and Heating zones. • For the Fan zone, the mode is fixed to Heat Exchange. • For five minutes after the start of Automatic mode, the Heat Exchange state is maintained. • The display on the remote controller remains “Automatic” regardless of the ventilation mode in actual operation. 2) Criteria for each zone: [Cooling zone] OA ≧ 24°C or OA ≧ 20°C and RA ≧ 24°C [Fan zone] 20°C ≦ OA < 24°C and 20°C ≦ RA < 24°C [Heating zone] Temperature range out of the Cooling and Fan zones 3) Bypass mode condition in automatic ventilation control [Cooling zone] RA ≧ 26°C and OA ≧ 22°C and RA ≧ OA + 3°C [Heating zone] RA ≦18°C and RA/10°C + 14.5°C ≦ OA ≦ 22°C and OA ≧ RA + 3°C • If the system is in an undefined zone when operation starts, the system is operated in Heat exchange mode. If the state moves to this zone during operation, the previous state is retained.	TOA sensor TRA sensor CODE No. (DN) [EA] [EC]

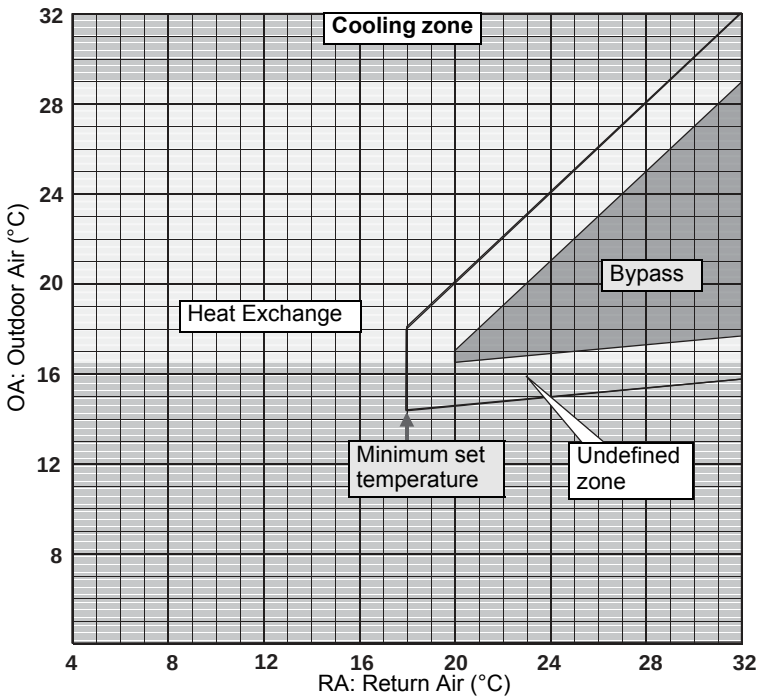
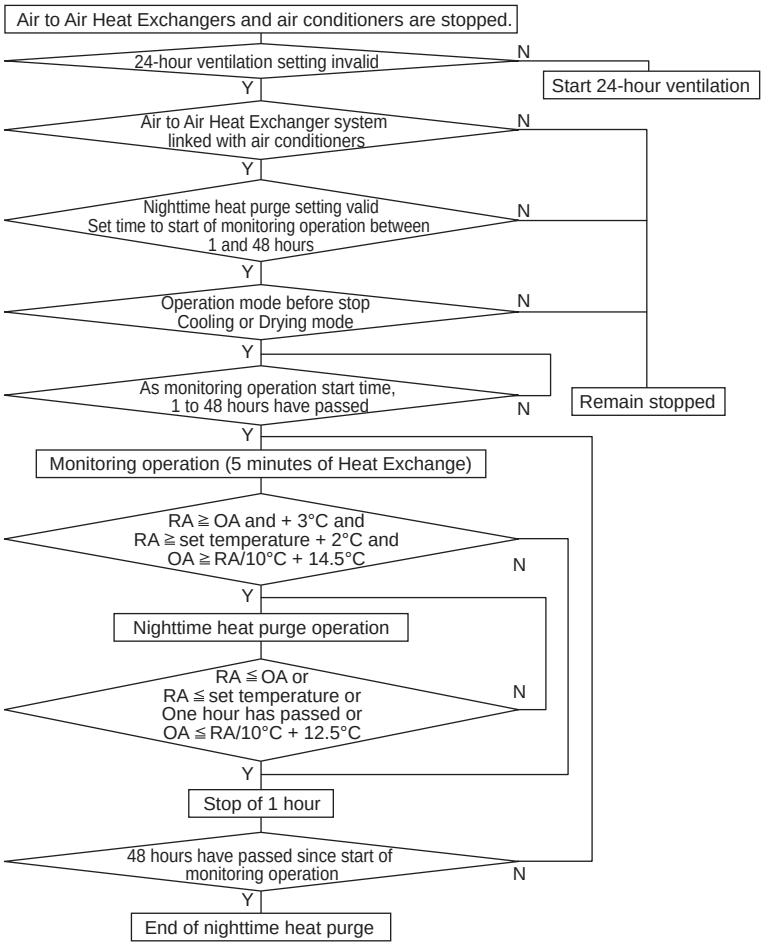
NO.	Item	Specification outline	Remarks
2	Ventilation mode control (continued)	**Automatic ventilation mode control in the Air to Air Heat Exchanger system**  	

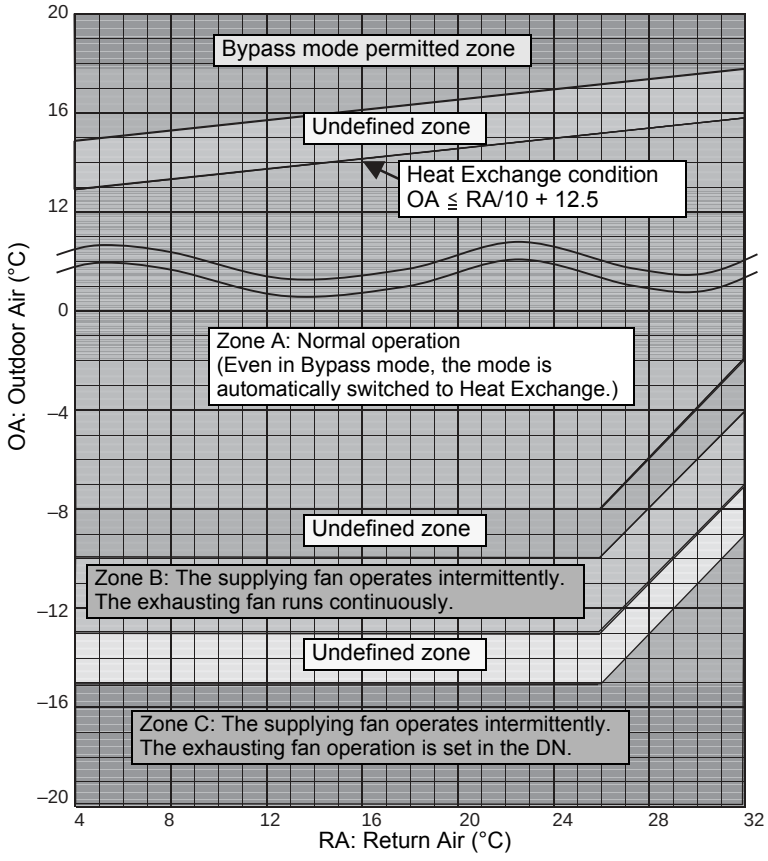
NO.	Item	Specification outline	Remarks
2	Ventilation mode control (continued)	2. Air to Air Heat Exchanger system linked with air conditioners 1) Automatic ventilation mode control in the air-conditioning linkage • Determine the mode from the operation mode of the air conditioner. [Cooling zone]: The air conditioner operation mode is Automatic cooling, Cooling, or Drying mode. [Heating zone]: The air conditioner operation mode is Automatic heating or Heating mode. In Fan mode, the zone is determined by the automatic ventilation mode control in the Air to Air Heat Exchanger system. • The setting of the automatic ventilation control in the Air to Air Heat Exchanger system linked with air conditioners can be changed with CODE No. (DN) [EC] of the DN setting. 0000: Valid only when the air conditioner is running (factory default). When the air conditioner is stopped, the zone is determined by the automatic ventilation mode control of the Air to Air Heat Exchanger system. 0001: Valid even if the air conditioner is stopped. If the air conditioner is stopped, the zone is determined by the operation mode and set temperature before stop. 0002: Invalid. The zone is determined by the automatic ventilation mode control in the Air to Air Heat Exchanger system. 2) The Bypass condition at the time of automatic ventilation mode control in the Air to Air Heat Exchanger system linked with air conditioners (excluding Fan mode) [Cooling zone] RA ≧ OA + 3°C and RA ≧ set temperature + 2°C and OA ≧ RA/10°C + 14.5°C and RA ≧ 20°C [Heating zone] OA ≧ RA + 3°C and RA ≦ set temperature - 2°C and OA ≧ RA/10°C + 14.5°C and RA ≦ 27°C • Condition for returning to Heat Exchange (determined by the set temperature before stop, even when the air conditioner is stopped) (For details, see the section “Cold Mode Control.”) [Cooling zone] RA ≦ set temperature - 2°C or RA ≦ 18°C [Heating zone] RA ≧ set temperature + 2°C or RA ≧ 29°C • If the system is in an undefined zone when operation starts, the system is operated in Heat exchange mode. If the state moves to this zone during operation, the previous state is retained. **Automatic ventilation mode control in the Air to Air Heat Exchanger system linked with air conditioners**  	

NO.	Item	Specification outline	Remarks
2	Ventilation mode control (continued)	 	
3	Ventilation fan speed control	1. By pressing the [VENT FAN] button, Ventilation Fan Speed High/Low and SA > EA/SA < EA can be switched. • SA > EA and SA < EA can be changed with CODE No. (DN) [48] of the DN setting. 0000: Normal (factory default) 0001: SA (High) > EA (Low) active 0002: SA (Low) < EA (High) active * "High" may be "Extra High." 2. When a system without a remote controller or RBC-AMT32E, RBC-AMS41E remote controller is used: • The ventilation mode can be changed with CODE No. (DN) [EB] of the DN setting.	CODE No. (DN) [EB][48]

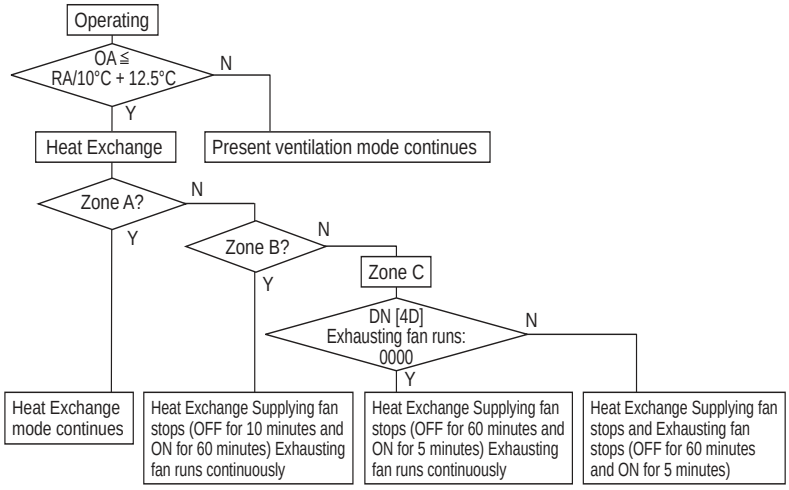
NO.	Item	Specification outline	Remarks
4	24-hour ventilation control	1. 24-hour ventilation operation and setting • By operating the [ON/OFF] and [VENT] buttons during operation of Air to Air Heat Exchangers, they stop operation and the system moves to 24-hour ventilation (low): 60 minutes ON, 60 minutes OFF. The ventilation mode is fixed to Heat Exchange. * The setting of 24-hour ventilation (Valid/Invalid) needs to be changed with CODE No. [49] of the DN setting. 0000: Invalid (factory default); 0001: Valid 2. Setting the on/off ratio of 24-hour ventilation • The on/off ratio complaint response mode can be changed with CODE No. (DN) [4A] of the DN setting. 0000: Normal; the air volume of ventilation: 1/2, fan is ON for 60 minutes and OFF for 60 minutes (factory default). 0001–0059: the air volume of ventilation: Fan is ON for [SET DATA of DN] minutes and OFF for [60-SET DATA of DN] minutes. 3. Changing the ventilation fan speed of 24-hour ventilation • The setting of the ventilation fan speed of the 24-hour ventilation can be changed with CODE No. (DN) [47] of the DN setting. 0000: Operate with ventilation fan speed fixed to Low (factory default) 0001: Operate with the ventilation fan speed that was set before stop. 4. In the Air to Air Heat Exchanger system, Air to Air Heat Exchangers stop if the [ON/OFF] button is pressed when they are running, and the system enters 24-hour ventilation mode. 5. In the Air to Air Heat Exchanger system linked with air conditioners, Air to Air Heat Exchangers and air conditioners stop if the [ON/OFF] button is pressed when they are running, and the system enters 24-hour ventilation mode. 6. In the Air to Air Heat Exchanger system linked with air conditioners, Air to Air Heat Exchangers stop if the [VENT] button is pressed when only the Air to Air Heat Exchangers are running or when both the Air to Air Heat Exchangers and air conditioners are running, and the system enters 24-hour ventilation mode. * The setting of the single operation of the Air to Air Heat Exchanger needs to be changed with CODE No. (DN) [31] of the DN setting. (Setting for the header air conditioner) 0000: Invalid (factory default); 0001: Valid 7. Operation during 24-hour ventilation • During 24-hour ventilation, the ventilation fan speed and the ventilation mode cannot be changed, and they are not displayed. 8. Stop of 24-hour ventilation • From the NRC-01HE, 24-hour ventilation can be stopped temporarily by holding the [VENT FAN] button down for four seconds when 24-hour ventilation is in operation. • The "24H" display goes out.	CODE No. (DN) [47][31][49][4A] • "24H" lights up
5	Delayed operation control	1. The delay setting needs to be changed with CODE No. (DN) [4B] of the DN setting in the Air to Air Heat Exchanger system linked with air conditioners. After pressing the [ON/OFF] button, operation of the Air to Air Heat Exchanger is delayed by [SET DATA of DN] × 10 minutes. 0000: No delay (factory default) 0001–0006: Delay by [SET DATA of DN] × 10 minutes * The delay time can be set between 10 and 60 minutes in the unit of 10 minutes. * If the [VENT] button is pressed during single operation of Air to Air Heat Exchangers, delayed operation is not performed. 2. During delayed operation, " " lights up.	CODE No. (DN) [4B] • " " lights up.

NO.	Item	Specification outline	Remarks
6	Nighttime heat purge control	This function is valid only for the Air to Air Heat Exchanger system linked with air conditioners (invalid for the Air to Air Heat Exchanger system). 1. If the [ON/OFF] button is pressed during operation, the Air to Air Heat Exchangers and the air conditioners stop, and the system enters the nighttime heat purge mode (standby mode). * The setting of nighttime heat purge (Valid/Invalid) needs to be changed with CODE No. (DN) [4C] of the DN setting. 0000: Invalid (factory default) 0001–0048: Temperature monitoring operation starts after [SET DATA of DN] × 1 hour. 2. Conditions that make the nighttime heat purge setting valid • Only when the air conditioners and Air to Air Heat Exchangers are stopped • Only when the operation mode before the stop of the air conditioner header unit is Automatic cooling, Drying, or Cooling • When 24-hour ventilation is set to Invalid • Invalid when only the Air to Air Heat Exchangers are stopped • Invalid when the air conditioners are stopped in states where only the Air to Air Heat Exchangers are stopped 3. When the nighttime heat purge setting is valid • The mode moves from the stop of the Air to Air Heat Exchangers to the nighttime heat purge operation mode (standby mode). " " lights up, and the system enters the nighttime heat purge operation standby mode. 4. Nighttime heat purge operating conditions: • The nighttime heat purge monitoring operation start time specified in the DN setting (1 to 48 hours) has passed. • Temperature monitoring operation is performed for five minutes (Heat Exchange mode) and nighttime heat purge operation starts if the following conditions are met. • RA ≧ 0A + 3°C and RA ≧ set temperature + 2°C and OA ≧ RA/10°C + 14.5°C 5. During nighttime heat purge operation • The ventilation fan speed can be changed with CODE No. (DN) [47] of the DN setting. 0000: Operate with the ventilation fan speed fixed to Low (factory default) 0001: Operate with the ventilation fan speed that was set before stop • During nighttime heat purge operation, the ventilation mode (fixed to Bypass mode) cannot be changed, and it is not displayed. 6. Nighttime heat purge temporary stop condition (one-hour stop) • RA ≦ OA or RA ≦ set temperature or OA ≦ RA/10°C + 12.5°C or one hour has passed since the start of nighttime heat purge 7. Nighttime heat purge stop (termination) conditions • The air conditioners or Air to Air Heat Exchangers start operation. • When single operation of the fan is performed while " " is lit, nighttime heat purge stops. When single operation of the Air to Air Heat Exchanger is stopped, the mode does not return to "Nighttime heat purge." • 48 hours have passed since the start of nighttime heat purge operation (start of temperature monitoring operation). 8. When nighttime heat purge operation stops: • The " " display goes out.	CODE No. (DN) [4C][47] • " " lights up.

NO.	Item	Specification outline	Remarks
6	Nighttime heat purge control (continued)	**Nighttime heat purge control**   	

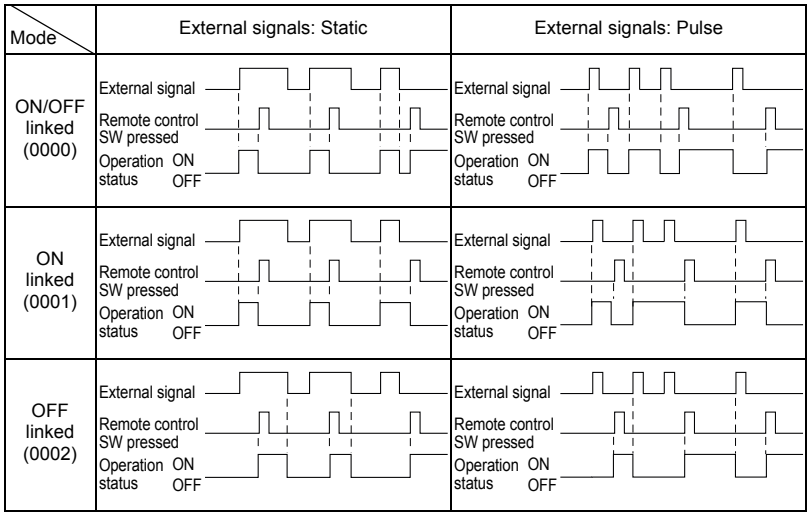
<table>
<tr><th>NO.</th><th>Item</th><th>Specification outline</th><th>Remarks</th></tr>
<tr><td>7</td><td>Cold mode control</td><td>
1. Even in Bypass mode control, the system automatically enters Heat Exchange mode to prevent condensation if OA ≦ RA/10°C + 12.5°C.
• The display on the remote controller remains “Bypass mode” regardless of the ventilation mode in actual operation.
• When operation starts in Bypass mode, the system runs in Heat Exchange mode for three minutes if the state before stop is Heat Exchange mode (cold mode control).
2. The ON time in each zone is maintained for at least three minutes. When the temperature condition moves to another zone, the system starts the OFF condition in another zone.
3. In the B zone condition, the supplying fan performs intermittent operation (stops for 10 minutes and runs for 60 minutes). The exhausting fan runs continuously.
4. In the C zone condition, the supplying fan stops. However, it stops for 60 minutes and runs for five minutes.
The setting of the exhausting fan can be changed with CODE No. (DN) [4D] of the DN setting.
0000: Exhausting fan runs (factory default)
0001: Exhausting fan stops
<table>
<tr><th>Zone</th><th>Zone criterion</th></tr>
<tr><td>Bypass mode permitted zone ⇒ Zone A</td><td>OA ≦ RA/10°C + 12.5°C</td></tr>
<tr><td>Zone A ⇒ Zone B</td><td>OA ≦ – 10°C or OA ≦ RA – 36°C</td></tr>
<tr><td>Zone B ⇒ Zone C</td><td>OA ≦ – 15°C or OA ≦ RA – 41°C</td></tr>
<tr><td>Zone C ⇒ Zone B</td><td>OA ≧ – 13°C or OA ≧ RA – 39°C</td></tr>
<tr><td>Zone B ⇒ Zone A</td><td>OA ≧ – 8°C or OA ≧ RA – 34°C</td></tr>
<tr><td>Zone A ⇒ Bypass mode permitted zone</td><td>OA ≧ RA/10°C + 14.5°C</td></tr>
</table>
Cold mode control


</td><td>CODE No. (DN) [4D]</td></tr>
</table>

NO.	Item	Specification outline	Remarks
7	Cold mode control (continued)		
8	Filter symbol display	1. The indoor header unit's cumulative hours of operation are counted, and when they exceed the prescribed value, a filter replacement signal is sent to the remote controller to display a filter symbol on the remote controller. • The setting of the prescribed number of hours can be changed with CODE No. (DN) [01] of the DN setting. 0000: None 0001: 150 hours 0002: 2,500 hours (factory default) 0003: 5,000 hours 0004: 10,000 hours 2. When a filter reset signal is received from the remote controller, the timer measuring cumulative hours is cleared. If the prescribed number of hours has been exceeded, the measurement time is reset with the symbol on the remote controller display erased. 1) In the Air to Air Heat Exchanger system linked with air conditioners, the cumulative time of operation of the indoor header unit is the representative of the group. * In the Air to Air Heat Exchanger system linked with air conditioners, the cumulative time of 24-hour ventilation operation is not counted. * In the Air to Air Heat Exchanger system linked with air conditioners, the cumulative time of the nighttime heat purge operation is not counted. 2) In the Air to Air Heat Exchanger system, the cumulative operating time of the exhausting fan of the Air to Air Heat Exchanger header unit is the representative of the group. * In the Air to Air Heat Exchanger system, the cumulative operating time of 24-hour ventilation is counted. 3) When the degree of dirt of the filter is set, its time is half the standard time. • The setting of the degree of dirt of the filter can be changed with CODE No. (DN) [02] of the DN setting. 0000: Standard (factory default) 0001: High degree of dirt (half the standard time)	CODE No. (DN) [01][02] • " ▦ " lights up

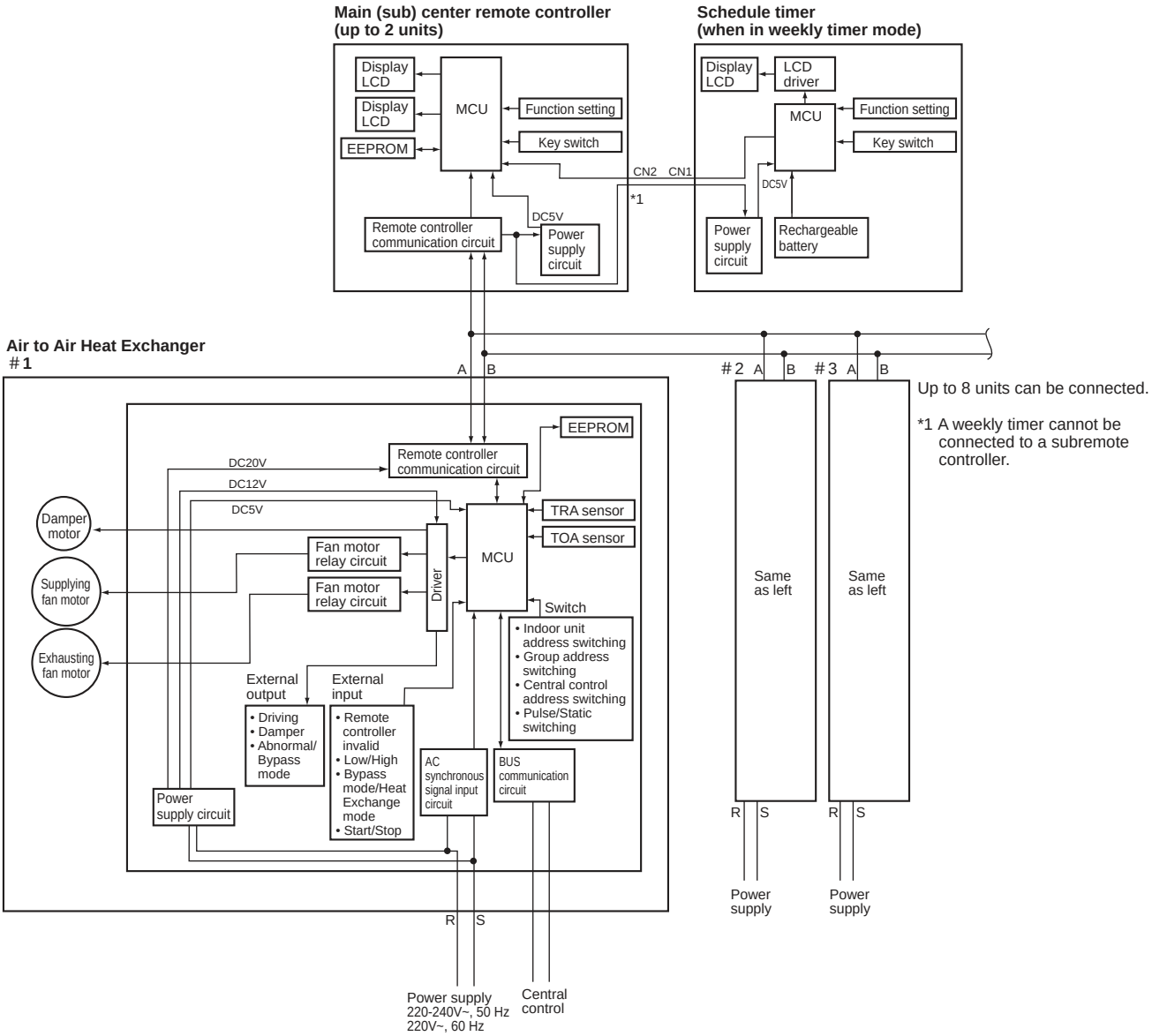
<table>
<tr><th>NO.</th><th>Item</th><th>Specification outline</th><th>Remarks</th></tr>
<tr><td>9</td><td>Selection of central control mode</td><td>1. The range of operations that can be performed by operating the remote controller of the Air to Air Heat Exchanger can be determined through the setting of the central controller.
2. Setting details
• TCC Link central control
<table>
<tr><th rowspan="2">Operation from TCC Link central control</th><th colspan="5">Operation on NRC-01HE</th><th rowspan="2">NRC-01HE display</th></tr>
<tr><th>Setting start/stop</th><th>Setting ventilation start/stop</th><th>Setting timer</th><th>Setting ventilation fan speed</th><th>Setting ventilation mode</th></tr>
<tr><td>Individual</td><td>O</td><td>O</td><td>O</td><td>O</td><td>O</td><td rowspan="5">“ ” is displayed</td></tr>
<tr><td>[Central 1]</td><td>×</td><td>O</td><td>×</td><td>O</td><td>O</td></tr>
<tr><td>[Central 2]</td><td>×</td><td>O</td><td>×</td><td>O</td><td>O</td></tr>
<tr><td>[Central 3]</td><td>O</td><td>O</td><td>O</td><td>O</td><td>O</td></tr>
<tr><td>[Central 4]</td><td>O</td><td>O</td><td>O</td><td>O</td><td>O</td></tr>
</table>
(O: Accessible ×: Inaccessible)
* The ventilation start/stop operation applies only to operation linked with air conditioners. It becomes effective when “single operation of the fan” is set to 0001 (valid) in CODE No. (DN) [31].</td><td>• “ ” lights up while in central control mode.
• The display blinks when a control function inaccessible to a remote controller is chosen.</td></tr>
<tr><td>10</td><td>Operation output (Connecting an auxiliary fan)</td><td>1. Operation output setting
• The output setting can be changed by CODE No. (DN) [ED]
0000: Contact is on only during normal operation.
* Contact is off during 24-hour ventilation or nighttime heat purge operation.
* Contact is off during cold mode (while the temperature is below -10 °C).
0001: Contact is on during normal operation, 24-hour ventilation, or nighttime heat purge operation.
* Contact is on when 24-hour ventilation is stopped intermittently.
* Contact is off when nighttime heat purge operation is on standby. (paused before the monitoring operation of the nighttime heat purge operation starts)
* Contact is off during cold mode (while the temperature is below -10 °C).
0002: Contact is on during 24-hour ventilation or nighttime heat purge operation.
* Contact is on when 24-hour ventilation is stopped intermittently.
* Contact is off during normal operation or when the nighttime heat purge operation is on standby. (paused before the monitoring operation of the nighttime heat purge operation starts)
* Contact is off during cold mode (while the temperature is below -10 °C).
0003: Contact is on only when SA fan (Supplying fan) is running.
* Contact is off when 24-hour ventilation is stopped intermittently, so do not connect an auxiliary fan.
0004: Contact is on only when EA fan (Exhausting fan) is running.
* Contact is off when 24-hour ventilation is stopped intermittently, so do not connect an auxiliary fan.</td><td>CODE No. (DN) [ED]
• External output terminal block ((1) – (2))</td></tr>
<tr><td>11</td><td>Electric damper output</td><td>1. Output setting for electric damper
• The setting can be switched between Normal and Complaint Response Setting in the DN setting.
• The output setting can be changed with CODE No. (DN) [5C] of the DN setting.
0000: Normal (factory default)
0001: 24-hour ventilation, nighttime heat purge operation supported
2. Operation ON/OFF condition in normal setting
• ON during intermittent stop in 24-hour ventilation mode
• ON in cold mode control (Zones B and C)
• ON if the fan is stopped when switching the damper (Heat exchange mode/ Bypass mode)
• ON from the start of monitoring operation of nighttime heat purge to the end of nighttime heat purge
• OFF during delayed operation
• OFF during the stop of normal operation (including 24-hour stop)
3. Operation output ON/OFF condition when support of 24-hour ventilation and nighttime heat purge operation is set
The settings are the same as those for normal settings except the following:
• OFF during intermittent stop in 24-hour ventilation mode
• OFF during temporary stop in nighttime heat purge mode</td><td>CODE No. (DN) [5C]
• External output terminal block ((3) – (4))</td></tr>
</table>

<table>
<tr><th>NO.</th><th>Item</th><th>Specification outline</th><th>Remarks</th></tr>
<tr><td>12</td><td>Linked operation with external devices</td><td>Connect the Remote ON/OFF adapter (NRB-1HE: sold separately) to the connectors CN706(2P) and CN705(5P) on the control circuit board of the Air to Air Heat Exchanger.
1. Output signals of external devices
• DC12V, DC24V: Connect to CN706(2P)
• No voltage a-contact: Connect to CN705(5P) and use (1) Green – (5) Black
2. Pulse/Static switch of output signals of external devices (Static: OFF by default)
• No. 1 of the switch SW701 on the board (Pulse: ON)
3. Linked operation with external devices
• You can set the Air to Air Heat Exchanger operations for ON/OFF signals of external devices by CODE No. (DN) [4E].
0000: The Air to Air Heat Exchanger starts/stops together with the starting/stopping of an external device. (The latter operation of the remote controller or the switch of the external device overrides the former.)
0001: The Air to Air Heat Exchanger starts together with the starting of an external device. Use the remote controller to stop operation.
0002: The Air to Air Heat Exchanger stops together with the stopping of an external device. Use the remote controller to start operation.

Operation signals DN [4E]
 
</td><td>CODE No. (DN) [4E]
• Remote ON/OFF adapter (NRB-1HE: sold separately)
• No. 1 of the switch SW701 on the board
Pulse: ON
Static: OFF (Factory setting)</td></tr>
</table>

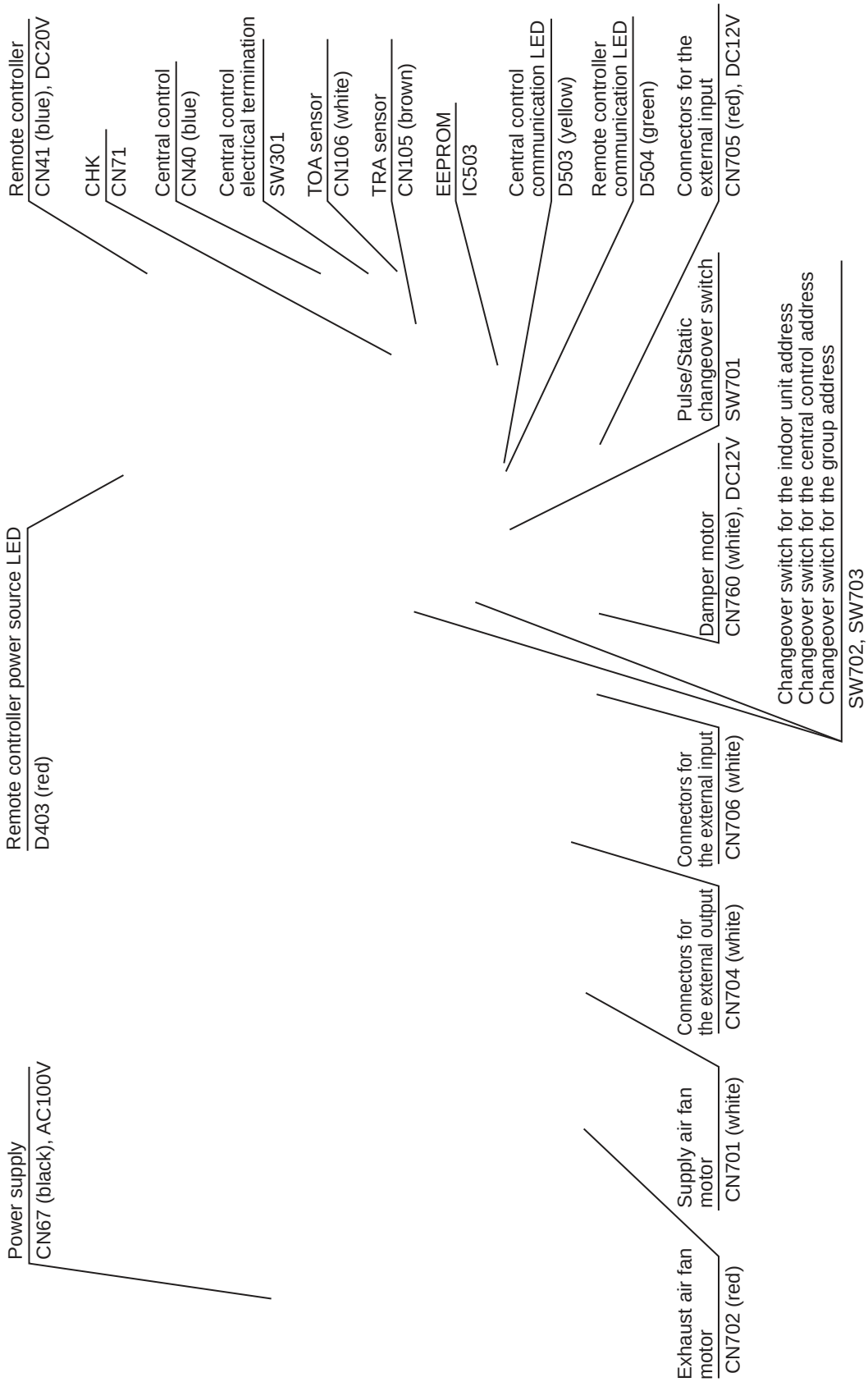
7 Applied Control and Functions (Including Circuit Configuration)

7-1. Heat Exchanger Controller Block Diagram



7-2. Indoor Printed Circuit Board

MCC-1615



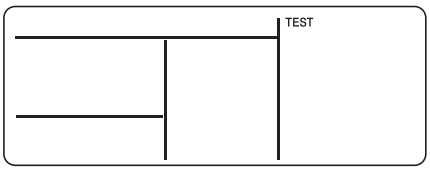
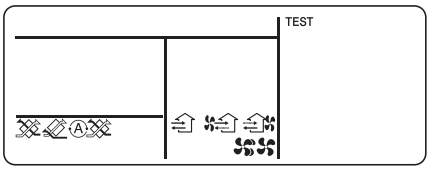
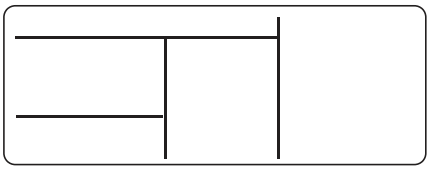
7-3. Functions at Test Operation

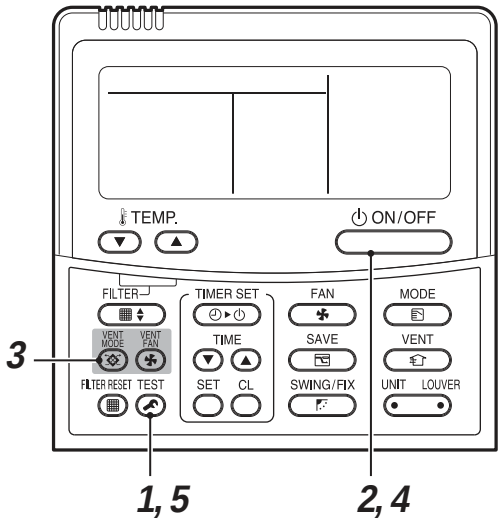
◆Checking ventilation mode test operation

Starting and stopping test operation

▼Performing test operation from the indoor remote controller

Wired remote controller

Procedure	Operation
1	When the TEST button is pushed for 4 seconds or more, “TEST” is displayed in the display section, and the unit enters test operating mode. 
2	Press the ON / OFF button.
3	By using the VENT MODE button, select or . Errors are detected as usual. 
4	When the test operation is finished, push the ON / OFF button to stop the operation. (The same display as in procedure 1 appears in the display.)
5	Push the TEST button to clear the test operating mode. (“TEST” disappears from the display section, and the status returns to normal stopped status.) 



NOTE

Test operation will return to normal operation after a lapse of 60 minutes.
During test operation, the cold mode control and delayed operation are disabled.
Bypass mode ventilation

- In Bypass mode, Bypass operation is performed regardless of the RA and OA sensor temperatures.

Automatic mode ventilation

- In the Air to Air Heat Exchanger system, the ventilation mode is fixed to Heat Exchange.
- If the operation mode is Cooling or Heating in the Air to Air Heat Exchanger system linked with air conditioners, the ventilation mode is fixed to Heat Exchange.
- If the operation mode is Fan in the Air to Air Heat Exchanger system linked with air conditioners, the ventilation mode is fixed to Bypass.

◆Check function for operation of Air to Air Heat Exchanger

This function is provided to check the operation of Air to Air Heat Exchanger singly without communication with the remote controller. This function can be used regardless of operation or stop of the system.
However, if using this function for a long time, a trouble of the equipment may be caused. Limit using this function within several minutes.

[How to operate]
Short-circuit CHK pin (CN71 on the P.C. board).

[How to clear]
Open CHK pin. While the system is operating, it stops once but automatically returns to operation after several minutes.

	Short-circuit of CHK pin
Fan motor	(H)
Ventilation mode	Heat exchange mode
Operation output, Electric damper output	OFF
Communication	All ignored
P.C. board LED	Lights

- For the detailed positions of CHK pin (CN71 on P.C. board), refer to the P.C. board MCC-1615.

7-4. Specifications of Optional Connectors on the Air to Air Heat Exchanger Unit Board

Function	Connector No.	Pin No.	Specification	Note
External input No-voltage contact a	CN705	1	0V (COM)	
		2	Remote controller prohibition input	Remote controller prohibition input (ON: Prohibited, OFF: Allowed)
		3	Ventilation fan speed change input	Ventilation fan speed change input (ON: LOW, OFF: HIGH)
		4	Ventilation mode change input	Ventilation mode change input (ON: Bypass, OFF: Heat Exchange)
		5	Start/Stop input	Start/Stop input (pulse/static input changed by No. 1 of DIP SW701, OFF: Static (default), ON: Pulse)
External input DC12V, 24V	CN706	1	DC12V (COM)	
		2	Start/Stop input	Start/Stop input (pulse/static input changed by No. 1 of DIP SW701, OFF: Static (default), ON: Pulse)

7-5. Configuring the Function Settings of the Air to Air Heat Exchanger Unit

(When configuring the settings, use the wired remote controller.)

<Procedure> Stop running the unit before configuring the settings.

1 **Press and hold the TEST + SET + CL buttons for 4 seconds or longer.**

The Unit No. displayed first indicates the indoor unit address of the header unit in group control.

The Air to Air Heat Exchanger Unit No. is 31-OO.

The fan of the selected Air to Air Heat Exchanger starts running.

The indicator lights up when the wired remote controller NRC-01HE is used.

- The line (system) address is always 31.
- The indoor unit address is between 1 and 64. The address is specified with No.1 to No.4 of SW702 and with No.1 and No.2 of SW703.

2 **Each time you press UNIT LOUVER (left side of the button), the unit No. of the Air to Air Heat Exchangers in the group are displayed successively. Only the fan of the selected Air to Air Heat Exchanger starts running.**

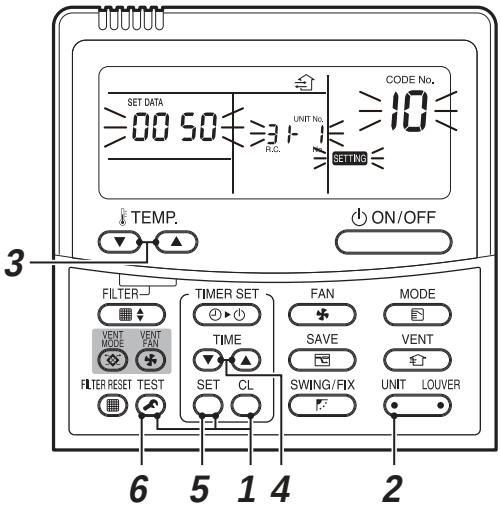
3 **Press the temperature TEMP. button to select the CODE No. (DN).**

4 **Press the timer TIME button to select the setting data.**

5 **Press the SET button. (There are no problems if the indicator lights up.)**

- To change the selected Air to Air Heat Exchanger, return to ***2***.
- To change CODE No. (DN) to set, return to ***3***.

6 **Press the TEST button to return to normal operation. (The unit stops.)**



Procedure

1 → ***2*** → ***3*** → ***4*** → ***5*** → ***6*** End

Codes (DN codes) for changing settings (Necessary for local advanced control)

The following DN codes are used in common for NRC-01HE, RBC-AMT32E, and RBC-AMS41E.

Code	Description	SET DATA and description	Factory default	Note
01	Lighting-up hours of the Filter Sign	0000: None 0001: 150 H 0002: 2500 H 0003: 5000 H 0004: 10000 H	0002: 2500 H	Adjusting this setting is necessary for the header unit.
02	Dirty state of filter	0000: Standard 0001: High degree of dirt (Half of standard time)	0000: Standard	Adjusting this setting is necessary for the header unit.
03	Central control address	0001-0064: Central address 0099: Unfixed	0099: Unfixed	Adjusting this setting is necessary for the header unit.
10	Type code	0050: Air to Air Heat Exchanger (Ceiling - embedded duct)	0050: Air to Air Heat Exchanger (Ceiling - embedded duct)	Adjusting this setting is necessary for all the Air to Air Heat Exchangers in the group.
11	Capacity code	0000: Unfixed 0001-0007:	Depends on the capacity	Adjusting this setting is necessary for all the Air to Air Heat Exchangers in the group.
14	Group address	0099: Unfixed 0000: Individual 0001: Header unit 0002: Follower unit	0099: Unfixed	Does not need to be configured as it is set in No. 4 of DIPSW703. Can be changed in the DN setting when No. 4 is OFF.
28	Auto recovery from a power failure	0000: Invalid 0001: Valid * Resumes the status just before the power failure	0000: Invalid	*1
31	Single operation of the fan	0000: Invalid 0001: Valid * ON/OFF operation for the Air to Air Heat Exchanger only	0000: Invalid	Adjusting this setting is necessary for the header unit. (System equipped with the Air to Air Heat Exchanger and air conditioners)
47	24-hour nighttime heat purge Fan speed ventilation setting	0000: Always LOW 0001: Fan speed ventilation before the operation is stopped * 24-hour nighttime heat purge Fan speed ventilation setting	0000: Always LOW	Adjusting this setting is necessary for all the Air to Air Heat Exchangers in the group.
48	Imbalanced Fan speed ventilation	0000: Normal 0001: SA (High) > EA (Low) active 0002: SA (Low) < EA (High) active * “High” may be “Extra High”.	0000: Normal	Adjusting this setting is necessary for all the Air to Air Heat Exchangers in the group.
49	24-hour ventilation	0000: Invalid 0001: Valid	0000: Invalid	Adjusting this setting is necessary for all the Air to Air Heat Exchangers in the group.
4A	ON/OFF ratio of 24-hour ventilation	0000: Normal (The air volume of ventilation 1/2: 60-minute ON, 60-minute OFF) 0001-0059: Arbitrary ([SET DATA of DN] minute ON, [60-SET DATA of DN] minute OFF)	0000: Normal	Adjusting this setting is necessary for all the Air to Air Heat Exchangers in the group.
4B	Delayed operation	0000: Invalid 0001-0006: [SET DATA of DN] x 10 minutes delay * Delaying the Air to Air Heat Exchanger operation to reduce the air-conditioning load when starting running the air conditioner	0000: Invalid	Adjusting this setting is necessary for all the Air to Air Heat Exchangers in the group. (System equipped with the Air to Air Heat Exchanger and air conditioners)
4C	Nighttime heat purge	0000: Invalid 0001-0048: Start after [SET DATA of DN] x 1 hour(s) * Setting for the time before the nighttime heat purge operation starts	0000: Invalid	Adjusting this setting is necessary for all the Air to Air Heat Exchangers in the group. (System equipped with the Air to Air Heat Exchanger and air conditioners)

Code	Description	SET DATA and description	Factory default	Note
4D	Setting of the exhausting fan operation below −15°C (OA)	0000: Exhausting fan run 0001: Exhausting fan stop * The supplying fan stops when the temperature is below −15°C. (OA)	0000: Exhausting fan run	Adjusting this setting is necessary for all the Air to Air Heat Exchangers in the group.
4E	Setting of the linked operation with external devices	0000: ON/OFF linked 0001: ON linked 0002: OFF linked * Specifies whether the ON/OFF operation of the Air to Air Heat Exchanger is linked with the external device operation	0000: ON/OFF linked	Adjusting this setting is necessary for the Air to Air Heat Exchanger to which an adapter for remote ON/OFF control (sold separately) is connected.
5C	Damper output	0000: Normal 0001: Support of 24-hour fan, nighttime heat purge	0000: Normal	Adjusting this setting is necessary for the Air to Air Heat Exchanger which transfers the operation output.
9D	Start/Stop by power on/off	0000: Invalid 0001: Valid * Starts/Stops running the Air to Air Heat Exchanger by powering on/off.	0000: Invalid	Adjusting this setting is necessary for the header unit. (System equipped with the Air to Air Heat Exchanger only)
EA	Changing the ventilation mode	0001: Bypass mode 0002: Heat Exchange mode 0003: Automatic mode * Compatible with systems without a remote controller and RBC-AMT32E, RBC-AMS41E	0003: Automatic mode	*1
EB	Changing the ventilation Fan speed	0002: High 0003: Low 0004: Imbalanced * “High” may be “Extra High”. * Compatible with systems without a remote controller and RBC-AMT32E, RBC-AMS41E	0002: High	*1
EC	Automatic ventilation control in air-conditioning linkage	0000: Valid only when air-conditioner is running 0001: Valid even when air-conditioner is stopped 0002: Invalid (Control Air to Air Heat Exchanger only) * Automatic ventilation control setting in air-conditioning linkage	0000: Valid only when air-conditioner is running	Adjusting this setting is necessary for all the Air to Air Heat Exchangers in the group.
ED	Changing the operation output	0000: ON during normal operation 0001: ON during normal operation, 24-hour ventilation, or nighttime heat purge operation 0002: ON during 24-hour ventilation or nighttime heat purge operation 0003: ON when SA fan is running 0004: ON when EA fan is running	0000: ON during normal operation	Adjusting this setting is necessary for the Air to Air Heat Exchanger which transfers the operation output.
EE	Changing the abnormal signal/ Bypass mode signal output	0000: ON when an abnormal signal is detected 0001: ON when the Bypass mode signal is detected	0000: ON when an abnormal signal is detected	Adjusting this setting is necessary for the Air to Air Heat Exchanger which transfers the operation output.

*1 Adjusting this setting is necessary for the header unit when using a system equipped with the Air to Air Heat Exchanger only, and the Air to Air Heat Exchanger with the smallest indoor unit address number when using a system equipped with the Air to Air Heat Exchanger and air conditioners.

Model
Code: 10

Setting data	Model	Model name (abbreviation)
0050*	Air to Air Heat Exchanger (Ceiling-embedded)	VN-M***HE series

* Factory default value of EEPROM installed on the service circuit board

Capacity of the Air to Air Heat Exchanger
Code: 11

Setting data	Type
0000*	Invalid
0001	150m^3/h type
0002	250m^3/h type
0003	350m^3/h type
0004	500m^3/h type
0005	650m^3/h type
0006	800m^3/h type
0007	1000m^3/h type

* Factory default value of EEPROM installed on the service circuit board

■ Remote controller switch monitoring function

This function is available to call the service monitor mode from the remote controller during a test run to acquire temperatures of sensors of indoor unit (Air to Air Heat Exchanger).

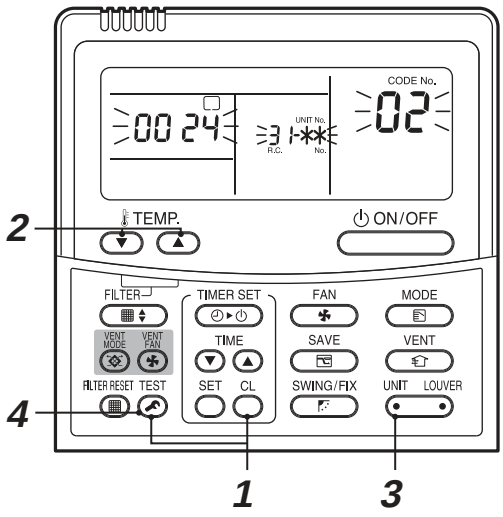
1 **Push CL and TEST buttons simultaneously for at least 4 seconds to call the service monitor mode.**

2 **Pushing TEMP. ▼ ▲ buttons, select the number of sensor (CODE No.) to be monitored. (See the following table.)**

3 **Pushing UNIT LOUVER (left side of the button), select an indoor unit to be monitored.**

* The unit number of the Air to Air Heat Exchanger is 31-OO.

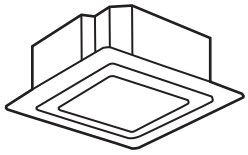
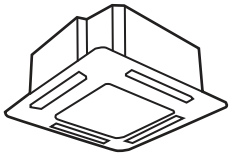
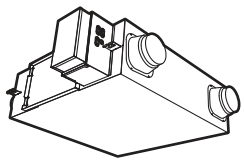
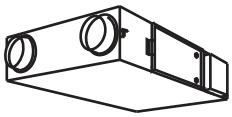
4 **Push TEST button to return to the normal display.**

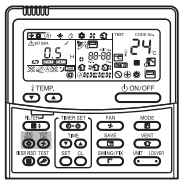


Indoor unit data (Air to Air Heat Exchanger)	
CODE No.	**Data name**
02	Indoor unit Return air temperature (TRA)
F0	Microcomputer cumulative energized hours (x 100h)
F2	Supply air fan cumulative energized hours (x 100h)
F3	Filter cumulative hours (x1 h)
FA	Indoor unit outdoor air temperature (TOA)

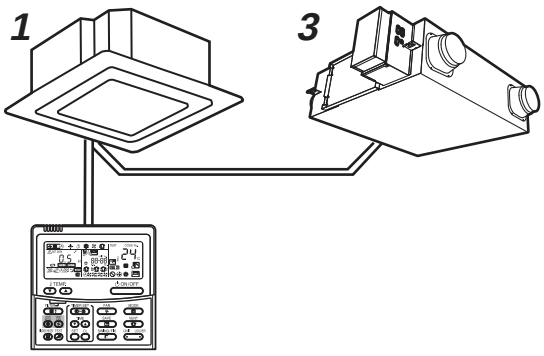
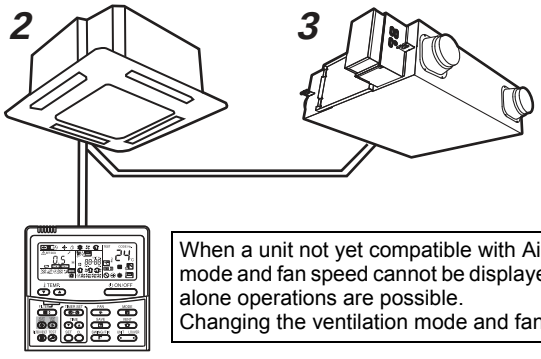
8 Air to Air Heat Exchanger Unit and Air-Conditioning System

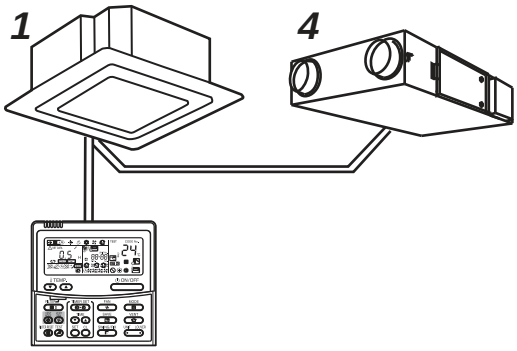
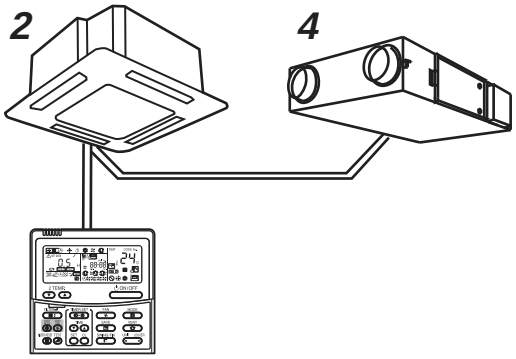
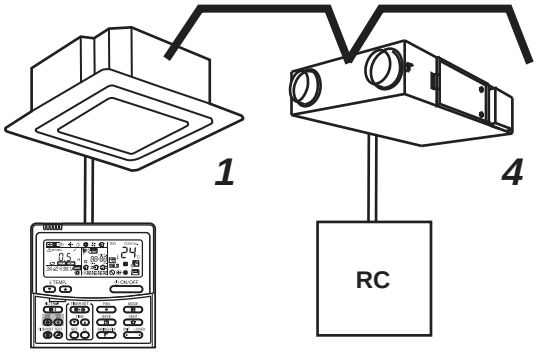
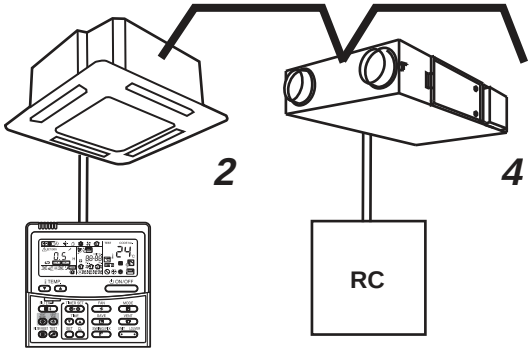
Examples of connections available when installing an Air to Air Heat Exchanger unit (VN-M OO HE)

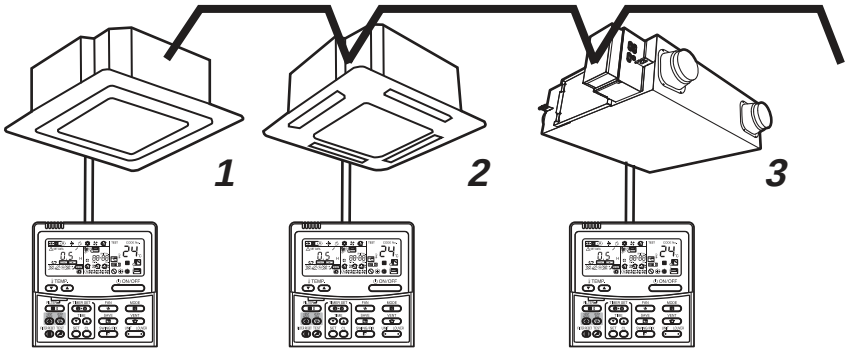
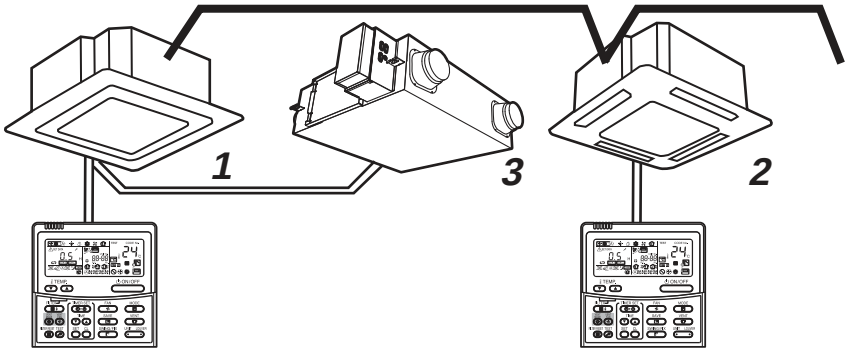
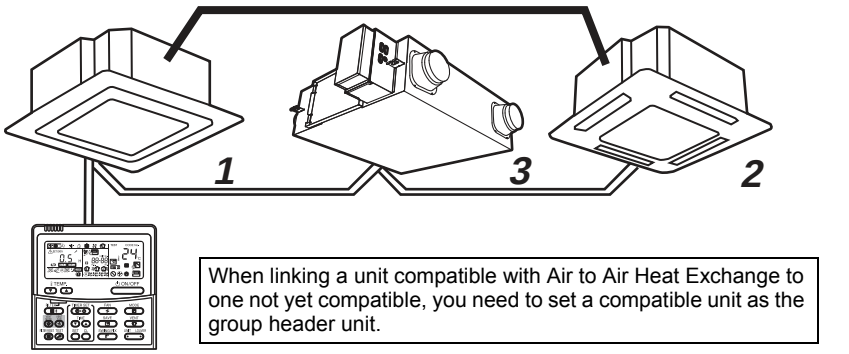
Classified by specifications				
				Remote controller line * Adapter omitted
1 Indoor unit compatible with Air to Air Heat Exchanger	***2*** Indoor unit not yet compatible with Air to Air Heat Exchanger	***3*** New Air to Air Heat Exchanger unit (VN-M OO HE)	***4*** Old Air to Air Heat Exchanger unit (VN- OO TE) (VN-1K TAE) (VN-1K TBE)	TCC-LINK line

Remote controller

NRC-01HE

Not on the assumption of connection with an Air to Air Heat Exchanger unit or via general-purpose device interface

Pattern 1	 Possible
Pattern 2	 Possible When a unit not yet compatible with Air to Air Heat Exchange is connected, the ventilation mode and fan speed cannot be displayed, but the linkage and Air to Air Heat Exchanger stand alone operations are possible. Changing the ventilation mode and fan speed is also possible depending on the DN setting.

Pattern 3		Not Possible
Pattern 4		Not Possible
Pattern 5		Not Possible
Pattern 6		Not Possible

Pattern 7	 Possible
Pattern 8	 Possible
Pattern 9	 Possible When linking a unit compatible with Air to Air Heat Exchange to one not yet compatible, you need to set a compatible unit as the group header unit.

■ List of Indoor Units (SMMS Series) Compatible with the Air to Air Heat Exchanger Unit

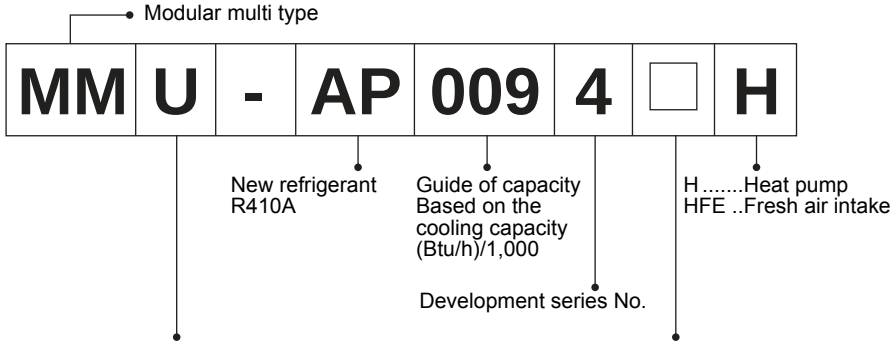
- "O" in the tables indicates an indoor unit compatible with the Air to Air Heat Exchanger unit.
  * For the 4-way air discharge type/2-way air discharge type, products produced in September 2010 or later are compatible.

- "–" in the tables indicates an indoor unit not yet compatible with the Air to Air Heat Exchanger unit.
  * The linkage operation is possible, but changing the ventilation mode and fan speed is not possible. (Will be possible if the DN setting is changed)

- If "O" is shown but the development number is older than that indicated in the tables, the indoor unit is not yet compatible with the Air to Air Heat Exchanger unit.
  * The linkage operation is possible, but changing the ventilation mode and fan speed is not possible. (Will be possible if the DN setting is changed)

Indoor unit type	Cassette type				Duct type			Ceiling type	High wall type
	4-way air discharge type	Compact 4-way air discharge type	2-way air discharge type	1-way air discharge type	Duct type	Built-in type	Slim duct type		
Development No. (Series No.)	2	4	2	4	4	4	4	4	4
Compatibility	O	O	O	O	O	O	O	O	–

Indoor unit type	Floor type			Floor standing type	Fresh air intake type
	Cabinet type	Concealed type	Console type		
Development No. (Series No.)	4	4	4	4	1
Compatibility	O	O	O	O	–



Type	Note on type
U .....Cassette type	None ...4-way air discharge type M.....Compact 4-way air discharge type W.....2-way air discharge type S.....1-way air discharge type Y.....Small sized 1-way air discharge type
D .....Duct type	None ...High static pressure type B.....Built-in type SP .....Slim duct type
C .....Ceiling type	None ...Ceiling type
K.....High wall type	M.....High wall type
L .....Floor type	None ...Cabinet type B.....Concealed type N .....Console type
F .....Floor standing type	None ...Floor standing type

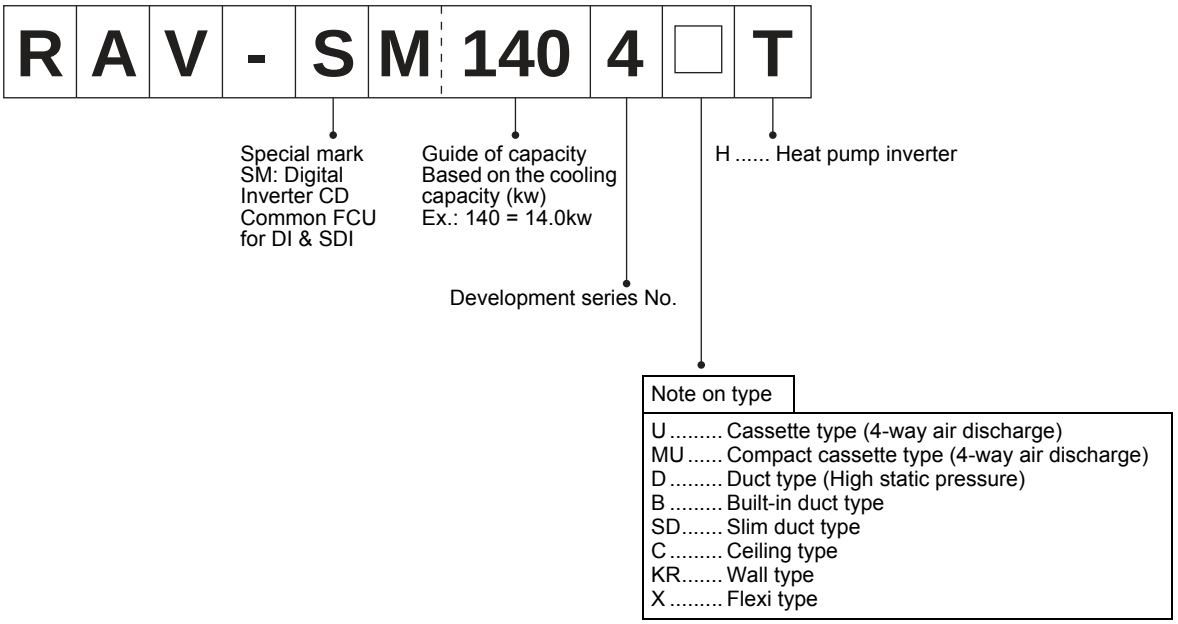
■ List of Indoor Units (DI, SDI Series) Compatible with Air to Air Heat Exchanger Unit

- "O" in the tables indicates an indoor unit compatible with the Air to Air Heat Exchanger unit.
  * For the 4-way air discharge type/Duct type/Slim duct type, products produced in September 2010 or later are compatible.

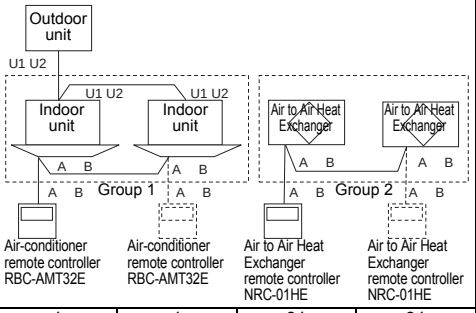
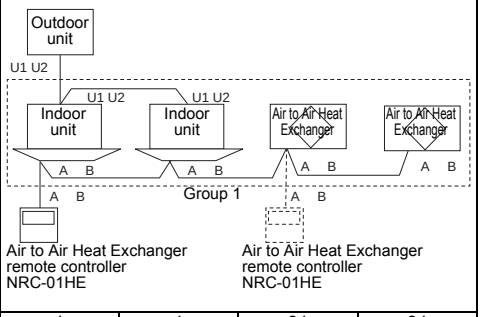
- "–" in the tables indicates an indoor unit not yet compatible with the Air to Air Heat Exchanger unit.
  * The linkage operation is possible, but changing the ventilation mode and fan speed is not possible. (Will be possible if the DN setting is changed)

- If "O" is shown but the development number is older than that indicated in the tables, the indoor unit is not yet compatible with the Air to Air Heat Exchanger unit.
  * The linkage operation is possible, but changing the ventilation mode and fan speed is not possible. (Will be possible if the DN setting is changed)

Indoor unit type	Cassette type		Duct type			Ceiling type	High wall type	Flexi type
	4-way air discharge type	Compact 4-way air discharge type	Duct type	Built-in type	Slim duct type			
Development No. (Series No.)	4	4	2	4	4	4	4	2
Compatibility	O	O	O	O	O	O	–	–



Air to Air Heat Exchanger Unit and (SMMS Series) Air-Conditioning System

<table>
<tr><th>System</th><th>Central control</th><th>Address</th><th colspan="4">Air to Air Heat Exchanger only</th><th colspan="4">Linked with air-conditioner</th></tr>
<tr><td rowspan="12">Air to Air Heat Exchanger and Air-Conditioner (SMMS series)</td><td rowspan="6">Without central control</td><td></td><td colspan="4"> 
</td><td colspan="4"> 
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<tr><td>Line address</td><td>1</td><td>1</td><td>31</td><td>31</td><td>1</td><td>1</td><td>31</td><td>31</td></tr>
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<tr><td>Group address</td><td>1</td><td>2</td><td>1</td><td>2</td><td>1</td><td>2</td><td>2</td><td>2</td></tr>
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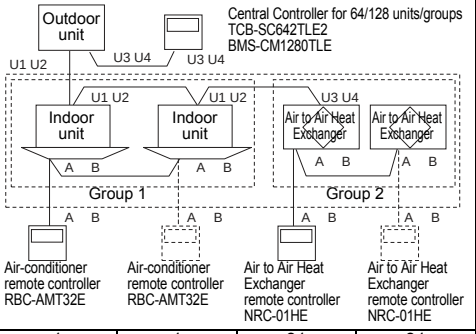
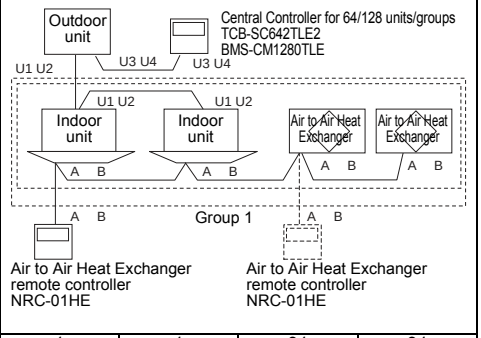
<tr><td>Air to Air Heat Exchanger address settings</td><td colspan="4">• The line (system) address of an Air to Air Heat Exchanger unit is always 31.
• The indoor unit address of an Air to Air Heat Exchanger unit needs to be manually specified in No.1 to No.4 of SW702 and in No.1 and No.2 of SW703.
• The group address of only one Air to Air Heat Exchanger unit needs to be manually specified to “header: ON” in No.4 of SW703.</td><td colspan="4">• The line (system) address of an Air to Air Heat Exchanger unit is always 31.
• The indoor unit address of an Air to Air Heat Exchanger unit needs to be manually specified in No.1 to No.4 of SW702 and in No.1 and No.2 of SW703.
(The setting of the smallest address applies to the remote controller display.)
• The group address of an Air to Air Heat Exchanger unit does not need to be specified.</td></tr>
<tr><td>Remote controller</td><td colspan="4">Air-conditioner group
• RBC-AMT32E, RBC-AMS41E, and NRC-01HE can be used.
Air to Air Heat Exchanger group
• RBC-AMT32E cannot be connected.
• RBC-AMS41E can be used. (*1)
• NRC-01HE can be used.</td><td colspan="4">• RBC-AMT32E, RBC-AMS41E can be used. (*1)
• NRC-01HE can be used.</td></tr>
<tr><td>Note</td><td colspan="4"></td><td colspan="4">• The group header must be an indoor unit compatible with Air to Air Heat Exchange.
• If the group header is an indoor unit not yet compatible with Air to Air Heat Exchange, the linkage operation is possible, but the ventilation fan speed and mode of the Air to Air Heat Exchanger cannot be changed (can be changed depending on the DN setting).
• The group follower can run without any problems even if it is an indoor unit not yet compatible with Air to Air Heat Exchange.</td></tr>
<tr><td rowspan="6">With central control</td><td></td><td colspan="4"> 
</td><td colspan="4"> 
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• The group address of an Air to Air Heat Exchanger unit does not need to be specified.</td></tr>
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Air to Air Heat Exchanger group
• RBC-AMT32E cannot be connected.
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• NRC-01HE can be used.</td><td colspan="4">• RBC-AMT32E, RBC-AMS41E can be used. (*1)
• NRC-01HE can be used.</td></tr>
<tr><td>Note</td><td colspan="4">• Connect central control wiring only to the header of the Air to Air Heat Exchanger.
• Do not connect remote controller wiring between the indoor unit and Air to Air Heat Exchanger unit.</td><td colspan="4">• The group header must be an indoor unit compatible with Air to Air Heat Exchange.
• If the group header is an indoor unit not yet compatible with Air to Air Heat Exchange, the linkage operation is possible, but the ventilation fan speed and mode of the Air to Air Heat Exchanger cannot be changed (can be changed depending on the DN setting).
• The group follower can run without any problems even if it is an indoor unit not yet compatible with Air to Air Heat Exchange.
• Do not connect central control wiring between the indoor unit and Air to Air Heat Exchanger unit.</td></tr>
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(*1) Ventilation fan speed and mode of the Air to Air Heat Exchanger cannot be changed (can be changed depending of the DN setting).

Air to Air Heat Exchanger Unit and (DI, SDI Series) Air-Conditioning System

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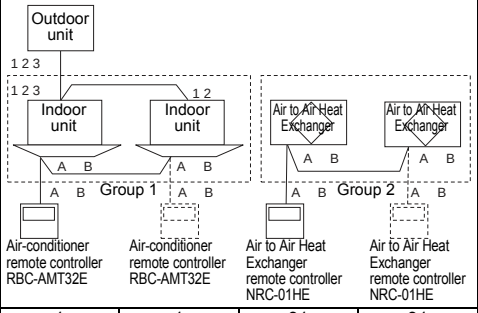
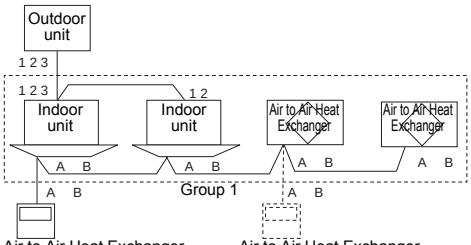
<tr><td rowspan="12">Air to Air Heat Exchanger and Air-Conditioner (DI, SDI series)</td><td rowspan="6">Without central control</td><td></td><td colspan="4"> 
</td><td colspan="4"> 
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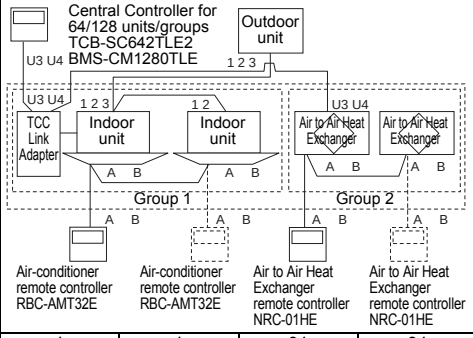
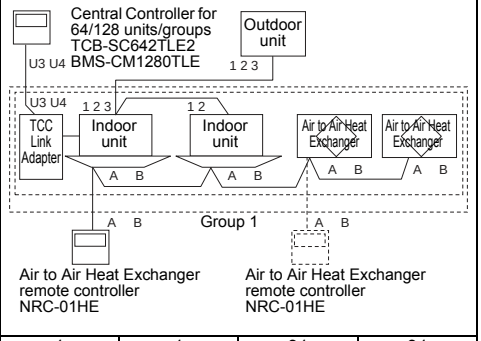
<tr><td rowspan="6">With central control</td><td></td><td colspan="4"> 
</td><td colspan="4"> 
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• The group follower can run without any problems even if it is an indoor unit not yet compatible with Air to Air Heat Exchange.
• Do not connect central control wiring between the indoor unit and Air to Air Heat Exchanger unit.</td></tr>
</table>

(*1) Ventilation fan speed and mode of the Air to Air Heat Exchanger cannot be changed (can be changed depending of the DN setting).

9 Failure Diagnosis

9-1. Failure Diagnosis

9-1-1. Before diagnosing failure

Symptom	Cause
Operation does not start after pressing the button.	• Is the circuit breaker turned off?
	• Has a power failure occurred?
	• Does the indicator light up? (The ventilation delay setting is set to CODE No. [49] “ON” and it is not malfunction. The Air to Air Heat Exchanger will start running after the time set has passed.)
• Air does not come out. • The sound is loud.	Are the filters or heat exchange elements clogged? For maintenance, see page 134.
The unit runs though the operation lamp does not turn on.	Does the or 24H indicator appear on the display? The nighttime heat purge operation or 24-hour ventilation is set to CODE No. [4C] [49] “ON”. See page 80 for how to use the functions.
The unit starts running without any operation of the remote controller.	Has the unit just recovered from a power failure or have you just turned on the circuit breaker? (The settings concerning recovering from power failure or start/stop by power on/off are set to CODE No. [28] [9D] “ON”. Consult your dealer for details.)

9-1-2. How to diagnose failure

Situation	Where to check	Cause	Remedy
Displayed on the remote controller…Depends on the check code.			
Displayed on the central controller…Depends on the check code.			
The motor does not run.	• Lead wire	The circuit is open.	• Replace the motor with a new one.
	• Connection	A connection is loose.	• Connect firmly. • (Electric board, Motor connector)
	• Motor	The motor bearing is locked. The motor coil or temperature fuse is broken.	• Replace the motor with a new one.
	• Fan rotation	The fan is not rotating.	• Remove any obstacles.
	• Capacitor	The capacitor is not working properly.	• Replace the capacitor with a new one.
An abnormal sound is heard from the inside.	• Motor	Electromagnetic sound (the motor is buzzing). The bearing is in poor condition.	• Replace the motor with a new one.
	• Fan	The fan has not been installed properly. A foreign object has been taken in. The fan has been deformed.	• Install the fan securely. • Remove the foreign object. • Replace the fan with a new one.
	• Screws	A screw(s) is/are loose (not tightened completely).	• Tighten the screws firmly.
	• Filter	The filter is clogged.	• Clean the filter.
	• Heat exchange element	The heat exchange element is clogged.	• Clean the heat exchange element.
The motor is not running fast enough.	• Capacitor	The capacitor is not working properly.	• Replace the capacitor with a new one.
	• Motor	The motor bearing is not running smoothly.	• Replace the motor with a new one.
The damper does not open or close.	• Lead wire	A connection is loose.	• Connect firmly.
	• Damper motor	The coil of the damper motor is broken.	• Replace the damper motor with a new one.
	• Damper	Something is caught on the sliding part.	• Remove whatever is caught.
	• Connector assembly	A connection is loose.	• Replace the assembled connector with a new one.

9-2. How to Check for Errors

The remote controller (local remote controller or central control) is equipped with an LCD that displays the operation status. If an error has occurred, see the following table to check the error of the Air to Air Heat Exchanger unit using the failure diagnosis function.

The following tables show lists of the check codes indicated by each device. See the following tables for how to check depending on the location.

* For checking using the indoor remote controller or TCC-LINK central controller…See “Local remote controller & TCC-LINK central controller” in the following table.

Check code list (Indoor)

(Air to Air Heat Exchanger unit)

Check code Remote controller & TCC-LINK central controller	Typical cause of error	Description
E03	Indoor unit - remote controller regular communication error	No data is received from the remote controller or network adapter. (Also no central control communication)
E08	Duplicate indoor addresses	An address the same as the self-address was detected.
E18	Header indoor unit - indoor follower unit regular communication error	Regular communication is not possible between the header and follower indoor units.
F17	Outdoor air temperature sensor (TOA) error	Open-circuit or short-circuit of the outdoor air temperature sensor (TOA) was detected.
F18	Return air temperature sensor (TRA) error	Open-circuit or short-circuit of the return air temperature sensor (TRA) was detected.
F29	Indoor unit or other P.C. board error	EEPROM error (Another error may have been detected)
L03	Duplicate header indoor units	There are two or more header units in the group.
L08	Indoor group address not set	The indoor address group has not been set. (May also be detected on the outdoor unit side)
L09	Indoor power level not set	The indoor power level has not been set.
L20	Duplicate central control addresses	Central control addresses are duplicate.
P31	Other indoor unit error	The follower unit in the group cannot be run due to the E03/L07/L03/L08 alerts of the header unit.

(Remote controller)

Check code Local remote controller	Typical cause of error	Description
E01	No header remote controller, Remote controller communication error	No signal can be received from the indoor unit. The header remote controller has not been set (including double remote controllers).
E02	Remote controller transmission error	No signal can be sent to the indoor unit.
E09	Duplicate header remote controllers	Two remote controllers are set as header in the double-remote controller control. (* The header indoor unit stops signaling an error, and the follower indoor units continue running.)

(Central control device)

Check code TCC-LINK central controller	Typical cause of error	Description
C05	Central control communication (transmission) error	No central control signal can be sent.
C06	Central control communication (reception) error	No central control signal can be received.
P30	Follower unit error	An error occurred on the follower unit in the group. (“∗∗∗” is displayed on the local remote controller)

NOTE

Even if the same error (e.g. communication error) has occurred, the check code may differ depending on the device.

If the error was detected by the local remote controller or central control device, the error does not always affect the operations of the Air to Air Heat Exchanger unit.

9-3. Troubleshooting

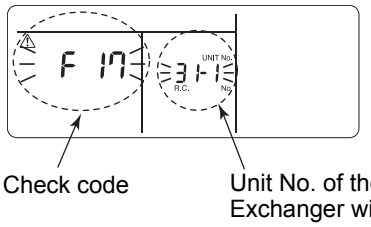
■ Confirmation and check

When an error occurred in the Air to Air Heat Exchanger, the check code and the unit No. of Air to Air Heat Exchanger appear on the display part of the remote controller.

The check code is only displayed during the operation.

If the display disappears, operate the Air to Air Heat Exchanger according to the following “Confirmation of error history” for confirmation.

* Unit No. of Air to Air Heat Exchanger is 31-OO.



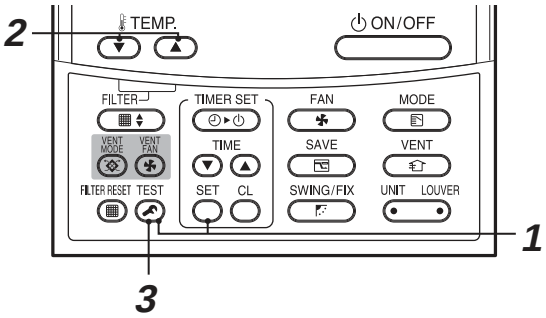
Check code

Unit No. of the Air to Air Heat Exchanger with a problem

■ Confirmation of error history

When an error occurred on the Air to Air Heat Exchanger, the error history can be confirmed with the following procedure. (The error history is stored in memory up to 4 troubles.)

The error can be confirmed from both operating status and stop status.

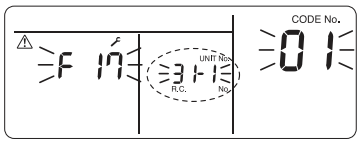


1 **When pushing SET and TEST buttons at the same time for 4 seconds or more, the following display appears.**

If [Service check] is displayed, the mode enters in the trouble history mode.

- [**01**: Order of error history] is displayed in CODE No. window.
- [Check code] is displayed in CHECK window.
- [Air to Air Heat Exchanger address in which an error occurred] is displayed in Unit No.

* Unit No. of Air to Air Heat Exchanger is 31-OO.



2 **Every pushing of TEMP. button used to set temperature, the error history stored in memory is displayed in order.**

The numbers in CODE No. indicate CODE No. [**01**] (latest) → [**04**] (oldest).

REQUIREMENT

Do not push CL button because all the error history of the Air to Air Heat Exchanger will be deleted.

3 **After confirmation, push TEST button to return to the usual display.**

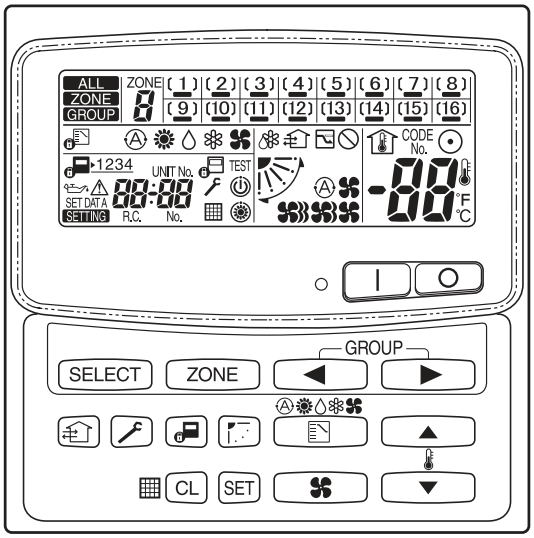
How to read the code display

<Seven-segment display>

<Actual character>

0 1 2 3 4 5 6 7 8 9 A b C d E F H J L P

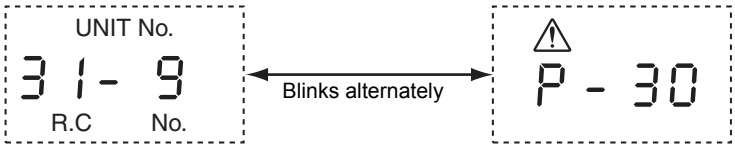
■ TCC Link Central Control Remote Controller (TCB-SC642TLE2)



(1) Checking and testing

If an error has occurred in the Air to Air Heat Exchanger, the check code and the unit No. of the Air to Air Heat Exchanger appear on the display of the remote controller.
Unit No. of the Air to Air Heat Exchanger is 31-OO.
Check codes are only displayed while the Air to Air Heat Exchanger is in operation.
If the display has already disappeared, access the error history by following the procedure described below.

Display of unit No. **Display of check code**



(2) Checking the error history

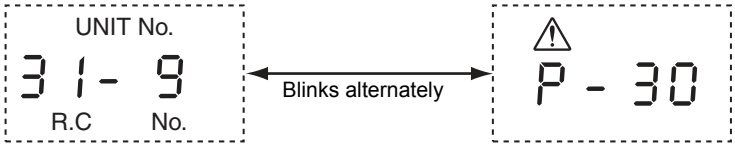
If an error has occurred on the Air to Air Heat Exchanger, the error history can be checked with the following procedure. Up to four errors are stored in memory.
The error history can be accessed regardless of whether the Air to Air Heat Exchanger is in operation or shut down.

1 **Press and hold the [🔧] and [SET] buttons simultaneously for at least four seconds.**

2 **"🔧" lights up, and CODE No. "01" is displayed.**

3 **If there is an error history when a group number is selected (blinking), the unit No. and the latest error history information are displayed alternately.**

Display of unit No. **Display of check code**



4 **To check other error history items, push the 🌡 buttons [▲] and [▼] to select another check CODE No. (01–04).**

5 **To check on a check code relating to another group, push the [ZONE] and [GROUP ◀] [GROUP ▶] buttons to select a group number.**
Do not push the [CL] button, as it will erase the entire error history of the selected group.

6 **To finish the service check, push the [🔧] button.**

9-4. Check Codes Displayed on the Remote Controller and Locations to Be Checked

Check code Remote controller	Location of detection	Check code name	System status	Error detection conditions	Items to check (locations)
E01	Remote controller	Indoor–remote controller communication error (detected at remote controller end)	Stop of corresponding unit only	Communication between indoor PC board and remote controller is disrupted.	• Check remote controller inter-unit tie cable (A/B). • Check for a broken wire or bad connector contact. • Check indoor power supply. • Check for defects in the indoor PC board. • Check remote controller address settings (when two remote controllers are in use). • Check remote controller board.
E02	Remote controller	Remote control transmission error	Stop of corresponding unit only	Signal cannot be transmitted from remote controller to indoor unit.	• Check internal transmission circuit of remote controller. • Replace remote controller as necessary.
E03	Indoor	Indoor–remote controller communication error (detected at indoor end)	Stop of corresponding unit only	There is no communication from the remote controller and communication adapter.	• Check remote controller and network adapter wiring.
E08	Indoor I/F	Duplicate indoor address	Stop of corresponding unit only	More than one indoor unit are assigned the same address.	• Check indoor address. • Check for any change made to remote controller connection (group/individual) since indoor address setting.
E09	Remote controller	Duplicate master remote controller	Stop of corresponding unit only	In two-remote controller configuration, both controllers are set up as master. (Header indoor unit is shut down with alarm, while follower indoor units continue operating.)	• Check remote controller settings. • Check remote controller board
E18	Indoor	Error in communication between indoor header and follower units	Stop of corresponding unit only	Periodic communication between indoor header and follower units cannot be maintained.	• Check remote controller wiring. • Check indoor power supply wiring. • Check PC boards of indoor units.
F17	Air to Air Heat Exchanger	Outdoor air temperature sensor (TOA) error	Stop of corresponding unit only	The resistance value of the sensor is infinite or zero (open or short circuit).	• Check TOA sensor connector connection and wiring. • Check TOA sensor resistance characteristics. • Check for defective Air to Air Heat Exchanger PC board.
F18	Air to Air Heat Exchanger	Return air temperature sensor (TRA) error	Stop of corresponding unit only	The resistance value of the sensor is infinite or zero (open or short circuit).	• Check TRA sensor connector connection and wiring. • Check TRA sensor resistance characteristic. • Check for defective Air to Air Heat Exchanger PC board.
F29	Indoor	Other indoor error	Stop of corresponding unit only	Indoor PC board is not operating normally.	• Check for defect in indoor PC board (faulty EEPROM)
L03	Indoor	Duplicate indoor header unit	Stop of corresponding unit only	There is more than one header unit in the group.	• Check indoor address. • Check for any change made to remote controller connection (group/individual) since indoor address setting.
L08	Indoor	Indoor group/ addresses not set	Stop of corresponding unit only	Address has not been set.	• Check indoor address. **Note:** This code is displayed when the power is turned on for the first time after installation.
L09	Indoor	Indoor capacity not set	Stop of corresponding unit only	Capacity of indoor unit has not been set.	Set indoor capacity (DN = 11)

Check code	Location of detection	Check code name	System status	Error detection conditions	Items to check (locations)
Remote controller					
L20	Indoor	Duplicate central control address	Stop of corresponding unit only	Duplicate central control address	• Check central control addresses. • Check network adapter PC board (applicable to AI-NET).
P31	Indoor	Other indoor error (group follower unit error)	Stop of corresponding unit only	There is error in another indoor unit in the group. Detection of E07/L07/ L03/L08	• Check PC boards of indoor units.

* “Indoor” in “location of detection” refers to Air to Air Heat Exchanger and air conditioner indoor units.

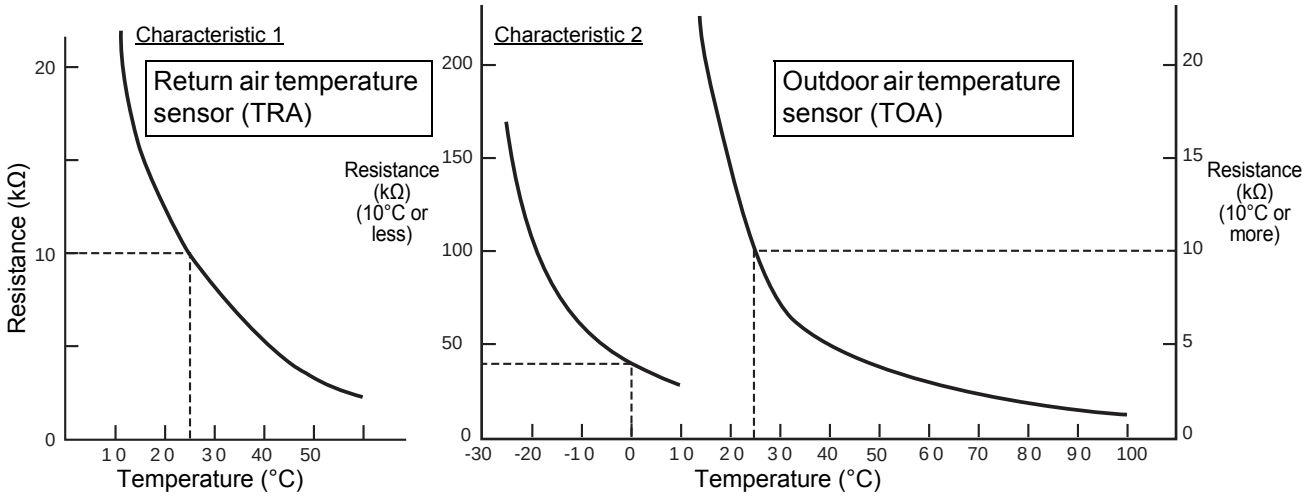
Errors detected by TCC-LINK central control device

Check code	Location of detection	Check code name	System status	Error detection conditions	Items to check (locations)
Remote controller					
C05	TCC-LINK	TCC Link central control device transmission error	Continued operation	Central device is unable to transmit a signal.	• Check for defects in the central control device. • Check for defects in central control communication line. • Check termination resistance setting.
C06	TCC-LINK	TCC Link central control device reception error	Continued operation	Central control device is unable to receive a signal.	• Check for defects in the central control device. • Check for defects in central control communication line. • Check termination resistance setting. • Check power supply for devices at the other end of the central control communication line. • Check for defects in PC boards of devices at the other end of the central control communication line.
P30	TCC-LINK	Group control follower unit error	Continued operation	Error occurs in a follower unit under group control (“P30” is displayed on the central control remote controller).	• Check the check code of the unit where the error was detected.
		Duplicate central control address	Continued operation	Duplicate central control address	• Check address settings.

9-5. Sensor Characteristics

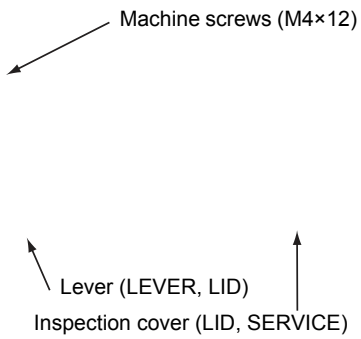
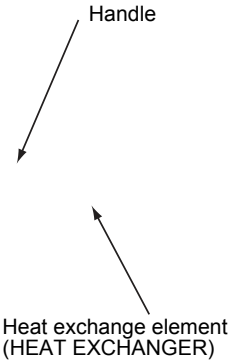
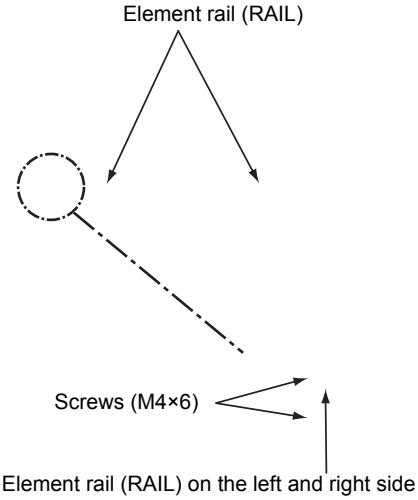
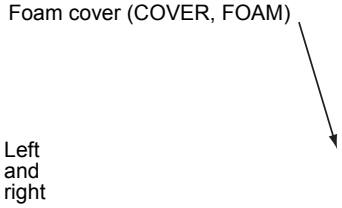
Air to Air Heat Exchanger

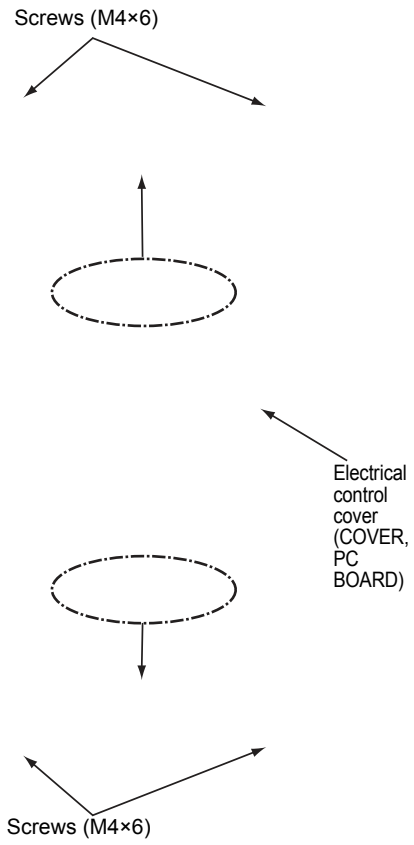
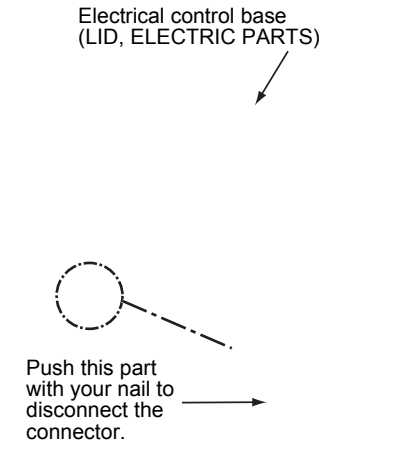
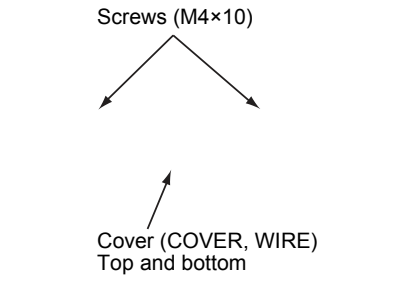
▼ Temperature Sensor Characteristics

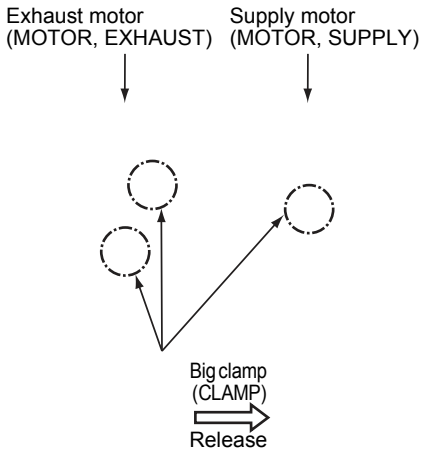
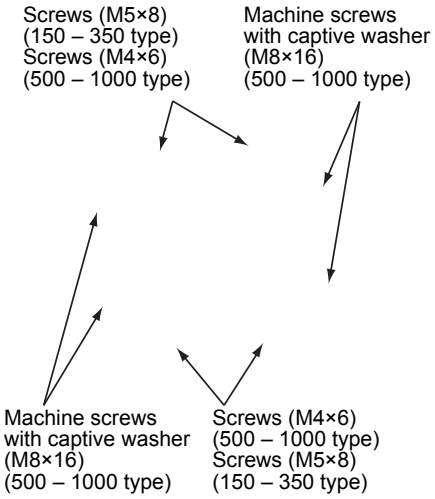
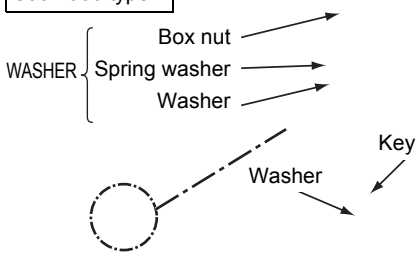
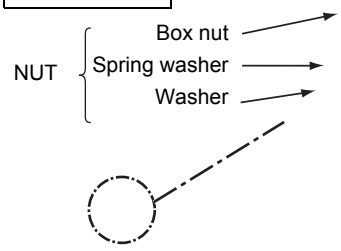


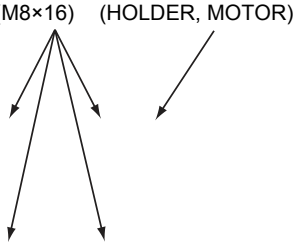
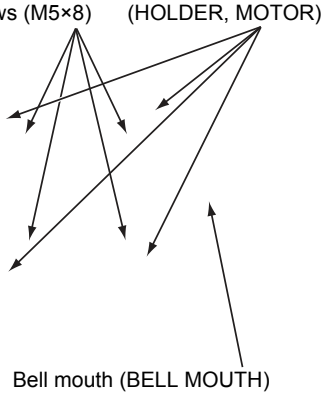
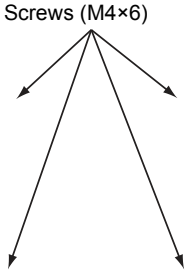
10 Exchanging and Assembling the Main Components

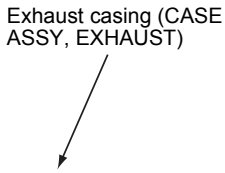
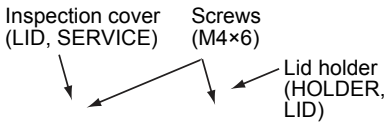
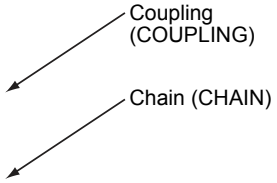
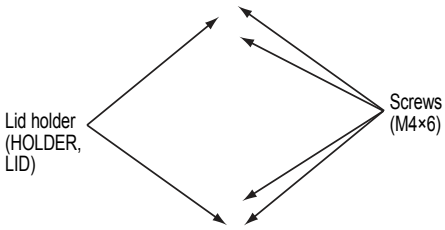
■ Assembling and exchanging the fan components

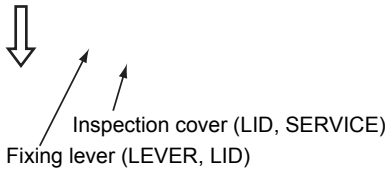
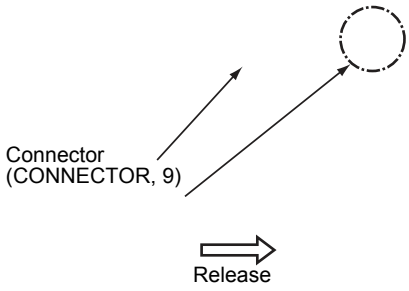
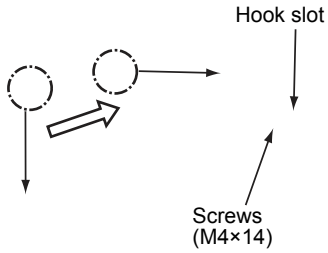
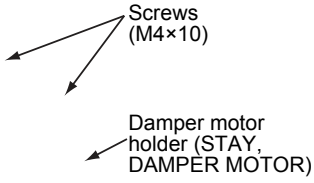
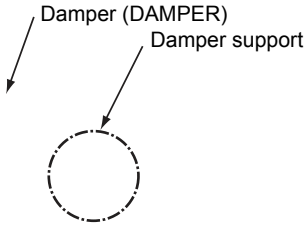
No.	Component	Procedure	Note
1	Inspection cover (LID, SERVICE) ***1***, ***15***, ***16***	***1.*** Remove the machine screws (M4×12) that fix the inspection cover (LID, SERVICE), pull up the lever (LEVER, LID), then remove the cover.	
2	Heat exchange element (HEAT EXCHANGER) ***1***, ***2***	***2.*** Hold the handle of the heat exchange element (HEAT EXCHANGER), then pull it out. **Note:** A single heat exchange element (HEAT EXCHANGER) weighs 2 – 4 kg (there are two elements). Be careful not to drop it.	
3	Element rail (RAIL) ***1*** - ***3***	***3.*** Remove the two screws (M4×6) that fix the element rail (RAIL) to pull the rail out.	
4	Foam cover (COVER, FOAM) ***1*** - ***4***	***4.*** Slide the foam cover (COVER, FOAM) to the center of the product to pull it out.	

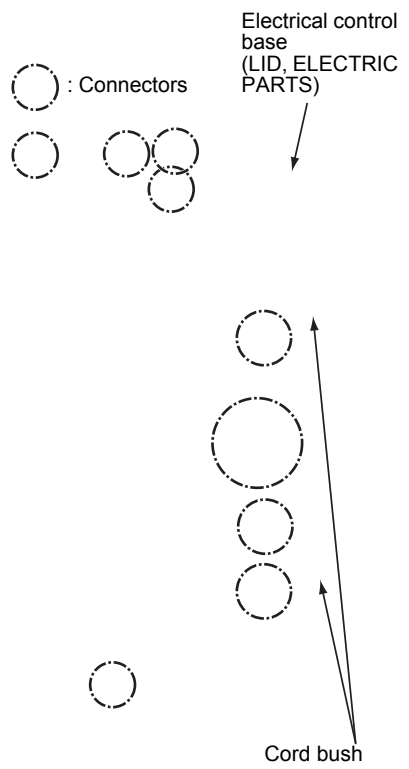
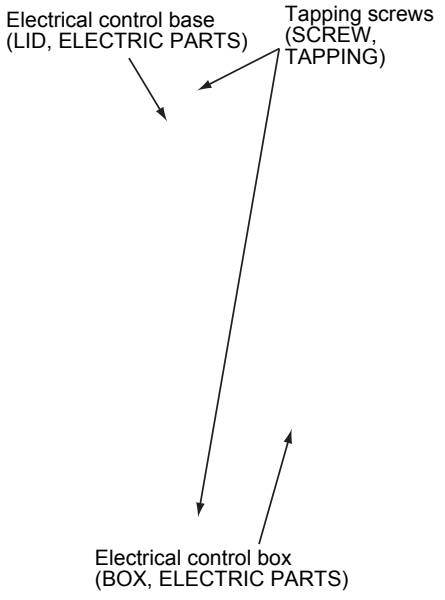
No.	Component	Procedure	Note
5	Electrical control cover (COVER, PC BOARD) ***5***	***5.*** Remove the four screws (M4×6) that fix the electrical control cover (COVER, PC BOARD), then remove the cover.	
6	Connector of MOTOR ***5***, ***6***	***6.*** Open the electrical control base (LID, ELECTRIC PARTS), and disconnect the connector (CONNECTOR, 1) connected to the connector of motor. **Note:** The connector of the supply motor (MOTOR, SUPPLY) is white. The connector of the exhaust motor (MOTOR, EXHAUST) is black.	
7	Cover (COVER, WIRE) ***1***, ***2***, ***7***	***7.*** Remove the four screws (M4×6) that fix the cover (COVER, WIRE), then remove the cover.	

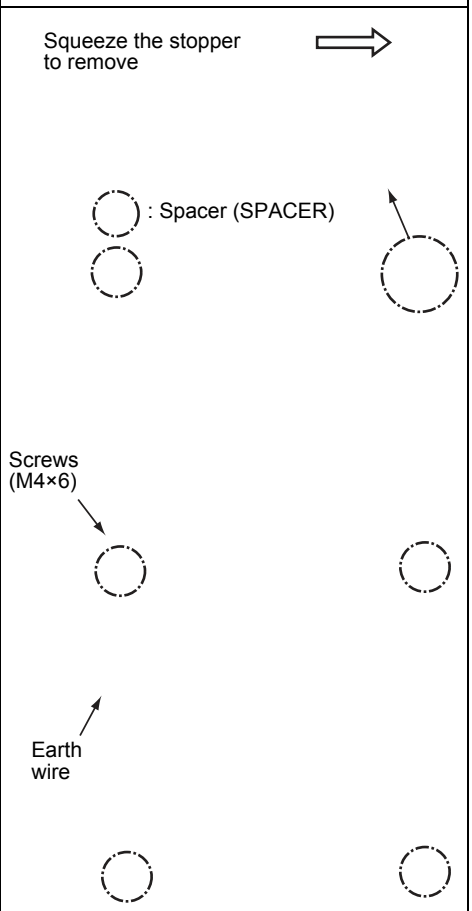
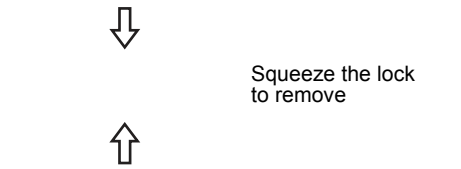
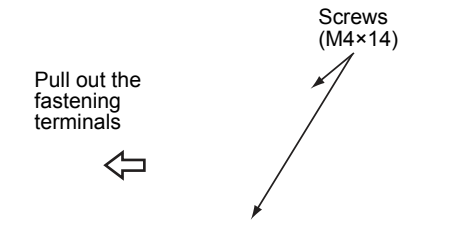
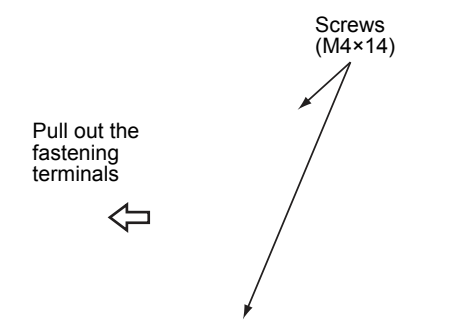
No.	Component	Procedure	Note
8	Fan (FAN) ***1*** - ***10***	***8.*** Release the big clamp (CLAMP) that fixes the cords of the supply motor (MOTOR, SUPPLY) and exhaust motor (MOTOR, EXHAUST).	
		9. Remove the screws that fix the motor holder (HOLDER, MOTOR), hold the holder, then slide it to the center of the product to remove it. **Note:** 150 – 350 type 4 Screws (M5×8) used 500 – 1000 type 4 Screws (M4×6) used 4 Machine screws with captive washer (M8×16) used	
		10.Remove the box nut, spring washer, and washer (NUT) that fix the fan (FAN), then remove the fan. **Note:** For the 800/1000 type, do not lose the key and washer left in the motor shaft.	800/1000 type  150 – 650 type 

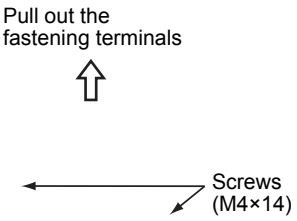
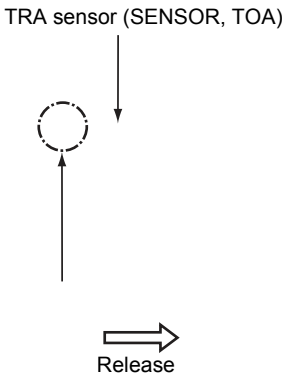
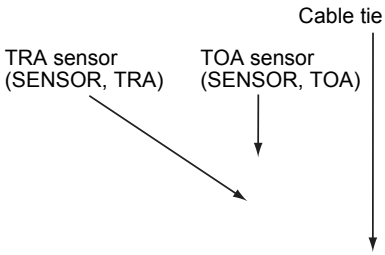
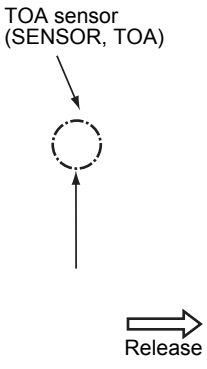
No.	Component	Procedure	Note
9	Supply motor (MOTOR, SUPPLY) ***1*** - ***6***, ***8*** - ***11***	***11.***Remove the screws that fix the supply motor (MOTOR, SUPPLY), then remove the motor.	800/1000 type Hexagon head screws (M8×16) Motor holder (HOLDER, MOTOR) 
10	Exhaust motor (MOTOR, EXHAUST) ***1*** - ***10***, ***12***	***12.***Remove the screws that fix the exhaust motor (MOTOR, EXHAUST), then remove the motor.	150 – 650 type Pan head screws (M5×8) Motor holder (HOLDER, MOTOR)  Bell mouth (BELL MOUTH)
11	Motor holder (HOLDER, MOTOR) Bell mouth (BELL MOUTH) ***1*** - ***6***, ***8*** - ***13***	***13.***Remove the four screws (M4×6) that fix the motor holder (HOLDER, MOTOR) and bell mouth (BELL MOUTH), then pull the four holders out. **Note:** The bell mouth (BELL MOUTH) of the 800/1000 type comes with the motor holder (HOLDER, MOTOR).	150 – 650 type Screws (M4×6) 

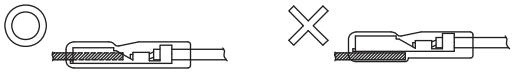
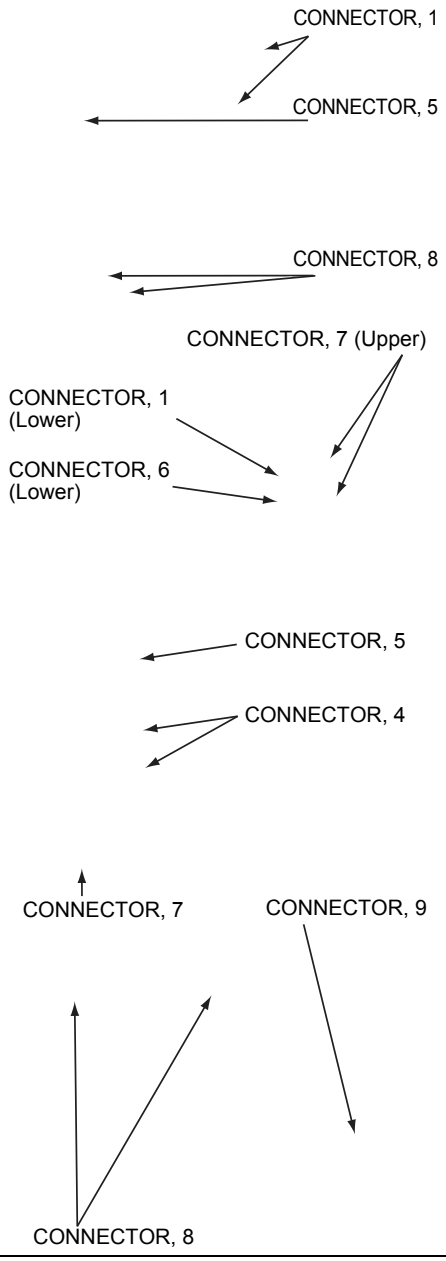
No.	Component	Procedure	Note
12	Exhaust casing (CASE ASSY, EXHAUST) ***1*** - ***4***, ***14***	***14.***Pull the exhaust casing (CASE ASSY, EXHAUST) to the former location of the foam cover (COVER, FOAM), pull the bottom toward you, then turn it horizontally to pull it out.	
13	Coupling (COUPLING) ***15***, ***16***	***15.***Remove the screws (M4×6) that fix the coupling (COUPLING), then remove the coupling. There is one on the inspection cover (LID, SERVICE), and one on the Lid holder (HOLDER, LID).	
14	Chain (CHAIN) ***15***, ***16***	***16.***Separate the chain (CHAIN) from the coupling (COUPLING).	
15	Lid holder (HOLDER, LID) ***1***, ***15***, ***17***	***17.***Remove the four screws (M4×6) that fix the lid holder (HOLDER, LID), then remove the holder. Two screws per location (there are two locations).	

No.	Component	Procedure	Note
16	Fixing lever (LEVER, LID) ***1***, ***18***	***18.***Widen the fixing lever (LEVER, LID) to remove it from the gutter.	
17	Damper motor holder (STAY, DAMPER MOTOR) ***1***, ***2***, ***19***, ***20***	***19.***Release the small clamp (CLAMP) and big clamp (CLAMP) that fix the connector (CONNECTOR, 9), then remove the connector.	
		20.Loosen the screw that fixes the damper motor holder (STAY, DAMPER MOTOR), then slide it toward you to remove it. **Note:** The screw hole of the damper motor holder (STAY, DAMPER MOTOR) is a hook slot, and you can remove the damper motor holder without removing the screw completely.	
18	Damper motor (MOTOR, LOUVER) ***1***, ***2***, ***19*** - ***22***	***21.***Remove the connector (CONNECTOR, 9) from the damper motor (MOTOR, LOUVER).	
		22.Remove the two screws that fix the damper motor (MOTOR, LOUVER), then remove it.	
19	Damper (DAMPER) ***1***, ***2***, ***19*** - ***23***	***23.***Remove the damper (DAMPER) from the damper motor holder (STAY, DAMPER MOTOR). Remove the damper motor (MOTOR, LOUVER), then remove the damper from the damper support.	

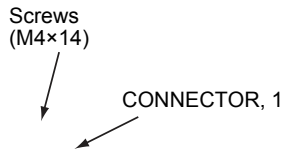
No.	Component	Procedure	Note
20	Electrical control base (LID, ELECTRIC PARTS) Tapping (SCREW, TAPPING) ***5***, ***24***, ***25***, ***26***	***24.*** Disconnect all the connectors from the PC board (PC BOARD). Thread all the connectors through the cord bushes.	
		25. Remove the two tapping screws (SCREW, TAPPING), then remove the electrical control base (LID, ELECTRIC PARTS).	

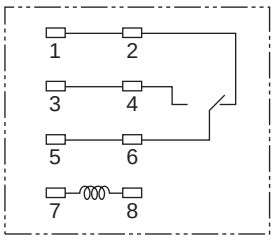
No.	Component	Procedure	Note
21	PC board (PC BOARD) ***5***, ***24***, ***26***	***26.***Remove the screws (M4×6) that fix the earth wire. Remove the six spacers from the PC board (PC BOARD).	
22	Spacer (SPACER) ***5***, ***24***, ***26***, ***27***	***27.***Squeeze the lock of the spacer (SPACER) to remove it from the electrical control base (LID, ELECTRIC PARTS).	
23	Power supply terminal block (TERMINAL BLOCK, 2P) ***5***, ***28***	***28.***Pull out the fastening terminals of the connectors (CONNECTOR, 1/CONNECTOR, 6/ CONNECTOR, 7). Remove the two screws that fix the power supply terminal block (TERMINAL BLOCK, 2P), then remove the power supply terminal block.	
24	External terminal block (TERMINAL BLOCK, 5P) ***5***, ***29***	***29.***Pull out the fastening terminal of the connector (CONNECTOR, 5). Remove the two screws that fix the external terminal block (TERMINAL BLOCK, 5P), then remove the external terminal block.	

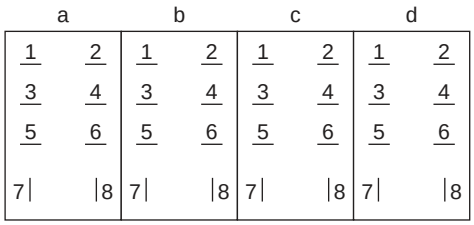
No.	Component	Procedure	Note
25	Communication wire terminal block (TERMINAL, 4P) ***5***, ***30***	***30.***Pull out the fastening terminal of the connector (CONNECTOR, 8). Remove the two screws that fix the communication wire terminal block (TERMINAL, 4P), then remove the communication wire terminal block.	
26	TRA Sensor (SENSOR, TRA) ***1***, ***2***, ***5***, ***31***, ***32***	***31.***Release the small clamp (CLAMP) and big clamp (CLAMP) that fix the TRA sensor (SENSOR, TRA), then remove the TRA sensor.	
		32.Cut the cable tie, then remove the connector of the sensor (SENSOR, TRA) from the PC board (PC BOARD). **Note:** When cutting the cable tie, be careful not to cut the lead wire unintentionally. Connector of TRA sensor (SENSOR, TRA): CN105 (Brown) Connector of TOA sensor (SENSOR, TOA): CN106 (white)	
27	TOA sensor (SENSOR, TOA) ***1***, ***2***, ***5***, ***32***, ***33***	***33.***Release the small clamp (CLAMP) and big clamp (CLAMP) that fix the TOA sensor (SENSOR, TOA), then remove the TOA sensor.	

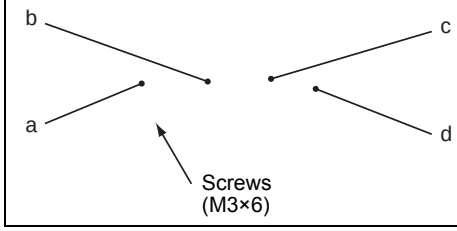
No.	Component	Procedure	Note
28	Connector (CONNECTOR, 1 - 9) ***5***, ***34***	***34.***Cut the cable tie that fixes the connector (CONNECTOR, 1 - 9), then pull out the fastening terminals of the connectors. **Note:** When cutting the cable tie, be careful not to cut the lead wire unintentionally. • Note on connecting Connect the fastening terminal firmly, and make sure the fastening terminal holds the tab terminal securely. (Do not insert the tab terminal between the fastening terminal and sleeve.)  • Note on connecting Insert the connector firmly. (After inserting the connector, pull it slightly to make sure it is firmly inserted.)	
29	Connector 1 (CONNECTOR, 1) ***5***, ***6***, ***34***, ***35***, ***44***, ***45***	***35.***Pull out the fastening terminals of the power supply terminal block (TERMINAL BLOCK, 2P), relay (RELAY, LY-1F), and capacitor (CAPACITOR). Remove the connector connecting connector 1 and 2 (CONNECTOR, 1 and 2).	
30	Connector 2 (CONNECTOR, 2) ***5***, ***34***, ***36***, ***45***	***36.***Pull out the fastening terminal of the relay (RELAY, LY-1F). Remove the connector connecting connector 1 and 2 (CONNECTOR, 1 and 2).	

No.	Component	Procedure	Note
31	Connector 3 (CONNECTOR, 3) ***5***, ***37***, ***45***	***37.***Pull out the fastening terminal of the relay (RELAY, LY-1F).	
32	Connector 4 (CONNECTOR, 4) ***5***, ***34***, ***38***, ***45***	***38.***Pull out the fastening terminal of the relay (RELAY, LY-1F). Remove the connector of the PC board (PC BOARD).	
33	Connector 5 (CONNECTOR, 5) ***5***, ***29***, ***34***, ***39***	***39.***Pull out the fastening terminal of the external terminal block (TERMINAL BLOCK, 5P). Remove the connector of the PC board (PC BOARD).	
34	Connector 6 (CONNECTOR, 6) ***5***, ***28***, ***34***, ***40***, ***45***	***40.***Pull out the fastening terminal of the power supply terminal block (TERMINAL BLOCK, 2P). Pull out the fastening terminal of the relay (RELAY, LY-1F).	
35	Connector 7 (CONNECTOR, 7) ***5***, ***28***, ***34***, ***41***, ***45***	***41.***Pull out the fastening terminal of the power supply terminal block (TERMINAL BLOCK, 2P). Remove the connector of the PC board (PC BOARD).	
36	Connector 8 (CONNECTOR, 8) ***5***, ***30***, ***34***, ***42***	***42.***Pull out the fastening terminal of the communication wire terminal block (TERMINAL BLOCK, 4P). Remove the connector of the PC board (PC BOARD).	
37	Connector 9 (CONNECTOR, 9) ***1***, ***2***, ***5***, ***19*** - ***21***, ***34***, ***43***	***43.***Remove the connector of the louver motor (MOTOR, LOUVER). Remove the connector of the PC board (PC BOARD).	

<table>
<tr><th>No.</th><th>Component</th><th>Procedure</th><th>Note</th></tr>
<tr><td>38</td><td>Capacitor
(CAPACITOR)
5, 44</td><td>44.Pull out the fastening terminal of the connector (CONNECTOR, 1).
Remove the screw (M4×14) that fixes the capacitor (CAPACITOR), then remove the capacitor.</td><td> 
</td></tr>
<tr><td>39</td><td>Relay (RELAY, LY-1F)
5, 45</td><td>45.Pull out the fastening terminals of the connectors (CONNECTOR, 1 -4, 6).
Remove the two screws (M3×6) that fixes the relay (RELAY, LY-1F), then remove the relay.

Terminal arrangement/
Internal connections
(Bottom view)
 

Relay terminal layout
 

<table>
<tr><td rowspan="2">For exhaust motor</td><td>Relay a
(4321F)</td><td>1
3
5
7</td><td>Empty
CONNECTOR, 2 (Red)
CONNECTOR, 3 (White)
CONNECTOR, 4 (Light blue)</td><td>2
4
6
8</td><td>Empty
Empty
Empty
CONNECTOR, 4 (Brown)</td></tr>
<tr><td>Relay b
(4322F)</td><td>1
3
5
7</td><td>Empty
CONNECTOR, 1 (Brown)
CONNECTOR, 6 (Red)
CONNECTOR, 4 (Light blue)</td><td>2
4
6
8</td><td>CONNECTOR, 3 (White)
Empty
Empty
CONNECTOR, 4 (Pink)</td></tr>
<tr><td rowspan="2">For supply motor</td><td>Relay c
(4311F)</td><td>1
3
5
7</td><td>Empty
CONNECTOR, 2 (White)
CONNECTOR, 3 (White)
CONNECTOR, 4 (Gray)</td><td>2
4
6
8</td><td>Empty
Empty
Empty
CONNECTOR, 4 (Blue)</td></tr>
<tr><td>Relay d
(4312F)</td><td>1
3
5
7</td><td>Empty
CONNECTOR, 1 (Orange)
CONNECTOR, 6 (Red)
CONNECTOR, 4 (Gray)</td><td>2
4
6
8</td><td>CONNECTOR, 3 (White)
Empty
Empty
CONNECTOR, 4 (Yellow)</td></tr>
</table></td></tr>
</table>