ENERGY RECOVERY VENTILATOR
COMMERCIAL ZC10 CHASSIS
ENGINEERING MANUAL

ERV Indoor Units

471 to 589 CFM

ARVU053CDA0

ARVU063CDA0

PROPRIETARY DATA NOTICE

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TABLE OF CONTENTS

TABLE OF SYMBOLS

⚠ **DANGER**	*This symbol indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*
⚠ **WARNING**	*This symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*
⚠ **CAUTION**	*This symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.*
Note:	*This symbol indicates situations that may result in equipment or property damage accidents only.*
	*This symbol indicates an action that must not be performed.*

MECHANICAL SPECIFICATIONS

General

ERV indoor units are factory assembled and provided with an internally mounted control circuit board, exhaust fan, supply fan, cross-flow air to air heat exchanger, washable outdoor air and return air filters, and bypass damper. Each unit is designed to operate using 208-230/60/1 power with voltage variances of ±10%. ERV operation range is 14°F - 113°F outdoor temperature.

Casing

The metal casing is designed to mount concealed above a finished ceiling. Supply fan discharge and exhaust fan inlet (return air) are front horizontal. Supply fan inlet (outdoor air) and exhaust fan discharge are rear horizontal. Cold metal surfaces are externally insulated. The case is provided with hanger brackets designed to support the unit weight on for corners. Hanger brackets have pre-punched holes designed to accept field supplied, all-thread rod hangers.

Fan Assemblies

ERV units have two fans; one fan for supply air and one fan for exhaust air. Both fans are direct driven. Fan motors are brushless, digitally-controlled (BLDC) design with permanently sealed bearings. The fan/motor assemblies are mounted in vibration attenuated rubber grommets. The fan speeds are controlled using a microprocessor-based direct digital control algorithm that provides three fan speeds. Fan speeds are super high, high, and low. Each fan speed can be adjusted from the factory setting using external static pressure (ESP) control settings to change fan speeds to compensate for airflow resistance caused by field installed ductwork.

Cross flow Air-to-air Heat Exchanger

Cross flow air-to-air heat exchanger is constructed of non-flammable, specially processed paper that allows transfer of heat and humidity. The air-to-air heat exchanger recovers energy from indoor air as it is exhausted outdoors. The recovered energy is transferred to the in-coming outdoor air without mixing airstreams. A hinged access panel allows removal of air-to-air heat exchanger for vacuum or brush cleaning. Since both heat and humidity are transferred, condensate drain is not required.

Air Filter

Two washable mesh filters are provided at the outdoor air and return air inlets of the air-to-air heat exchanger.

Microprocessor Controls

The ERV is provided with an integrated microprocessor-based controller. All unit operation parameters, excluding the unit operating schedule, are stored in non-volatile memory, resident on the ERV microprocessor. Operating schedules are stored in the wall controller or central controller. ERV units can be operated independently with a wall controller or interlocked to a Multi V system. When interlocking to a Multi V system, the field supplied communication cable between the ERV and outdoor unit is to be a minimum of 18 AWG, 2-conductor, stranded, and shielded cable (RS485), terminated via screw terminals on the control board. The microprocessor control provides the following functions:

- Auto restart following power restoration
- External static pressure (ESP) control of fans
- ERV mode allowing air to pass thru air-to-air heat exchanger
- Bypass mode allowing exhaust air to bypass air-to-air heat exchanger

The control board is also provided with terminals for connection of a field supplied CO2 sensor. DIP switch settings on the control board allow the ERV to operate independently or as a slave to a Multi V indoor unit.

ERV BENEFITS

ZC10 Chassis

Ventilation

Ventilation is a process that allows users to exchange indoor air with outdoor air in order to improve the air quality and to maintain environmental temperature conditions. The Energy Recovery Ventilation (ERV) system reduces the temperature and humidity of incoming outside air. A balance is achieved between indoor and outdoor ambient which enables the cooling or heating load placed on the air conditioning system to be reduced. It can be controlled individually or as an integral part of the air conditioning system.

Benefits

The ERV system provides efficiency, cost savings, superior performance, compact and light design, linear E.S.P control and easy maintenance. The ERV system is ideal for hotels, dormitories, restaurants,hospitals, retail establishments, theaters, schools, and office buildings.

Energy Savings

The indoor air is passed through the heat exchanger to pre-warm or pre-cool the incoming outside air which saves energy and money.

Design

Acoustically engineered and tested for quiet operation.

Easy Maintenance

Offers easy filter replacement and heat exchanger cleaning.

GENERAL DATA

Table 1:Energy Recovery Ventilator (ERV) Unit General Data

Type	ERV Units	
	ARVU053CDA0	ARVU063CDA0
Performance		
Power Input (SH1) Watts	471	589
Operating Range		
Operating Range (°F DB)	14 - 113	14 - 113
Heat Exchanger Data		
Air-to-Air Heat Exchanger	Cross flow fixed core	Cross flow fixed core
Quantity	1	1
Temperature Exchanger Efficiency (%) (fan speed SH1)		
Cooling (fan speed SH1)	64	62
Heating (fan speed SH1)	64	62
Enthalpy Exchange Efficiency (%)		
Cooling (fan speed SH1)	42	40
Heating (fan speed SH1)	49	46
Unit Data		
Sound Pressure (dB(A))	39	40
Net Weight (lbs)	120	120
Shipping Weight (lbs)	142	142
Fan		
Type	Cross Flow	Cross Flow
Quantity	2	2
Motor/Drive	Brushless Digitally Controlled/Direct	Brushless Digitally Controlled/Direct
Airflow Rate SH/H/L (CFM)	471 / 377 / 283	589 / 471 / 353
External Static Pressure SH/H/L (in wg)	0.60 / 0.39 / 0.22	0.60 / 0.39 / 0.22
Filters		
Filter Grade	MERV13	MERV13
Quantity	2	2
Filter Grade	MERV5	MERV5
Quantity	2	2

SH - Super High
Condensate drain not required
ERV temperature and enthalpy exchange efficiencies in accordance with AHRI 1060 test condition, 100% airflow, 0" external static pressure
Cooling: Outdoor 95°F DB, 78°F WB; Exhaust 75°F DB, 63°F WB
Heating: Outdoor 35°F DB, 33°F WB; Exhaust 70°F DB, 58°F WB

Table 2: Central Controllers

Central Controller	Name	Model No.	Devices per Controller	Systems per Comm Bus	Devices per Comm Bus	No. of Comm Bus Ports	Binary Signals Input/ Output	Power, Conn	Description
	AC Smart Premium	PQCSW421E0A	128	16	128	1	2/2	24 VAC	Provides scheduling, autochangeover, setback, remote controller lock, setpoint,range limit, run time limit, web access, email alarm notification, visual floorplan navigation, peak/demand control, software device interlocking, PDI integration, and AC Manager Plus integration advanced functionality in addition to basic unit control and monitoring.
	AC Ez	PQCSZ250S0	32	16	256	1		12 VDC, ODU	Provides for scheduling in addition to basic indoor unit control and monitoring.
	Advanced Control Platform(ACP) Standard	PQCPA11A0E	256	16	64 (128 with PDI Premium)	4	2/2	24 VAC	Provides for scheduling, remote controller lock, setpoint range limit, web access, peak/demand control, PDI integration, and AC Manager Plus integration advanced functionality in addition to basic unit control and monitoring.
	Advanced Control Platform (ACP) Premium	PQCPB11A0E	256	16	64 (128 with PDI Premium)		10/4	24 VAC	

Before specifying or placing an order, refer to the V-Net Network Solution Engineering Product Data Book and review the detailed technical data provided to fully understand the capabilities and limitations of these devices.

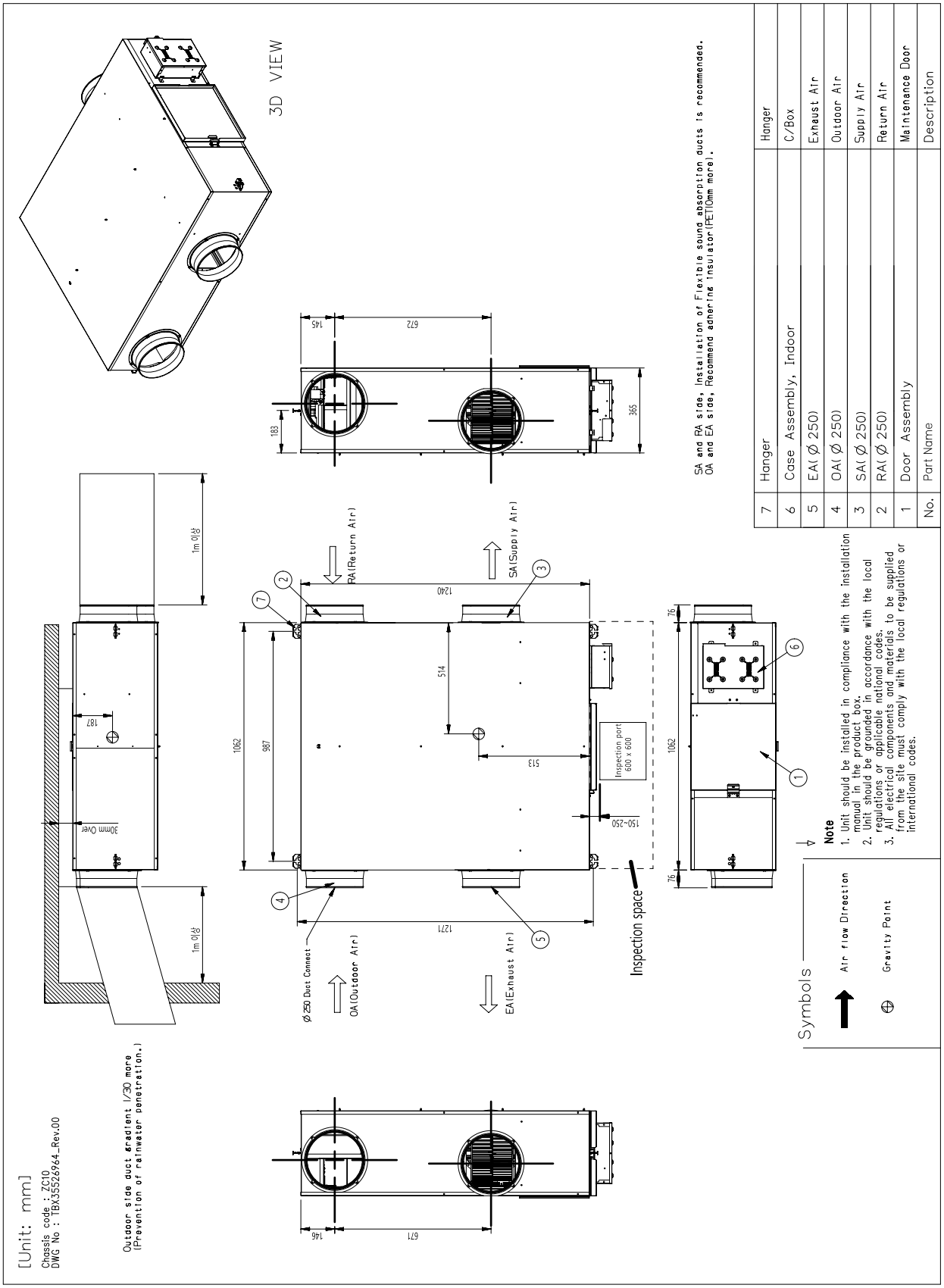
Table 3: Integration Solutions

Integration Solution	Name	Model No.	Devices per Controller	Systems per Comm Bus	Devices per Comm Bus	No. of Comm Bus Ports	Power	Binary Signals Input/ Output	Description
	BACnet® Gateway	PQNFB17C1	256	16	64 (128 with PDI Premium)	4	24 VAC	10/4	Allow integration of LG equipment for control and monitoring by open protocol BACnet® and LonWorks® building automation and controls systems.
	LonWorks® Gateway	PLNWKB100	64	16	64	1	24 VAC	2/2	

Before specifying or placing an order, refer to the V-Net Network Solution Engineering Product Data Book and review the detailed technical data provided to fully understand the capabilities and limitations of these devices.

DIMENSIONS

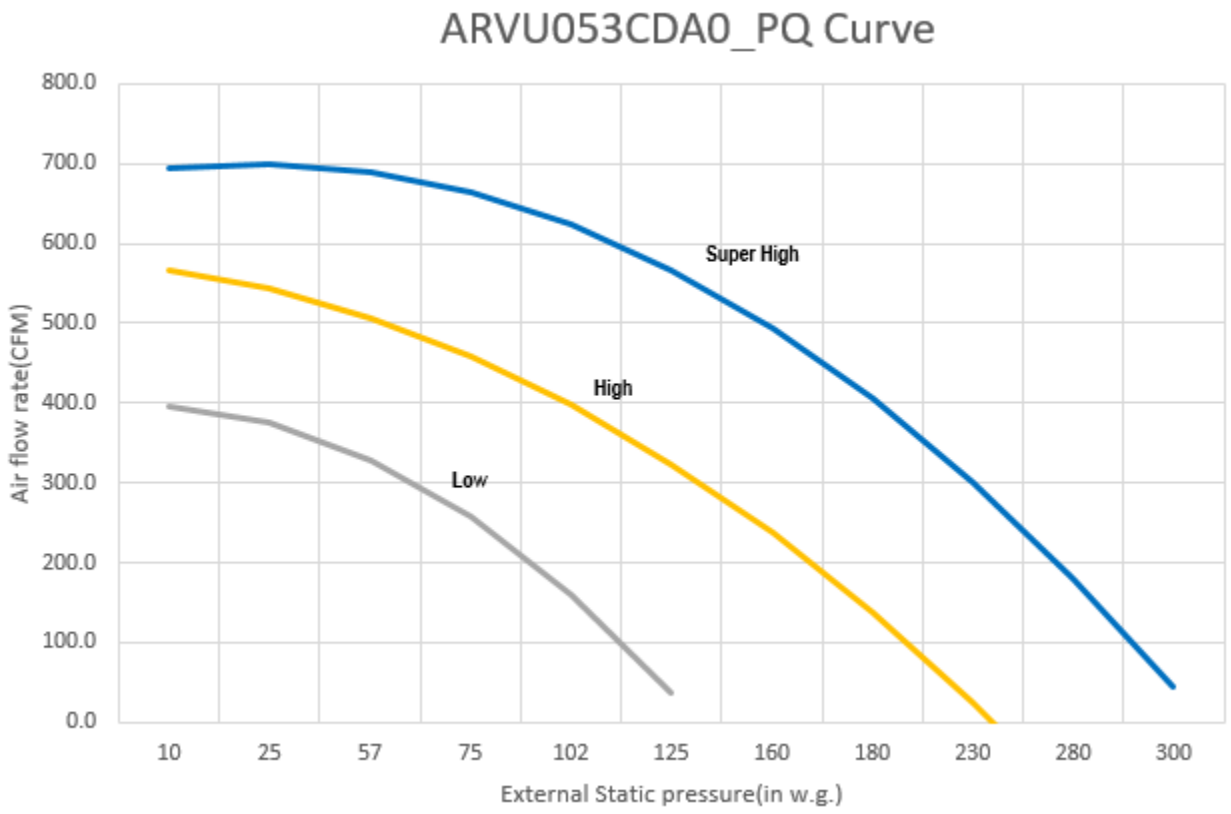
ZC10 Chassis



EFFICIENCY CURVES

ARVU053CDA0

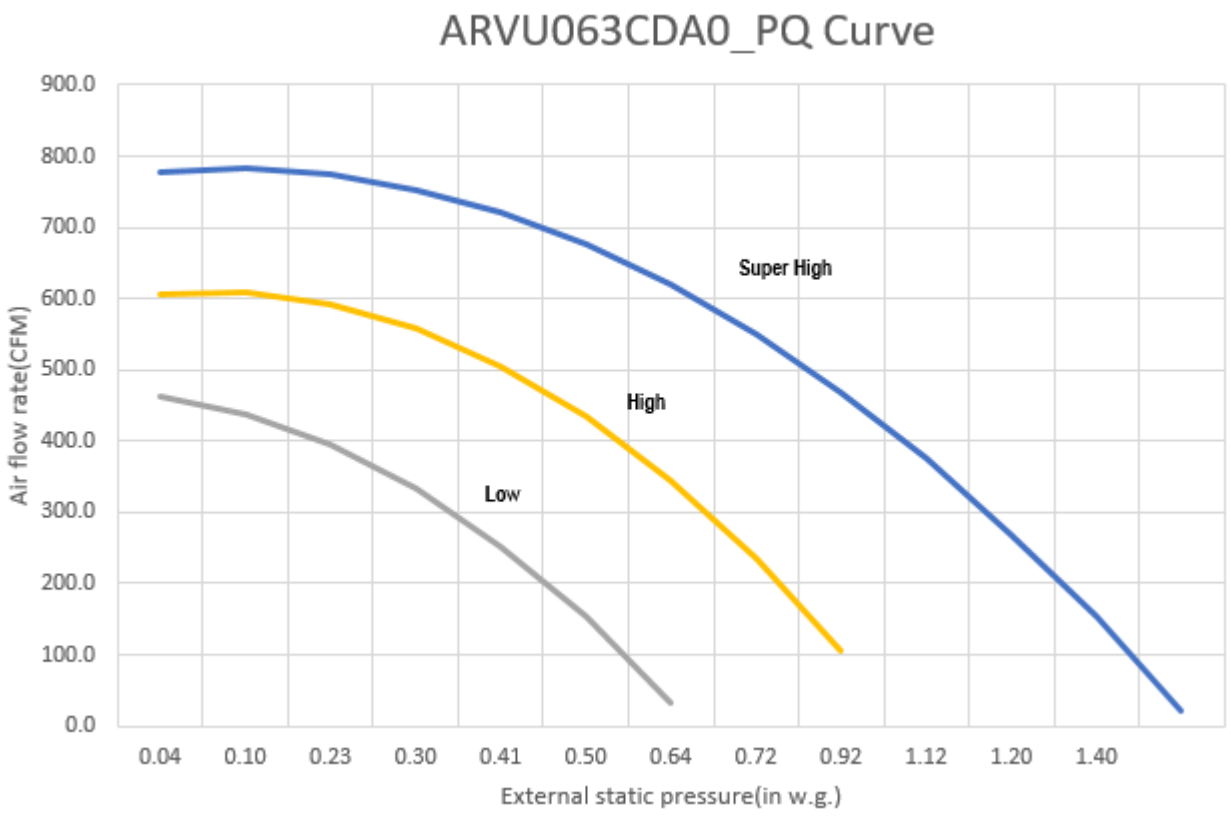
Figure 1:ARVU053CDA0.



EFFICIENCY CURVES

ARVU063CDA0

Figure 2:ARVU063CDA0.



ELECTRICAL AND ACOUSTICAL DATA

Model	Voltage Range	Rated Amps (A)	Power Supply			Power Input (W)	
			Hz	Volts	Phase	Cooling	Heating
ARVU053CDA0	187-253	2.2	60	208 - 230	1	330 / 200 / 100	330 / 200 / 100
ARVU063CDA0		3.0				475 / 280 / 140	475 / 280 / 140

Model	Sound Levels dB(A)		
	Super High Fan Speed	High Fan Speed	Low Fan Speed
ARVU053CDA0	39	34	28
ARVU063CDA0	40	36	29

Sound pressure levels are tested in an anechoic chamber under ISO Standard 3745.

ACOUSTIC DATA

Figure 3:ARVU053CDA0

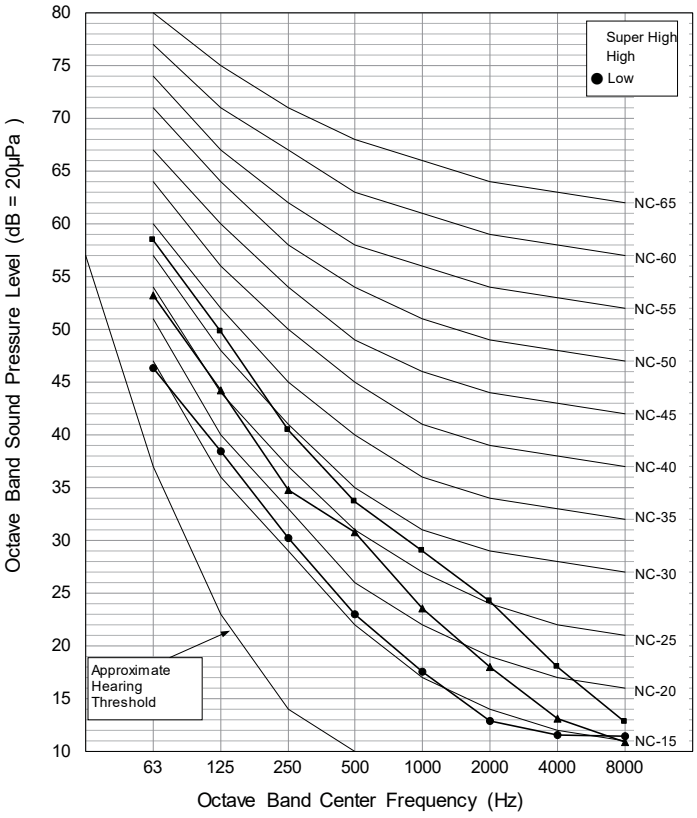


Figure 4:ARVU063CDA0

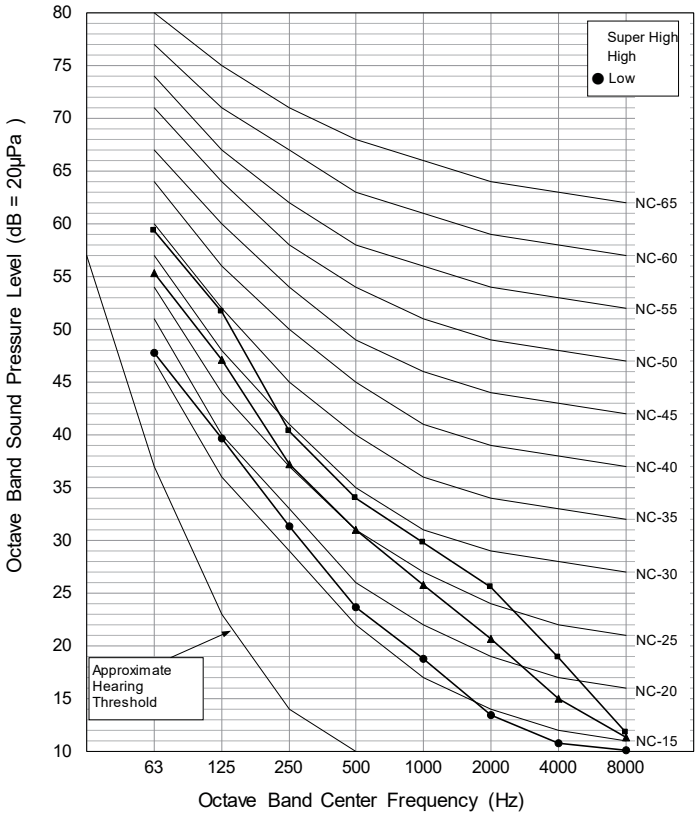
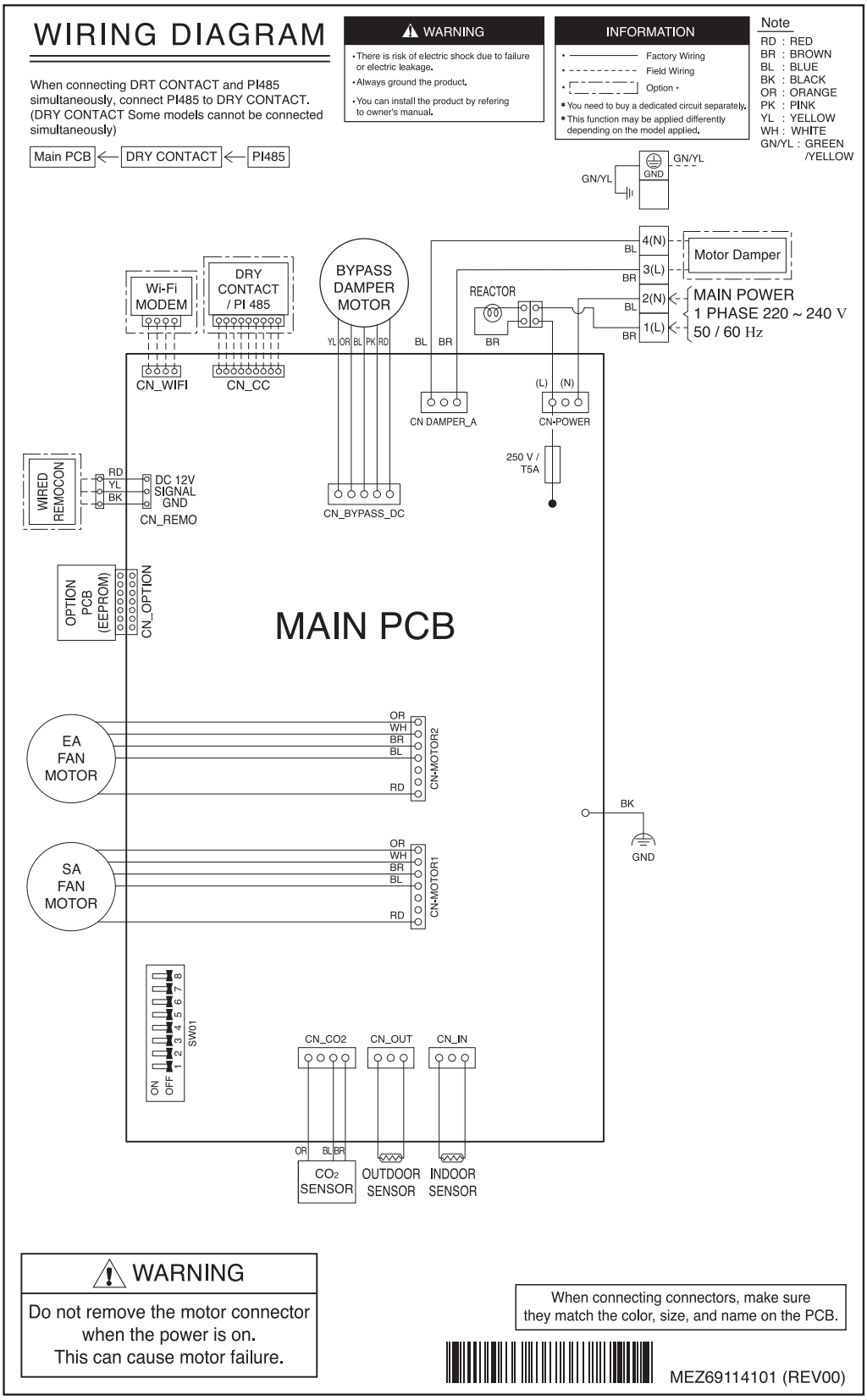


Figure 5:ZC10 Chassis.



INSTALLATION AND LAYOUT BEST PRACTICES

ZC10 Chassis

Figure 6:ZC10 Chassis Installation Drawing.

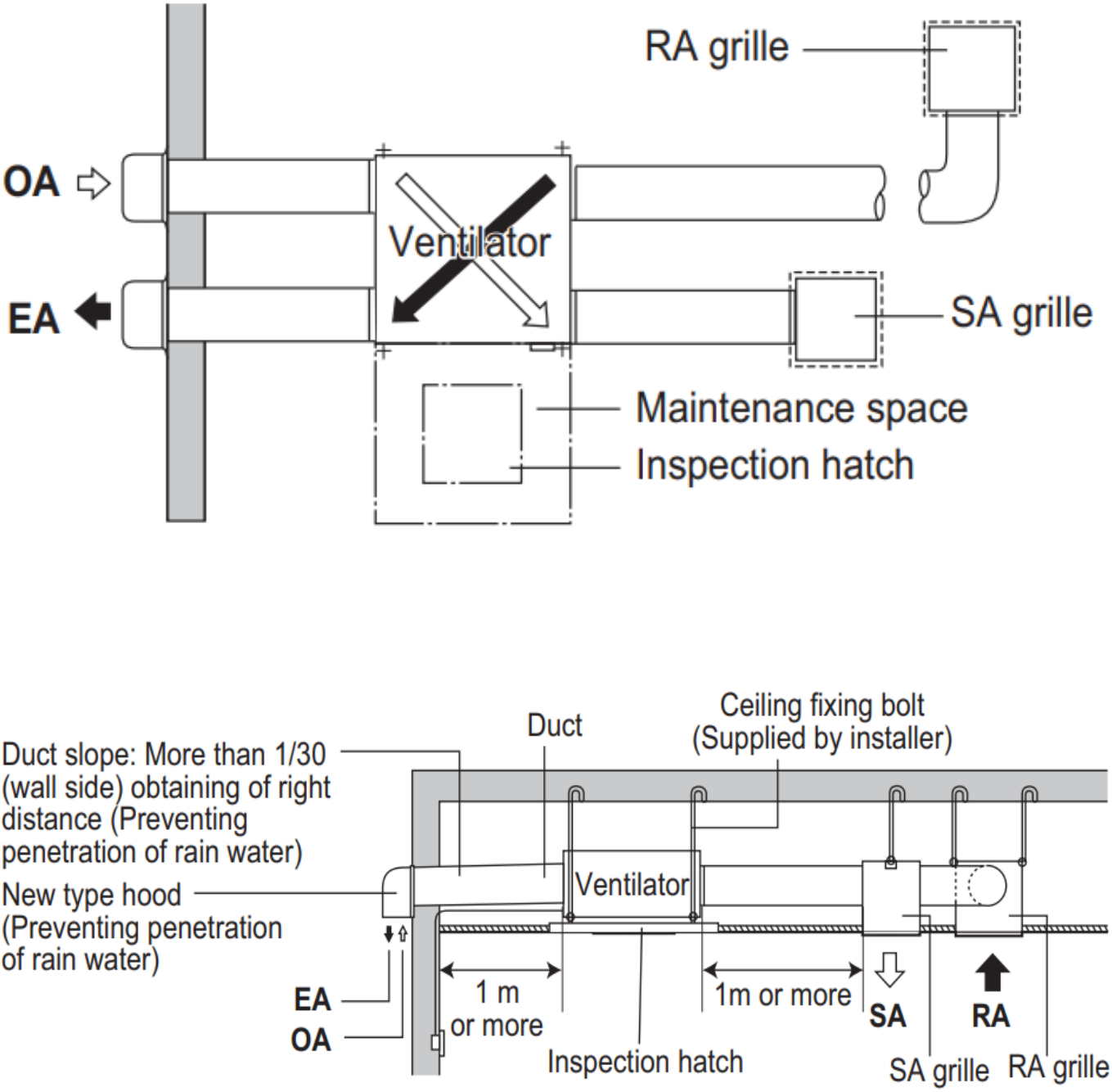
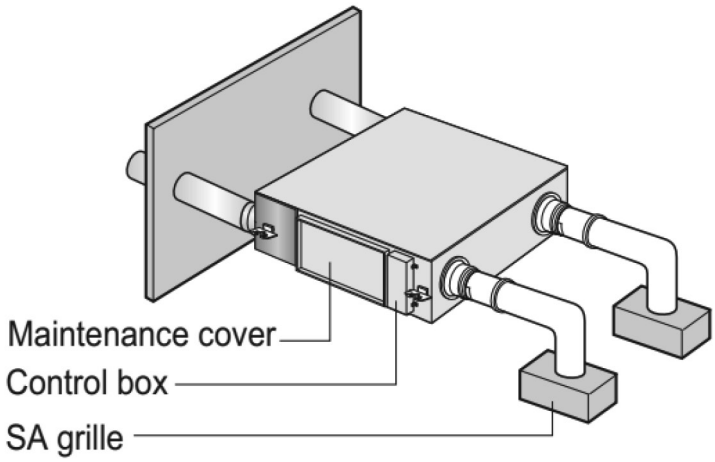
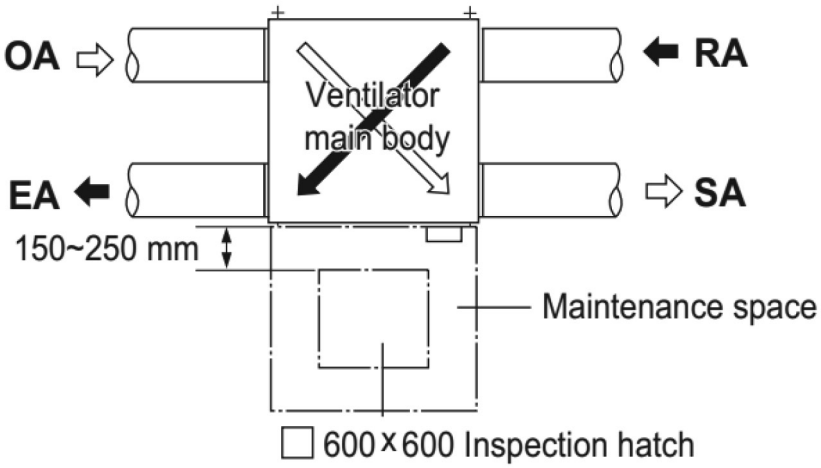


Figure 7:ZC10 Chassis Installation Drawing.

Three Dimensional View



Installation of Maintenance Cover



INSTALLATION AND LAYOUT BEST PRACTICES

Main Body Installation

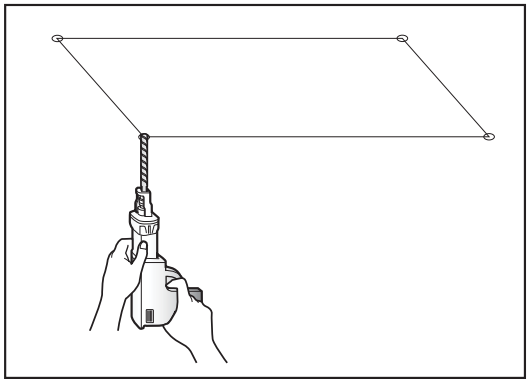
1. Attach the hangar bracket to the suspension bolt. Use nuts and washers (field supplied) to secure the upper and lower sides of the hangar bracket.
2. Install the unit after checking the indoor (SA/RA) and outdoor (EA/OA) in accordance with the figure duct direction label.
3. Install flexible duct between the unit and duct.
4. Minimum thickness of the insulation for the connecting duct must be 3/8 inch.
5. Tighten the upper nut.
6. Use a level instrument to make sure the unit is level.

INSTALLATION AND LAYOUT BEST PRACTICES

Installing Fixing Bolts

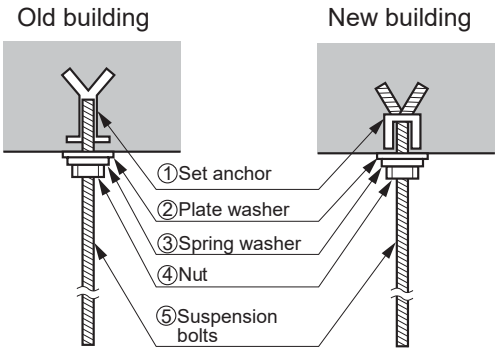
- Select and mark the position for the fixing bolts.
- Drill a hole on the face of the ceiling for the anchor.

Figure 8:Installing Fixing Bolts.



- Insert the anchor and washer on the suspension bolts to lock them in the ceiling.
- Firmly mount the suspension bolts to the anchor.
- User nuts, washers and spring washers to secure the installation plates onto the suspension bolt.

Figure 9:Securing Suspension Rods.



Selecting the Best Location

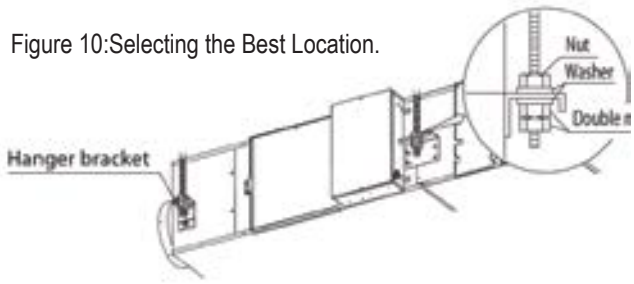
Do's

- Place the unit where it will be level and can support the weight of the unit.
- Install the unit where it can withstand vibration.
- Install the unit where service can be performed easily.

Don'ts

- Avoid installing the unit where inflammable gas is generated, flows, stored or vented.
- Avoid installing the unit where sulfurous acid gas or corrosive gas is generated.
- Avoid installing the unit near places near high frequency generators.

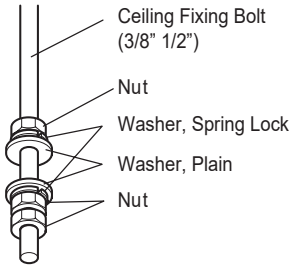
Figure 10:Selecting the Best Location.



Assembling Washer Nut

- Tighten the commercial washer nut (more than 13/16) for the outside diameter of 3/8" to the commercial ceiling fixing bolt 3/8".

Figure 11:Assembling the Washer Nut.



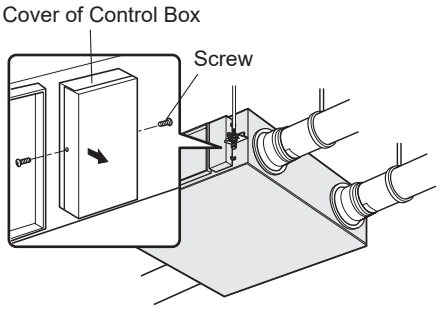
INSTALLATION AND LAYOUT BEST PRACTICES

Power Wiring

Connecting Power Wiring

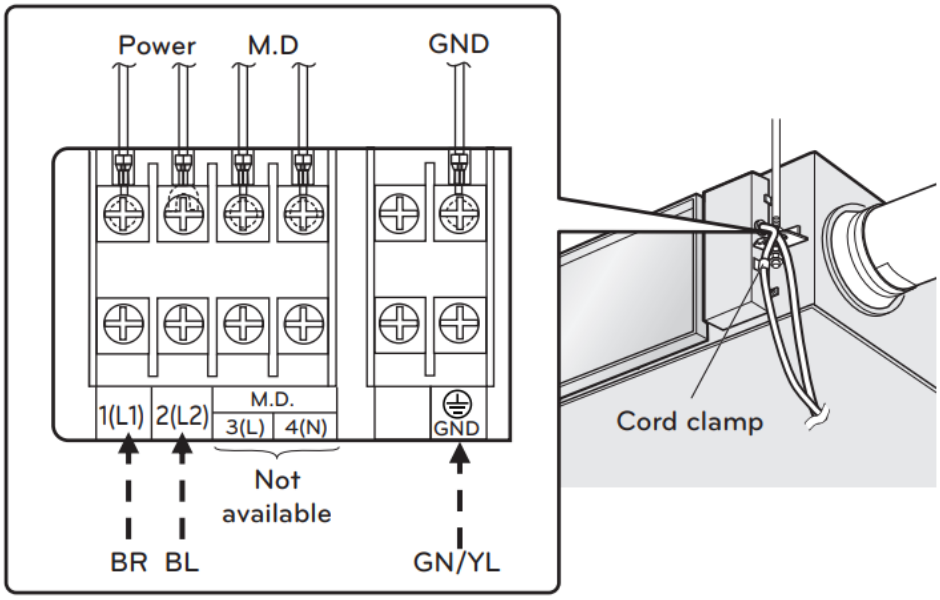
1. Remove two screws and open the cover of the control box.
2. Connect the main power wires to the terminal block.
3. After inserting the power wires into the bushing, fully insert it into the terminal block for connection.
4. Fix the power wires with the clamp.
5. Pull the power wired to ensure they cannot be removed.

Figure 12:Opening Control Box.



Depending on the product, the position of the screw varies.

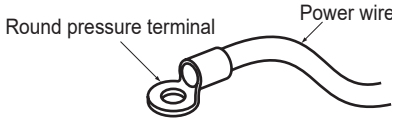
Figure 13:Inserting the Power Wiring.



Wiring Precautions

Use round pressure terminals for connections to the power terminal black.

Figure 14:Wiring Precautions.



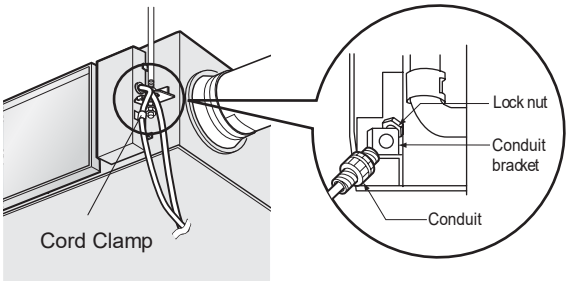
- Do not connect wiring of different thickness to the power terminal block (slack in the power wiring could cause abnormal heat).
- When connecting wiring which is the same thickness, connect the wiring according to the first image shown below.

Figure 15:Connecting Wiring.

Conduit Connection

1. Set the connecting cable into the terminal block of the indoor unit and tighten the screw to lock the conduit bracket to the indoor unit.
2. Join the conduit and the conduit bracket together.
3. Use the elbow type (L-Type) conduit.

Figure 16:Conduit Connection.



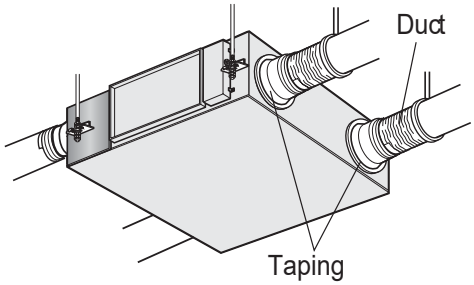
INSTALLATION AND LAYOUT BEST PRACTICES

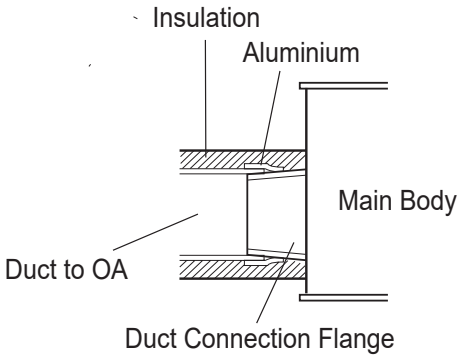
Duct Connection

Connecting the Duct

- After securely connecting the duct with the duct connection flange, wrap it with commercial aluminum tape so that air cannot leak out.
- Adjust the duct from the ceiling so that no force is applied to the main body of the ventilation system.
- Ensure that there are no foreign materials in the duct before connecting the duct.
- Ductwork connected to ERV should be insulated to prevent condensation.

Figure 17:Connecting the Duct.





Note:

To avoid causing a reduction in air volume or abnormal noise, do not connect the duct as shown in the image below.

Figure 18:Bad Duct Connection Examples.

Rapid Bending | Excessive Bending | Too Close Bending to Outlet | Rapid Reduction of Duct Diameter

⚠WARNING

- *If an electric duct heater is connected, it must include a built-in safety device to prevent heater operation when airflow is not present, to prevent the possibility of fire, property damage, and/or personal injury.*
- *When the outdoor air temperature falls below the ERV operating limit (14°F), the electric duct heater temperature control shall energize the electric duct heater to pre-heat the outdoor air above 14°F.*

Table 4:Installer Setting Codes and Values Table

No.	Function	Code	Value
1	Setting Address of Central Control	01	00~FF : Address of central control
2	Supply ESP	02	Value1 - Step(01:low, 02:high, 03:super high)
3	Exhaust ESP	03	Value 2 - ESP value (0 ~ 255)
4	Product direction	04	01: Normal, 02:Reverse
5	Quick Refresh Priority	05	01:Supply air first, 02: Exhaust air first
6	Master setting	06	00:Slave, 01:Master
7	Dry Contact Auto	07	00:OFF, 01:ON
8	Release of 3 Min Delay	08	01:Set

Setting Address of Central Control

1. When connecting central control, it sets the central control address of the indoor unit.
2. Function control and setting

• Select the address code with inputting the up-down button (0~ F).
• Change the items with inputting the right-left button. (Group address <-> indoor unit address)
• Set the address with inputting Setting/Cancel button (indoor data send)

Supply/Exhaust ESP Setting

1. Set the E.S.P (RPM) value of the air conditioner unit.
2. Function control and setting
   • Select the wind strength with inputting up-down button.
   • 01:low, 02:high, 03:very high (Seg flickering)
   • Move the setting items with inputting the right-left button.
   • Airflow selection <-> RPM value selection (Seg of selected item is flickering)
   • Select the RPM value of airflow with inputting up-down button.
   • 0~ 255 (Seg selecting)
   • Complete the RPM setting with inputting Setting/Cancel button (send RPM setting data of indoor unit).
   • Set the exhaust air ESP with conducting the steps above and inputting the function setting button and changing installer code to 04.

Product Direction

1. Set the installation direction of the ventilation for the indoor unit.
2. Function control and setting
   • Select the direction value with inputting the up-down button.
   • 01:normal direction, 02:opposite direction
   • Complete the setting with inputting Setting/Cancel button (stop flickering and send the date to the indoor unit).

INSTALLATION AND LAYOUT BEST PRACTICES

V-Net Wiring

V-Net Wiring

- This unit can be used as part of the combined operation system used together with Multi V indoor units or as an independent system for processing outside air.

Figure 19:V-Net Wiring - Combined Operation System.

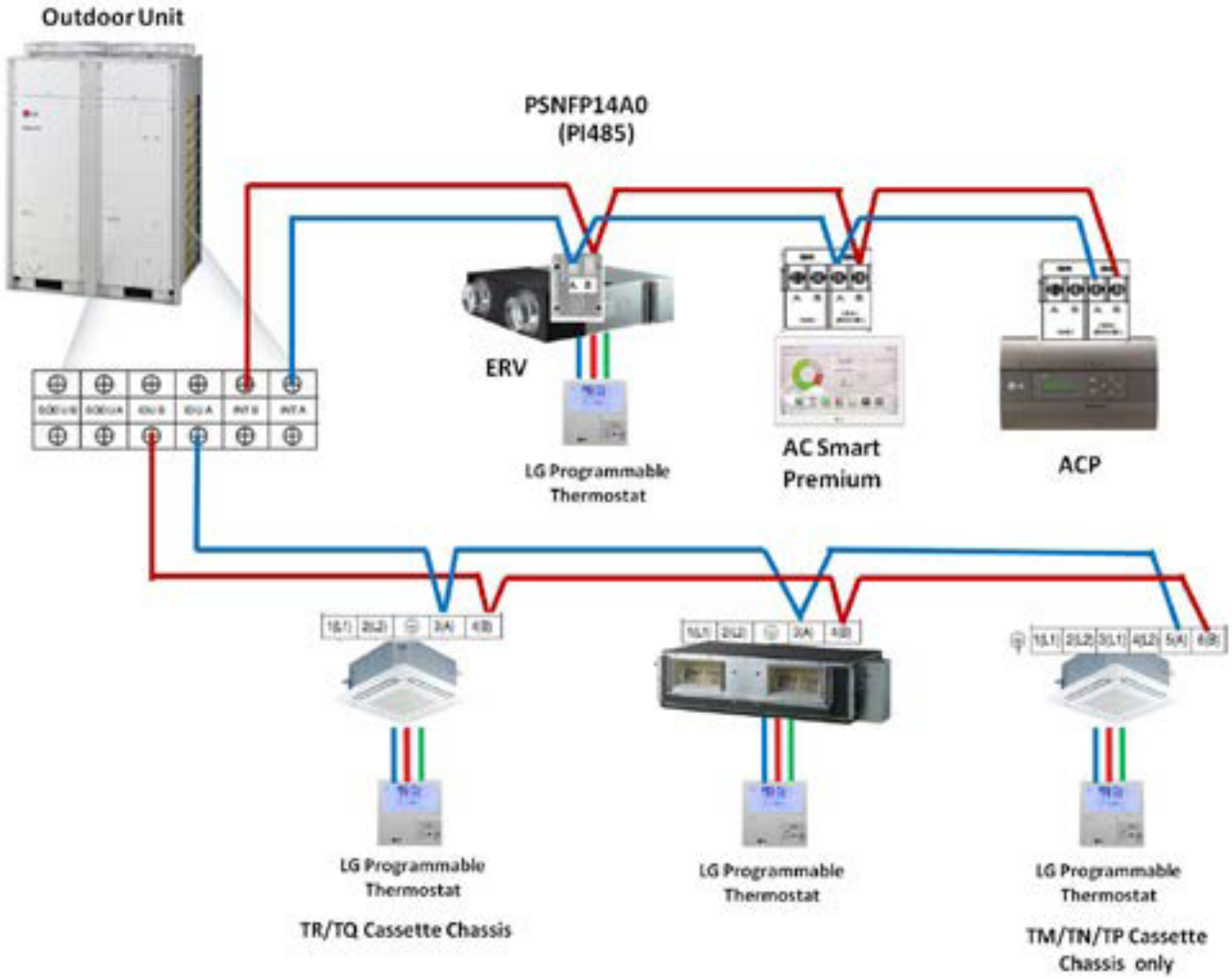
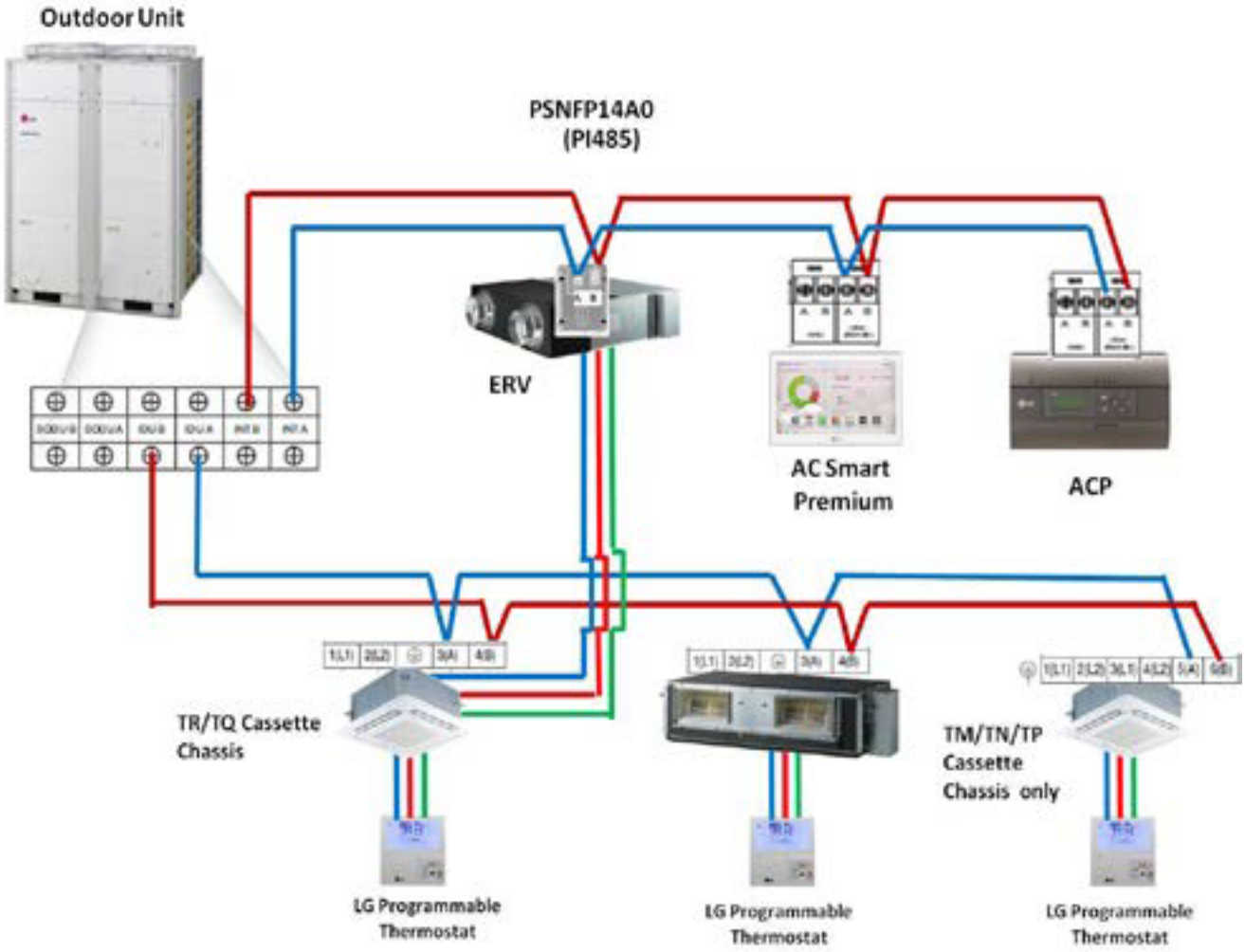


Figure 20:V-Net Wiring - Independent System.

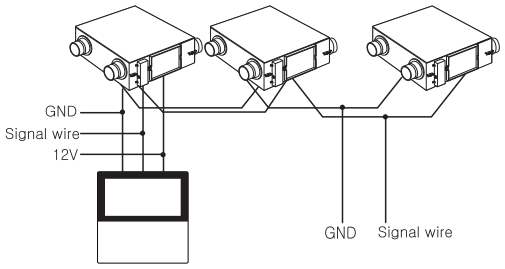


When interlocking ERV to indoor unit thermostat, ERV fan will ***not*** be interlocked to IDU fan. ERV mode and ON/OFF status can be controlled using "Vent" button.

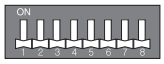
INSTALLATION AND LAYOUT BEST PRACTICES

Group Control

1. When installing more than 2 units of air conditioner to one wired remote controller, please connect as the below figure.
   - If it is not event communication indoor unit, set the unit as sub.
   - Check for event communication through the product manual.



When controlling multiple indoor units with event communication function with one remote controller, you must change the main/sub setting from the indoor unit.
- Alter the main/sub switch while power stays 'Off' and then turn the power 'On' after one minute from the alteration.
- For ceiling type cassette and duct product group, change the switch setting of the indoor PCB.



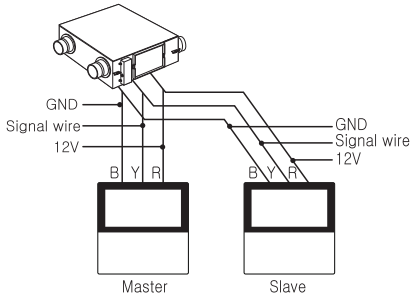
#1 switch Off: Main
(Factory default setting)

#1 switch On: Sub

- For wall-mount type and stand type product, change the main/sub setting with the wireless remote controller. (Refer to wireless remote controller manual for detail).

- When installing 2 remote controllers to one indoor unit with event communication function, set the main/sub of the remote controller. (Refer to remote controller main/sub selection).
- When installing the group, some functions excluding basic operation setting, fan level min/mid/max, remote controller lock setting and time may be limited.

2. When installing more than 2 wired remote controllers to one air conditioner, please connect as the below picture.
   - When installing more than 2 units of wired remote controller to one air conditioner, set one wired remote controller as main and the others all as subs, as shown in the below picture.
   - You cannot control the group as shown below for some product.
   - Refer to the product manual for more detail.



<When simultaneously connecting
2 sets of wired remote controller>

Note

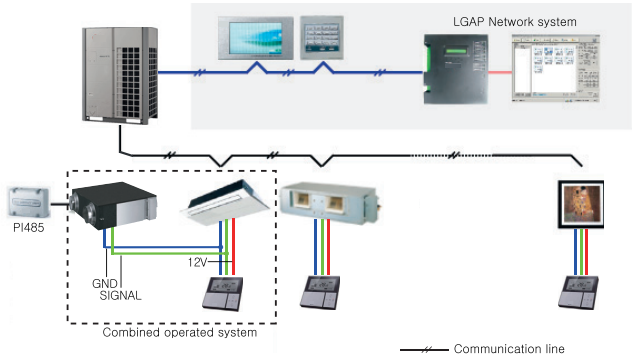
- When controlling in groups, set the main/sub of remote controller. Refer to Installer setting section on how to set main/sub for more detail.

INSTALLATION AND LAYOUT BEST PRACTICES

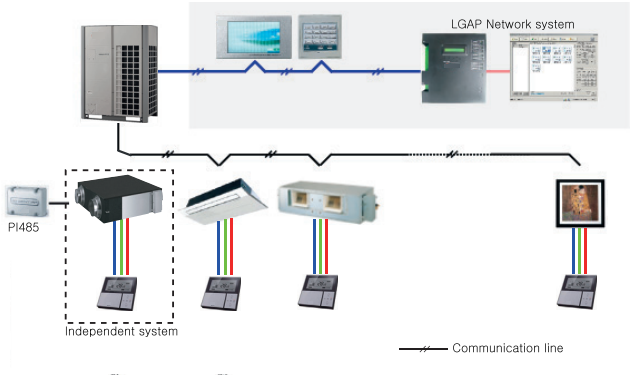
Group Control

This unit can be used as part of the combined operation system used together with indoor units (Multi V system air conditioner), or as an independent system for processing outside air.

Combined Operation System with Multi V System
(Connected with ventilation units and standard indoor units in a single refrigerant circuit.)



Independent System
(Connected only with a ventilation unit in a single refrigerant circuit.)



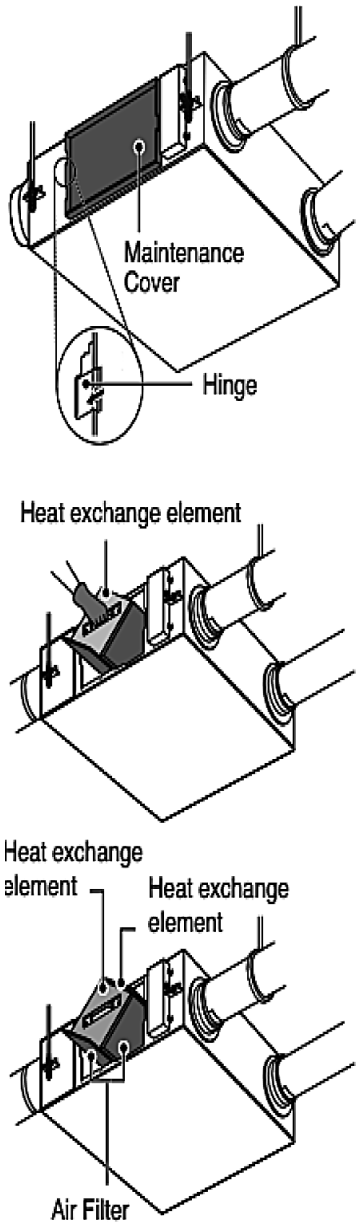
Maintenance and Service

- To prevent the ventilator from deteriorating, clean dust off the air filter and total heat exchanger regularly.

Removing the Filter and Heat Exchanger

1. Turn off the product and then turn off the main power switch.
2. Unscrew the hinge screw, slide it to the left, and then remove the Maintenance Cover.
3. Hold the handle and take out the heat exchanger element.
4. Take out the 2 pre-filters and 2 fine dust filters. The fine dust filter is located on the upper right side of the lead exchange element. There is one pre-filter on the left and right below the heat exchange element.

Figure 21:Removing the Filter and Heat Exchanger.

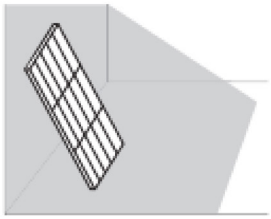


Cleaning the Filter and Heat Exchange Element

If you continue to use the product without thoroughly cleaning the filter and parts according to the cleaning cycle, the product may emit an odor. When using the product in a dusty environment, clean the filters and parts more often than the prescribed cycle.
The filter cleaning cycle is based on product use for 8 hours a day and may vary depending on the usage environment or time.
Components or appearance may vary depending on the model.

Part Name	Water Washing	Cleaning Cycle
Pre-filter	O	3 months
Fine dust filter (HEPA filter)	X	6 months
Heat exchange element	X	1 year

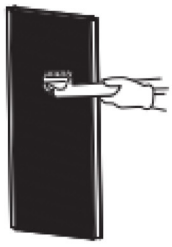
Figure 22:Cleaning the Filter and Heat Exchanger Element.



1. Clean the filter and heat exchange element disassembled from the product.

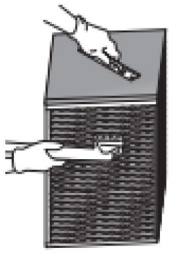
Pre-Filter

- Clean the filter with a vacuum or soft brush. If the contamination is severe, wash with lukewarm water mixed with neutral detergent.
- Dry the filter in a well-ventilated and shady place.



Fine Dust Filter (HEPA filter)

Attach the brush-shaped suction port to the vacuum cleaner to remove dust from the surface of the fine dust filter.



Heat Exchange Element

Attach the brush-shaped suction port to the vacuum cleaner to remove dust from the surface of the heat exchange element.

Note

Never wash the heat exchange element and fine dust filter with water.

Reassembling the Heat Exchanger

1. Insert the heat exchange element into the product.
   Insert the corner of the heat exchange element into the holder and carefully push it in.

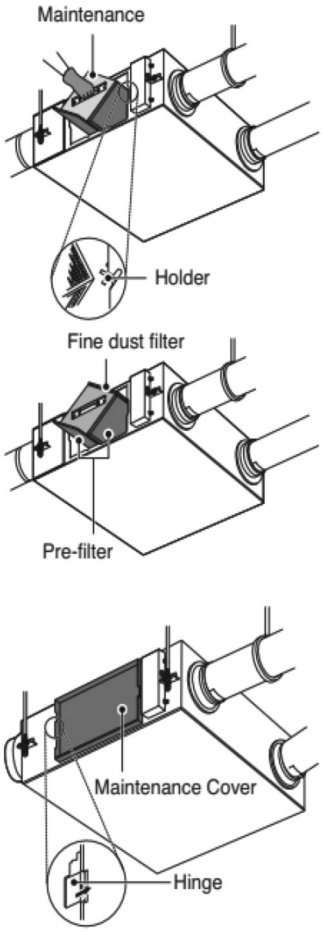
2. Insert the pre-filter and fine dust filter into the holder.

Note
When inserting the prefilter, be careful not to damage the surface of the heat exchanger element.

3. Hang the heat exchange element cover on the right hook and close it.
   Make sure the labeled side is out.

4. Slide the hinge to the right to secure the heat exchange element cover.

Figure 23:Assembling Total Heat Exchanger and Air Filter.



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