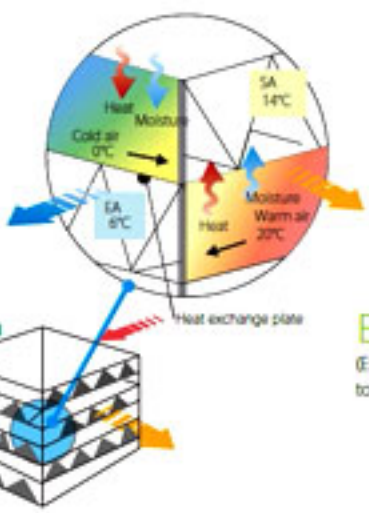
Heat Recovery Ventilator

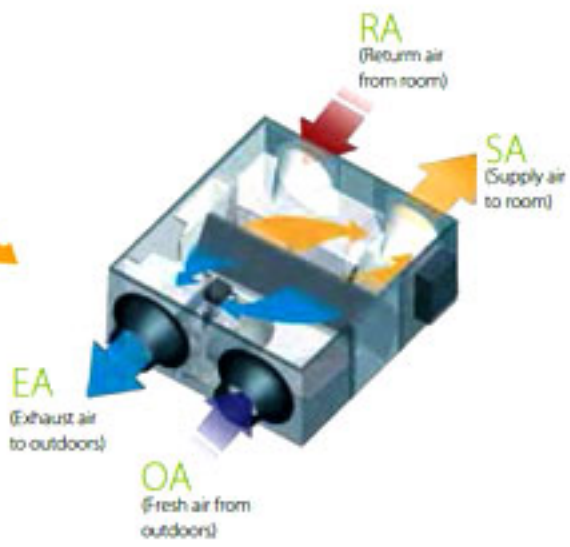
HRV

Model Names

HRV-200 HRV-500
HRV-300 HRV-800
HRV-400 HRV-1000

HRV-1500
HRV-2000





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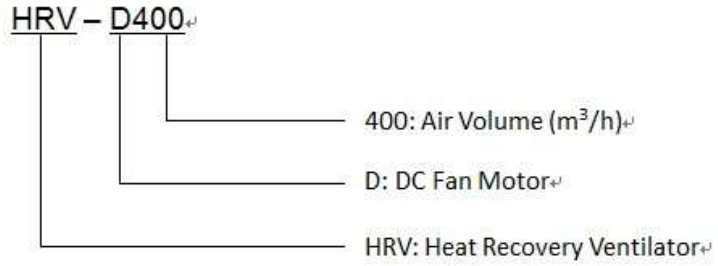
Hi-Tech Airconditioning

Contents

1. Nomenclature



2. Product Schedule

Model	Air volume (m^3/h)	Net dimension (L×W×H) (unit: mm)	Net weight (kg)	Power supply
HRV-D200	200	852×665×264	25	220-240V~50/60Hz
HRV-D300	300	928×734×270	27	220-240V~50/60Hz
HRV-D400	400	928×940×270	32	220-240V~50/60Hz
HRV-D500	500	1020×1036×270	35	220-240V~50/60Hz
HRV-D800	800	1276×1020×388	58	220-240V~50/60Hz
HRV-D1000	1000	1276×1269×388	69	220-240V~50/60Hz
HRV-D1500	1500	1600×1270×540	151	220-240V~50/60Hz
HRV-D2000	2000	1650×1470×540	165	220-240V~50/60Hz

3. External appearance

HRV-D(200, 300, 400, 500, 800,1000)

HRV-D(1500, 2000)

4. Features

HRV (Heat Recovery Ventilation) employ advanced technique and technics, the heat exchanged core forming by special paper that be processed with chemical treatment, which could create the optimum result in temperature, humidity and cooling recovery.

High efficiency heat exchanged core: When air flow formed by exhaust air and outdoor air through the heat exchanged core in cross way, because of temperature difference in the two sides of flat partition board, the heat transmission is occurred. In summer, outdoor air acquire cooling from air exhaust to decrease environment temperature; In winter, outdoor air acquire heating from air exhaust to increase temperature, that is to say, it realizing the energy recovery during air exhaust process to exchange the heating in heat exchanged core to outdoor air.

- Energy saving

Fresh-air and exhaust air are crossed through the exchanger. Temperature exchange was happened in the heat recovery ventilator. Fresh-air can beget a great deal of energy from exhaust air.

Adopt centrifugal fan with lower power consumption and longer air supply distance; Easy control, operation friendly.

- High efficiency

Adopting DC fan motor, efficiency can be up to 90%. Contrast with the AC fan motor, the power consumption of DC fan motor can reduce up to 30%.

- Low noise

Advanced 3-D spiral fan design and add sound absorption material, quiet operation.

- Flexible multi control ways

It can be controlled together with other indoor units.

- Compact design, easy installation and maintenance.

5. Specifications

Sale Model			HRV-D200	HRV-D300	HRV-D400	HRV-D500
Power supply		Ph-V-Hz	1-phase, 220-240V~50/60Hz			
Cooling	Temp. efficiency	%	76.1	74.8	76.2	76.1
	Enthalpy efficiency	%	77.3	76.1	78.7	78.2
Heating	Temp. efficiency	%	76.1	74.8	76.2	76.1
	Enthalpy efficiency	%	82.6	79.8	83.6	80.4
Input power		W	61	98	109	170
Current		A	0.72	0.99	1.07	1.56
Indoor fan motor	Model		WZDK100-38 G-1	WZDK100-38 G-1	WZDK100-38G-1	WZDK100-38G-1
	Insulation class		E			
	Output	W	26*2	42*2	46*2	72*2
	Pole number		8P	8P	8P	8P
	Speed	r/min	1390	1390	1390	1380
Indoor fan	material		ABS			
	Type		Centrifugal fan			
	Diameter	mm	Φ154	Φ194	Φ194	Φ203
	Height	mm	102	100	100	151
Indoor external static pressure (Hi)		Pa	75	75	80	80
Nominal air flow		m^3/h	200	300	400	500
Sound pressure level		dB(A)	27	30	32	35
Net dimension (L×W×H)		mm	852×665×264	928×734×270	928×940×270	1020×1036×270
Packing size (L×W×H)		mm	930×730×445	1010×800×45	1010×1010×450	1120×1120×452
Net/Gross weight		kg	25/40	27/44	32/52	35/60
Power supply	Wire's qty		3	3	3	3
	Code wire cross section	mm^2	2.5	2.5	2.5	2.5
Controller			Wired controller			
Fresh air	Fresh Air Diameter	mm	Φ144	Φ144	Φ144	Φ194
	Air drop	Pa	75	75	80	80

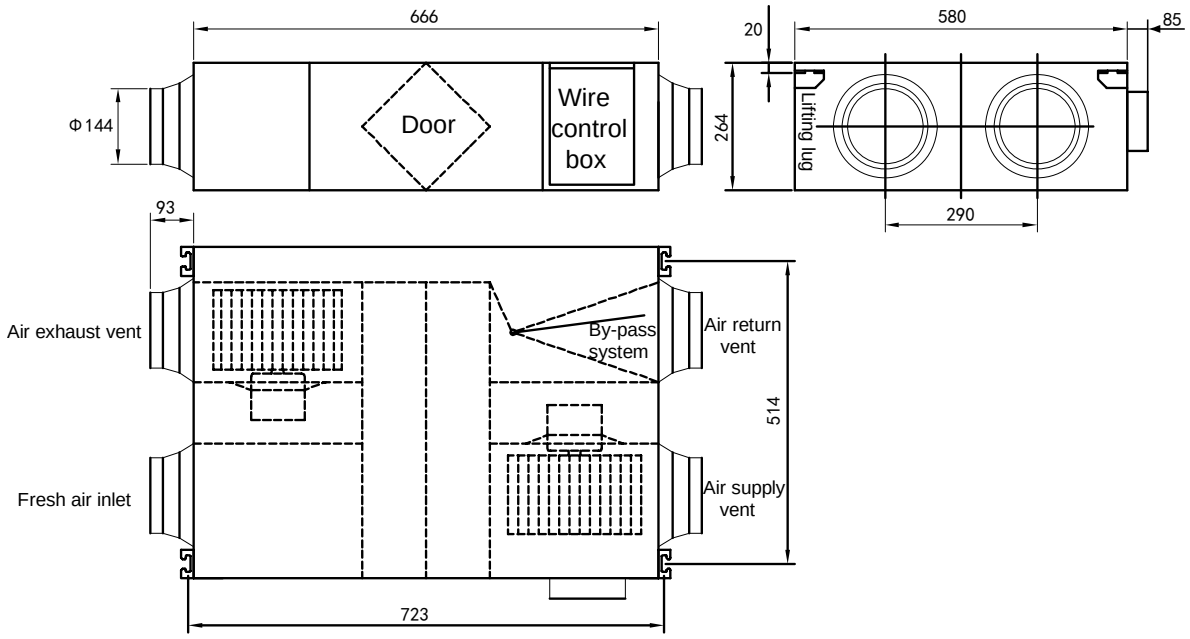
Sale Model			HRV-D800	HRV-D1000	HRV-D1500	HRV-D2000
Power supply		Ph-V-Hz	1-phase, 220-240V~50/60Hz			
Cooling	Temp. efficiency	%	76.9	75.8	77.8	77.2
	Enthalpy efficiency	%	78.1	76.9	79.2	78.7
Heating	Temp. efficiency	%	76.9	75.8	77.8	77.2
	Enthalpy efficiency	%	80.1	78.6	80.5	80.3
Input power		W	246	360	725	1340
Current		A	2.28	3.10	5.29	9.11
Indoor fan motor	Model		WZDK170-38 G-2	WZDK170-38 G-2	WZDK750-38G-W-1	WZDK750-38G-W-1
	Insulation class		E			
	Output	W	104*2	153*2	308*2	570*2
	Pole number		8P	8P	8P	8P
	Speed	r/min	1150	1230	1220	1390
Indoor fan	material		ABS		metal	
	Type		Centrifugal fan			
	Diameter	mm	Φ245	Φ245	Φ234	Φ234
	Height	mm	203	203	261	261
Indoor external static pressure (Hi)		Pa	100	100	160	170
Nominal air flow		m^3/h	800	1000	1500	2000
Sound pressure level		dB(A)	39	40	51	53
Net dimension (L×W×H)		mm	1276×1020×388	1276×1269×388	1600×1270×540	1650×1470×540
Packing size (L×W×H)		mm	1380×1100×57	1390×1350×5	1680×1350×720	1760×1580×720
Net/Gross weight		kg	58/88	69/100	151/224	165/247
Power supply	Wire's qty		3	3	3	3
	Code wire cross section	mm^2	2.5	2.5	2.5	2.5
Controller			Wired controller			
Fresh air	Fresh Air Diameter	mm	Φ242	Φ242	346×326	346×326
	Air drop	Pa	100	100	160	170

Note:

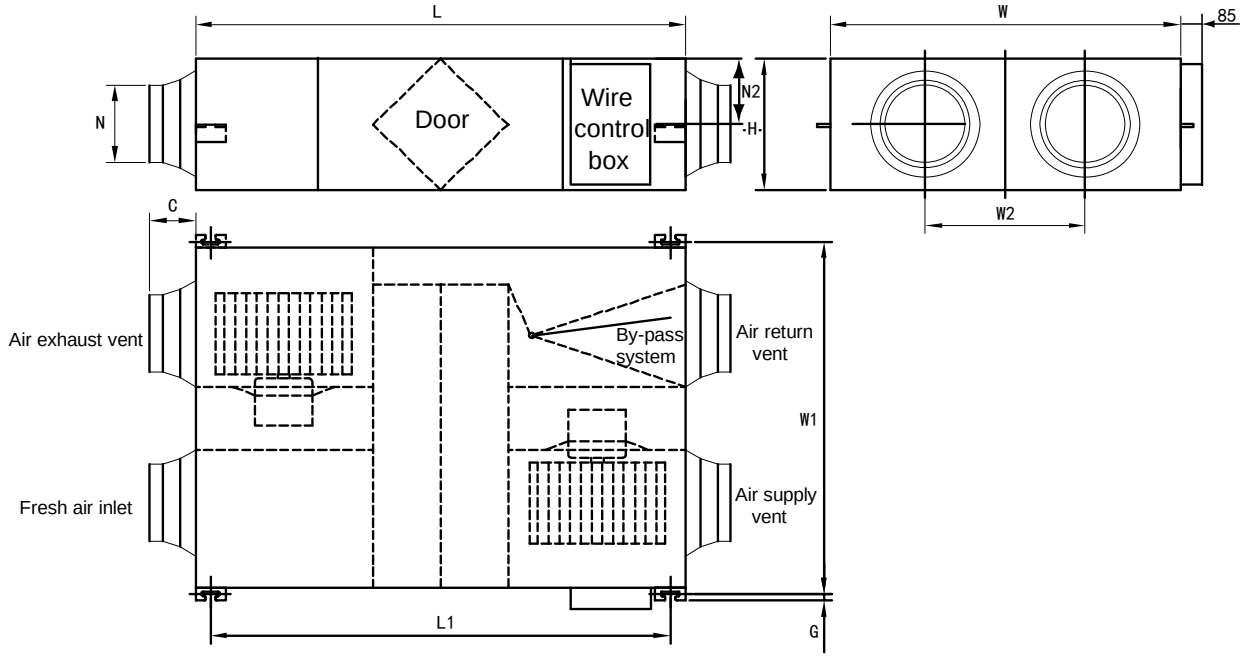
1. For the units model of HRV-D200~HRV-D2000, there are 3-speed adjustable air-volume (Hi, Med, Low).
2. For the units model of HRV-D200~HRV-D1000, all the parameters in the manual is measured at the high speed air-volume.

6. Dimensions

HRV-D200

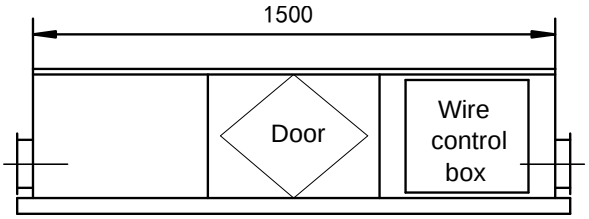


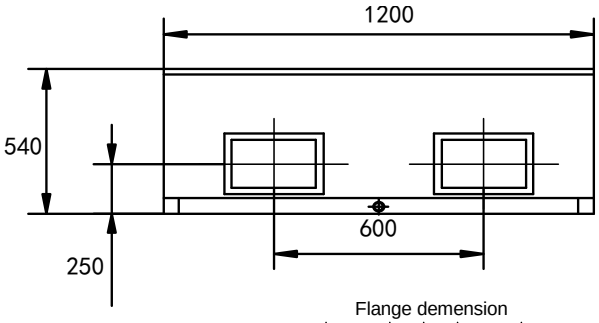
HRV-D300 HRV-D400 HRV-D500 HRV-D800 HRV-D1000

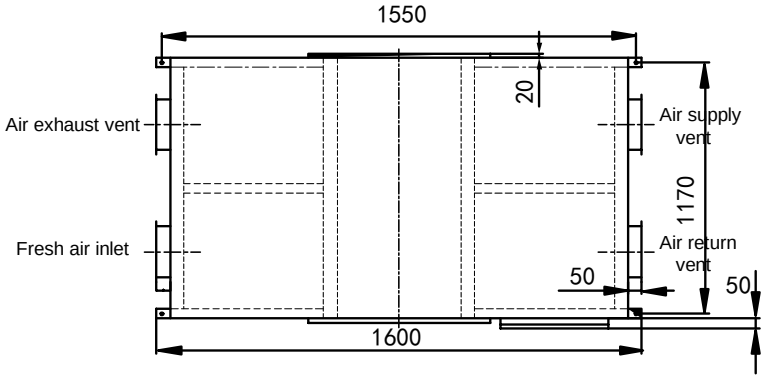


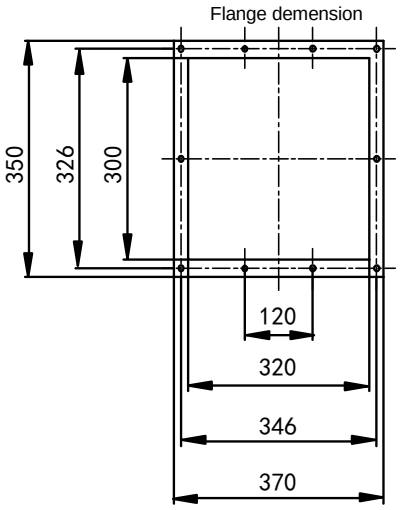
Model	L	L1	W	W1	W2	H	C	G	N	N2
HRV-D300	744	678	599	656	315	270	92	19	Φ144	111
HRV-D400	744	678	804	861	480	270	92	19	Φ144	111
HRV-D500	824	756	904	961	500	270	98	19	Φ194	111
HRV-D800	1116	1050	884	941	428	388	80	19	Φ242	170
HRV-D1000	1116	1050	1134	1191	678	388	80	19	Φ242	170

HRV-D1500

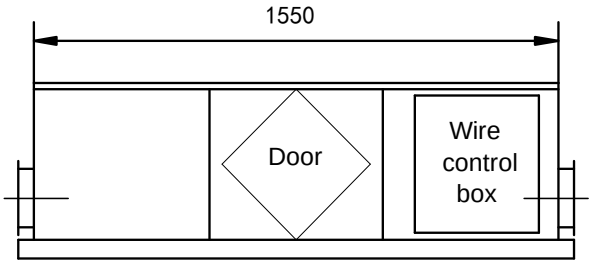


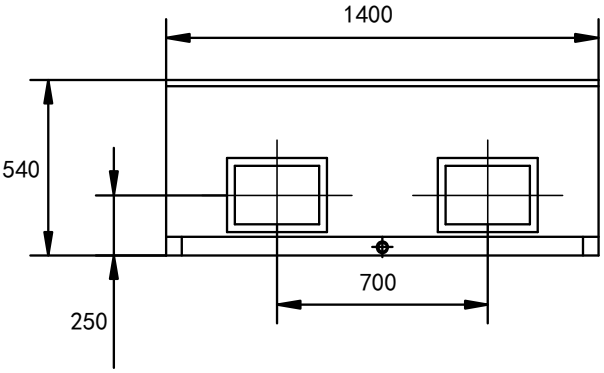


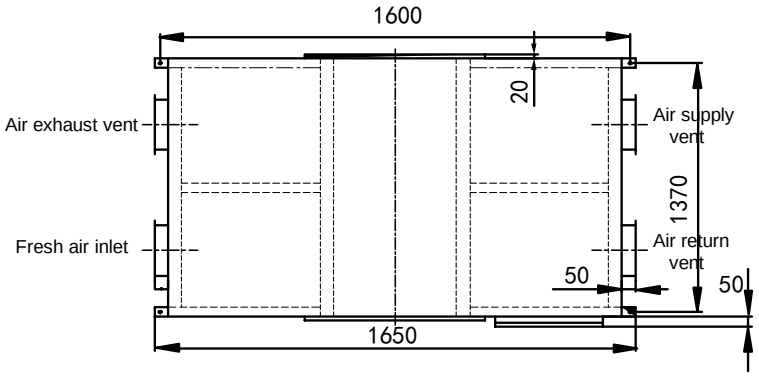


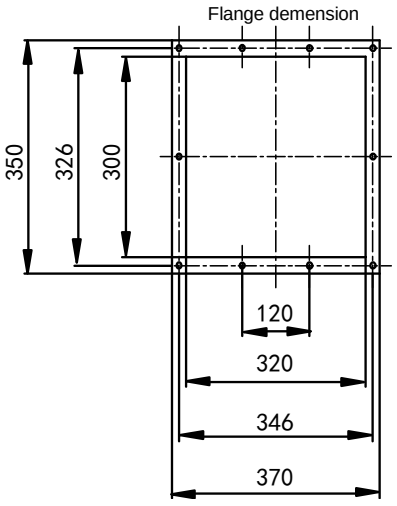


HRV-D2000

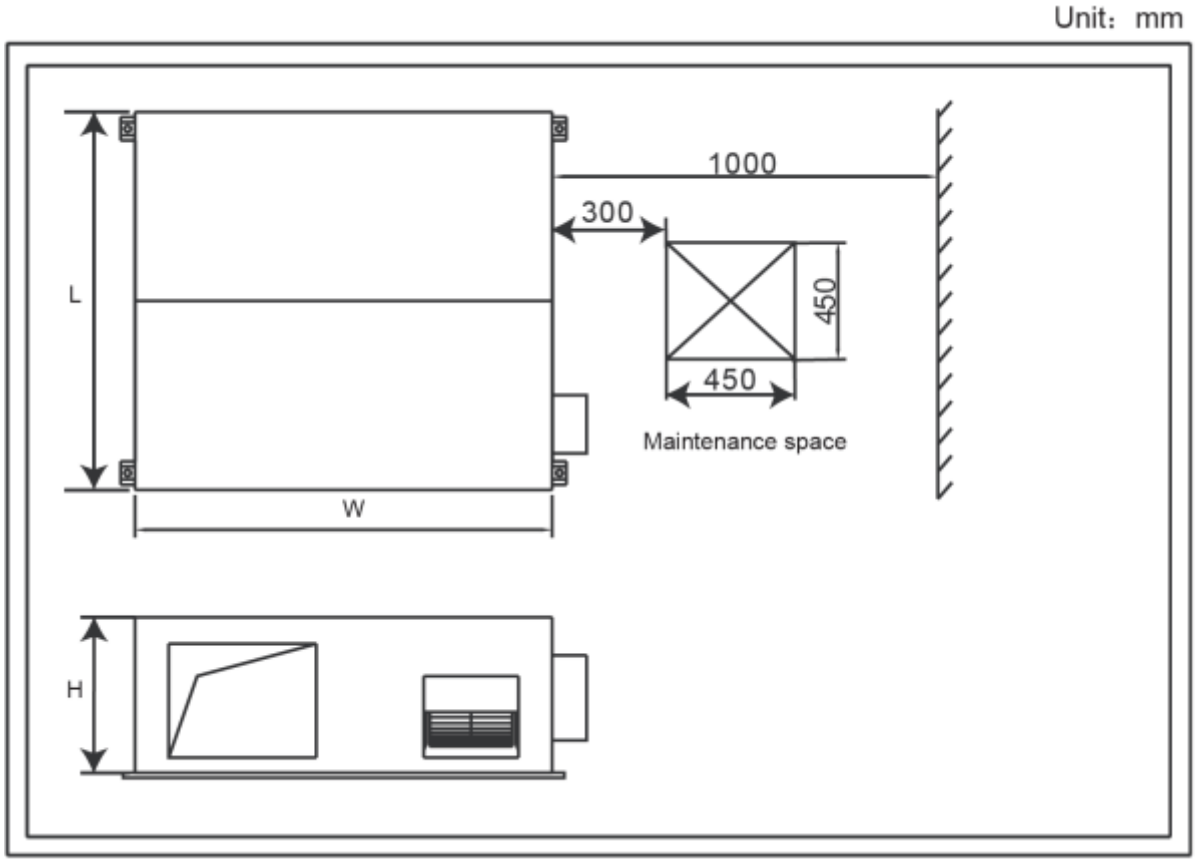






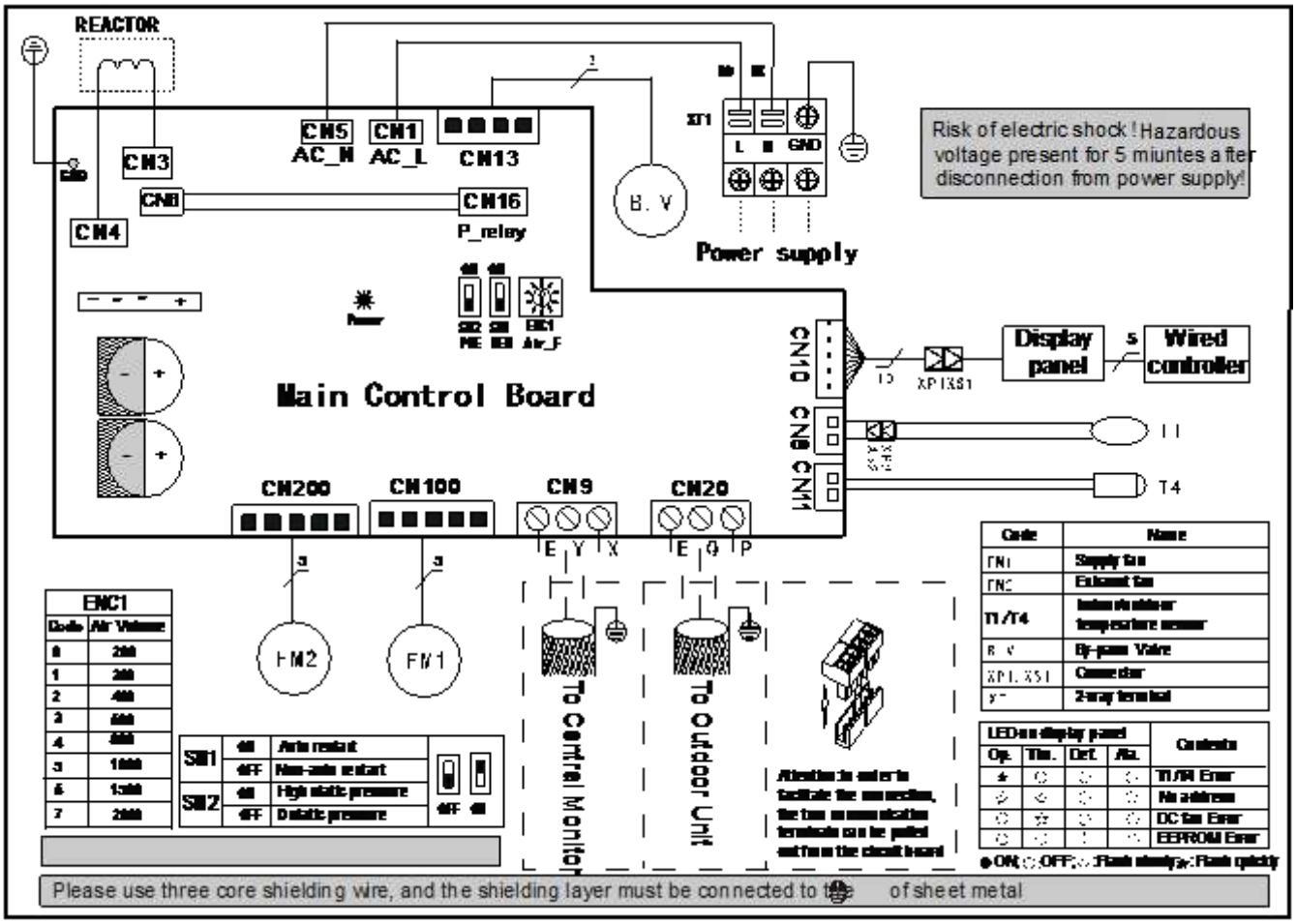


7. Maintenance Spaces

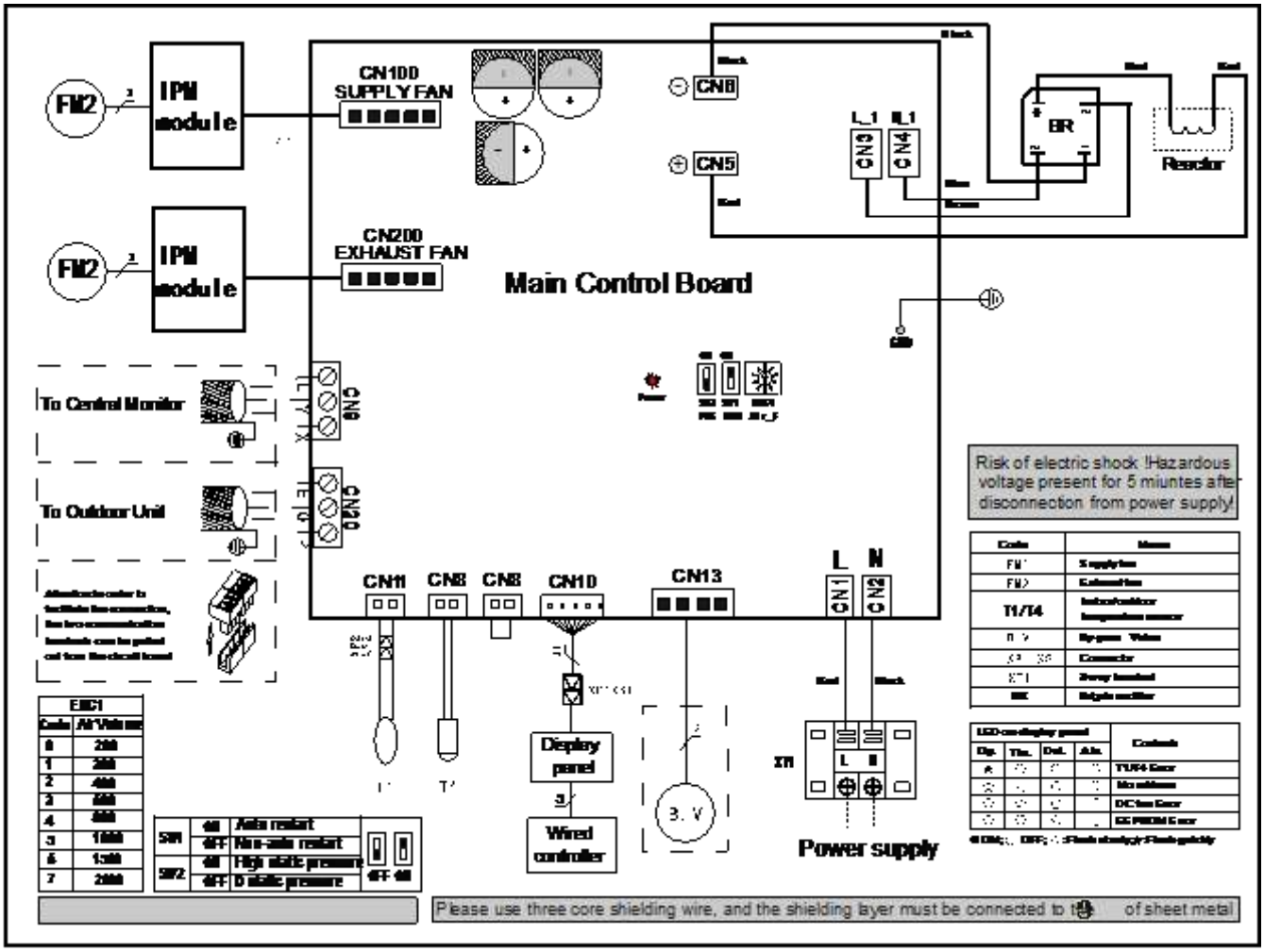


8. Wiring Diagrams

HRV-D200 HRV-D300 HRV-D400 HRV-D500 HRV-D800 HRV-D1000



HRV-D1500 HRV-D2000



9. Electric Characteristics

Model	Indoor Unit				Power Supply		IFM	
	Hz	Voltage	Min.	Max.	MCA	MFA	KW	FLA
HRV-D200	50/60	220-240	220	240	0.9	6	0.026*2	0.72
HRV-D300	50/60	220-240	220	240	1.25	6	0.042*2	0.99
HRV-D400	50/60	220-240	220	240	1.34	6	0.046*2	1.07
HRV-D500	50/60	220-240	220	240	1.95	6	0.072*2	1.56
HRV-D800	50/60	220-240	220	240	2.85	6	0.104*2	2.28
HRV-D1000	50/60	220-240	220	240	3.87	10	0.153*2	3.1
HRV-D1500	50/60	220-240	220	240	6.00	10	0.308*2	4.8
HRV-D2000	50/60	220-240	220	240	8.84	16	0.570*2	7.07

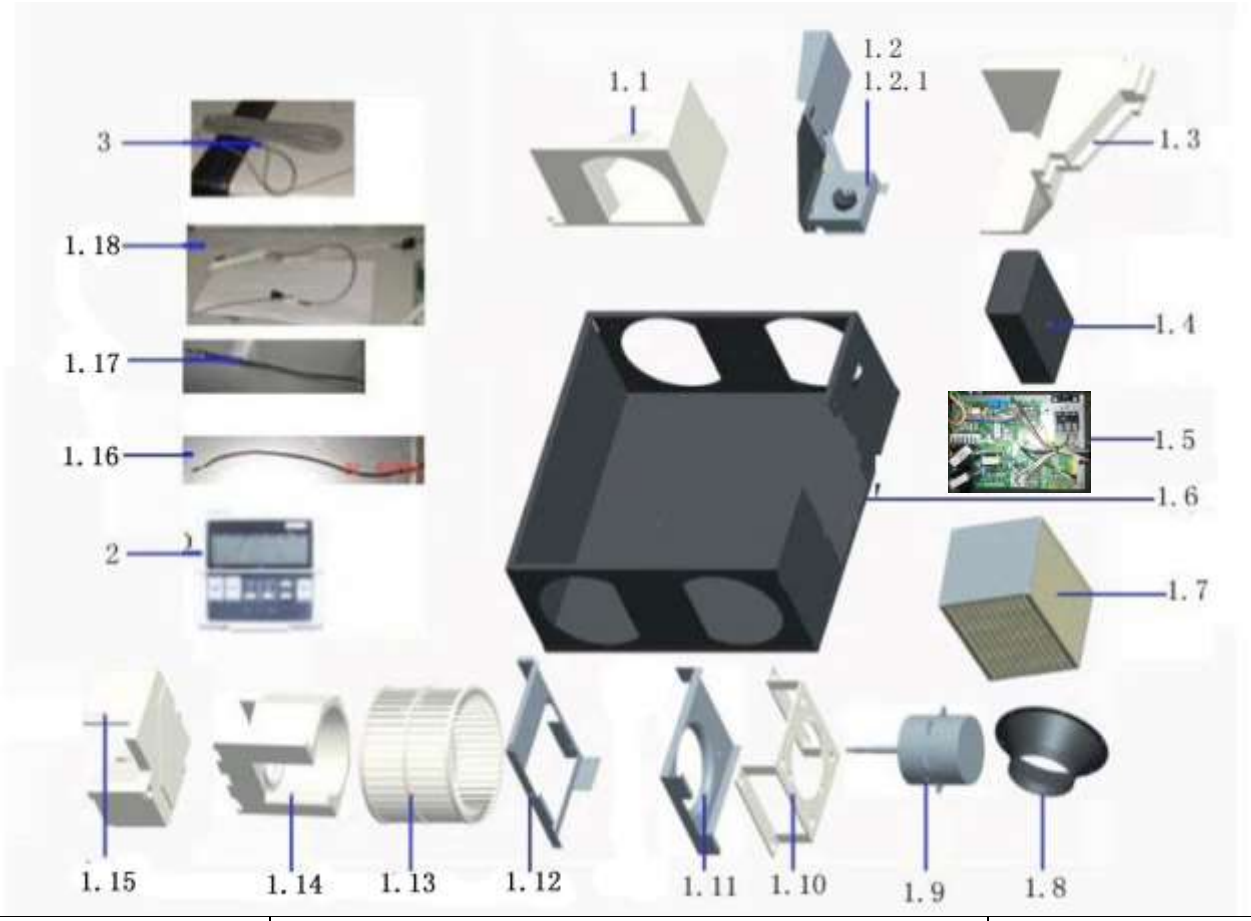
Note:
MCA: Min. Current Amps. (A)
MFA: Max. Fuse Amps. (A)
FLA: Full Load Amps. (A)
KW: Rated Motor Output (kW)
IFM: Indoor Fan Motor

10. Operation Condition Limits

Model	Outdoor air temperature	Room temperature	Room humidity
All models	-7℃～43℃	-7℃～43℃	Lower than 80% If higher than 80%, the surface of indoor unit may be condensed or the condensate will be blown from air outlet.

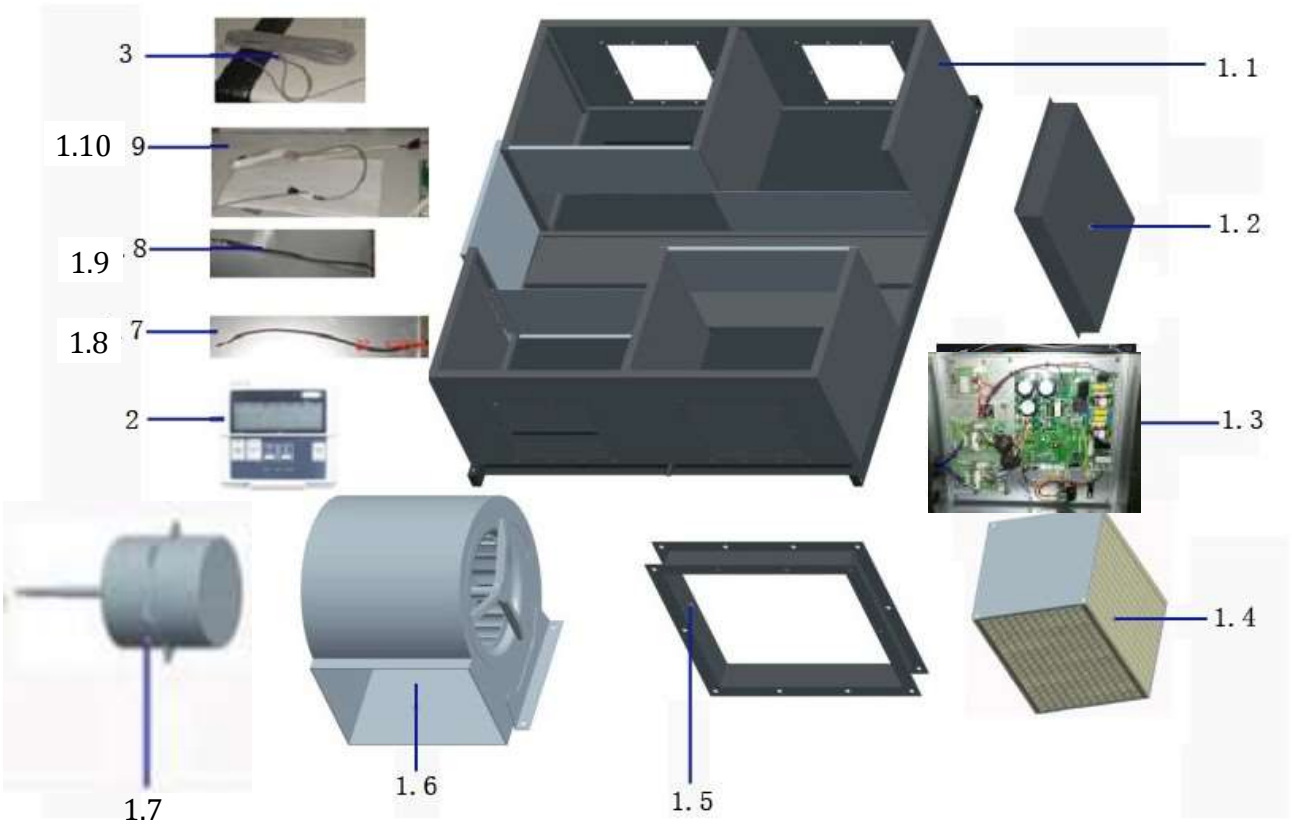
11. Exploded View

HRV-D200 HRV-D300 HRV-D400 HRV-D500 HRV-D800 HRV-D1000



NO.	Part Name	Quantity
1.1	Inlet channel	2
1.2	Bypass part	2
1.2.1	Synchronous motor	2
1.3	Partition board	2
1.4	Electrical box cover	1
1.5	Electrical box ass'y (RoHS)	1
1.5.1	Indoor main control board ass'y	1
1.5.2	Wire joint, 3p	1
1.6	Chassis	1
1.7	Heat exchange core	1
1.8	Inlet/Outlet air	4
1.9	DC fan motor	2
1.10	Motor bracket	2
1.11	Guide plate	2
1.12	Fan bracket	2
1.13	Fan	2
1.14	Volute shell	2
1.15	Bypass channel	1
1.16	Room temp sensor ass'y (RoHS)	1
1.17	Temp. sensor (T1) (RoHS)	1
1.18	Display board ass'y (M54) (RoHS)	1

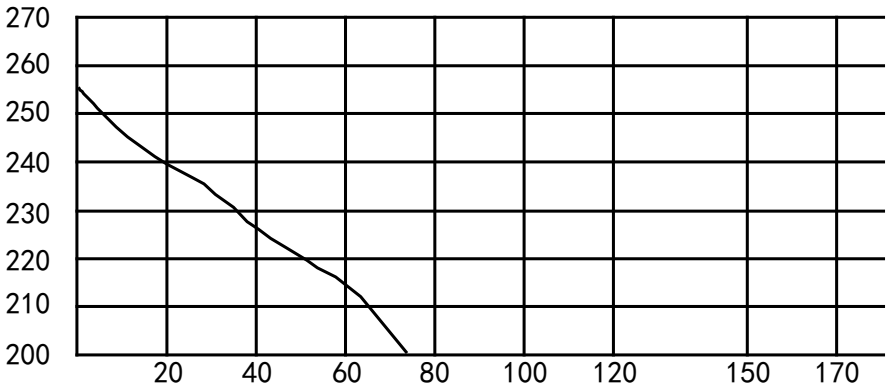
HRV-D1500 HRV-D2000



NO.	Part Name	Quantity
1.1	Chassis	2
1.2	Electrical box cover	2
1.3	Electrical box ass'y (RoHS)	1
1.3.1	Indoor main control board ass'y	1
1.3.2	Radiator components	1
1.3.2.1	Inverter module	2
1.3.2.2	Rectifier	1
1.3.3	Reactance	1
1.4	Heat exchange core	2
1.5	Inlet/Outlet air	4
1.6	Fan	2
1.7	DC fan motor	2
1.8	Room temp sensor ass'y (RoHS)	1
1.9	Temp. sensor (T1) (RoHS)	1
1.10	Display board ass'y (M54) (RoHS)	1

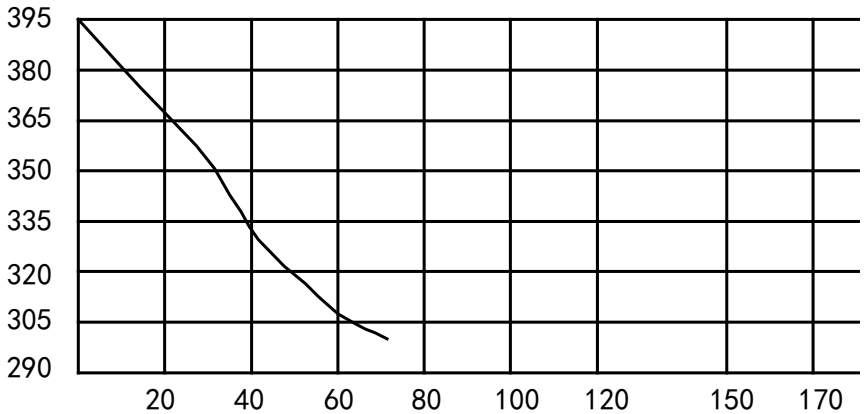
12. Blast Pressure Graphic

Static pressure (Pa)	Air flow (m3/h)	Brake power (W)
75	198	47
60	215	50
40	225	54
20	241	59
0	257	61



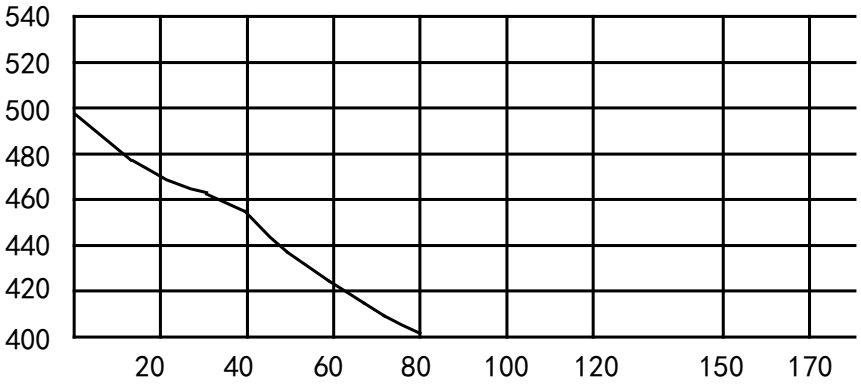
HRV-D200

Static pressure (Pa)	Air flow (m3/h)	Brake power (W)
75	297	78
60	309	80
40	331	86
20	361	92
0	395	98



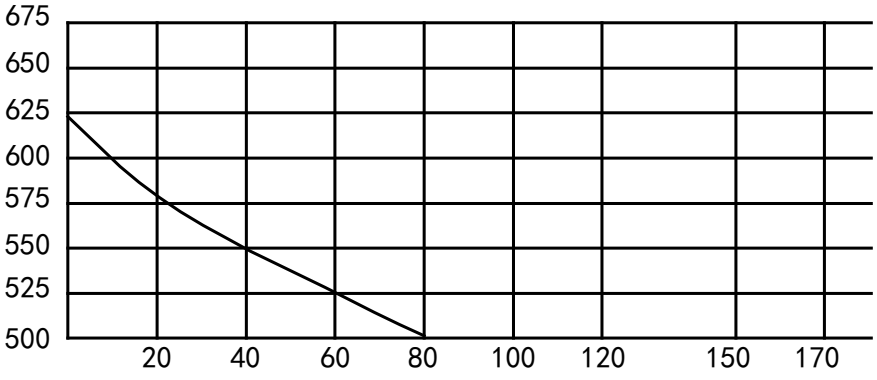
HRV-D300

Static pressure (Pa)	Air flow (m3/h)	Brake power (W)
80	407	85
60	424	89
40	455	95
20	470	102
0	496	109



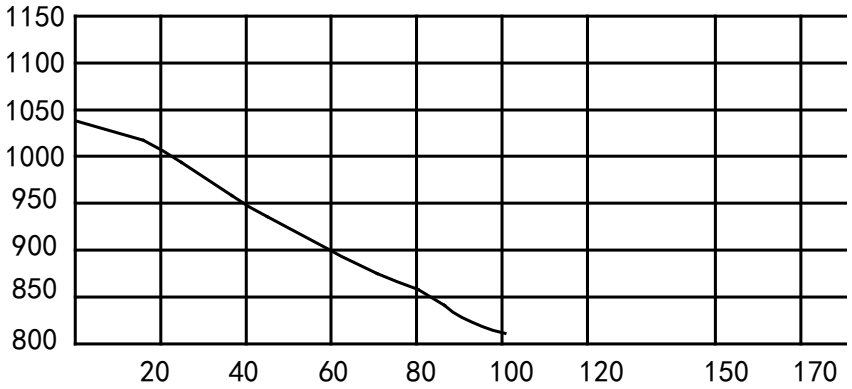
HRV-D400

Static pressure (Pa)	Air flow (m3/h)	Brake power (W)
80	507	124
60	527	138
40	560	143
20	580	158
0	620	170



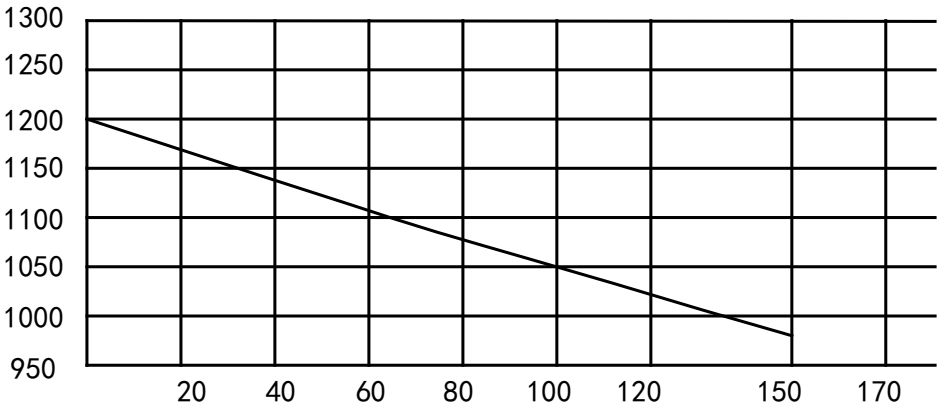
HRV-D500

Static pressure (Pa)	Air flow (m3/h)	Brake power (W)
100	829	184
80	862	196
50	923	215
25	966	233
0	1021	246



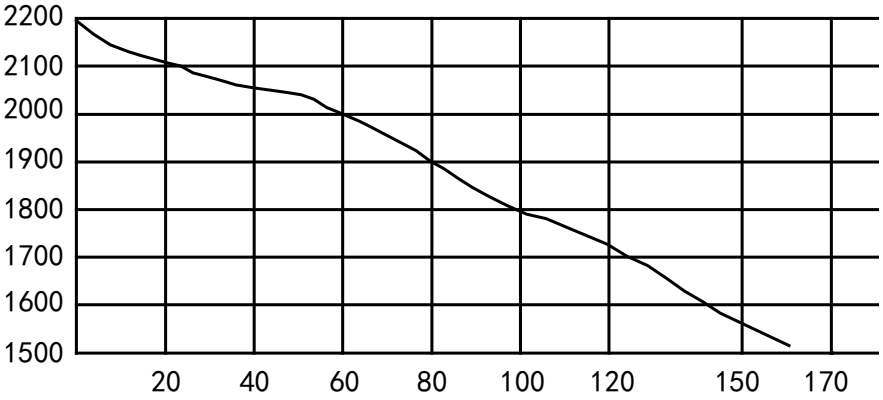
HRV-D800

Static pressure (Pa)	Air flow (m3/h)	Brake power (W)
150	980	221
120	1020	256
75	1090	284
40	1140	317
0	1206	360



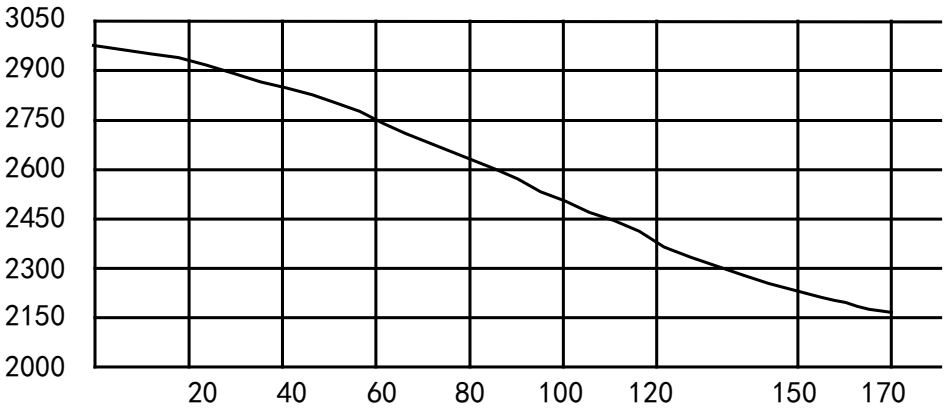
HRV-D1000

Static pressure (Pa)	Air flow (m3/h)	Brake power (W)
160	1534	550
130	1695	605
90	1869	629
50	2069	662
0	2209	725



HRV-D1500

Static pressure (Pa)	Air flow (m3/h)	Brake power (W)
170	2166	1069
130	2361	1121
90	2582	1186
50	2807	1258
0	2954	1340



HRV-D2000

13. Installation

13.1 Installation Preparation

Warning: The accessories needed for installation must be retained in your custody until the installation work is completed. Do not discard them.

1) Leave the unit inside its packaging while moving, until reaching the installation site. Where unpacking is unavoidable, use a sling of soft material or protective plates together with a rope when lifting, to avoid damage or scratches to the unit.

2) Hold the unit by the hanger brackets when opening the crate and moving it, and do not lift it holding on to any other part (especially the duct connecting flange).

Note: Be sure to instruct customers how to properly operate the unit (especially maintenance of air filter, and operation procedure) by having them carry out operations themselves while looking at the, manual.

13.2 Select the Installation Site

1) Select an installation site where the following conditions are fulfilled and meet with your customer's approval.

a. HRV should be installed far away from office, recreation or any other place silent requiring environment (install that in special machine room or wash room is recommended)

b. install in a place which has sufficient strength and stability. (Beam, ceiling and other locations capable of fully supporting the weight of the unit.) Insufficient strength is dangerous. It may also cause vibration and unusual operating noise.

c. Do not install the unit directly against a ceiling or wall. (If the unit is in contact with the ceiling or wall, it can cause vibration.)

d. Where sufficient clearance for maintenance and service can be ensured.

Caution:

- Install the units, power supply wiring and connecting wires at least 1 meter away from televisions or radios in order to prevent image interference or noise. (Depending on the radio waves, a distance of 1 meter may not be sufficient enough to eliminate the electric noise.)
- The bellows may not be able to be used in some districts, so exercise caution. (Contact your local government office or fire department for details.)
- When discharging exhaust air to a common duct, the Building Standard Law requires the use of fire proof materials, so attach a 2m copper plate standing duct.

2) Do not install the unit in the following locations:

- Place subjected to high temperature or direct flame. May result in fire or overheating.
- Place such as machinery plant and chemical plate where gas, which contains noxious gas or corrosive components of materials such as acid, alkali organic solvent and plaint, is generated. Place where combustible gas leakage is likely.

Copper piping and brazed joins may corrode, causing refrigerant to leak or poisoning and fore due to leaked gas.

- Place such as bathroom subjected to moisture.

Electric leak or electric shocks and other failure can be caused.

- Near machinery emitting electromagnetic waves.

Electromagnetic waves may disturb the operation of the control system and result in a malfunction of the equipment.

13.3 Preparations before Installation

1. Confirm the positional relationship between the unit and suspension bolts.

Leave space for servicing the unit and include inspection hatches. (Always open a hole on the side of the electric parts box so that the air filters, heat exchange elements, fans, can easily be inspected and serviced.)

2. Make sure the range of the unit's external static pressure is not exceeded.

3. Open the installation hole (Pre-setting ceilings)

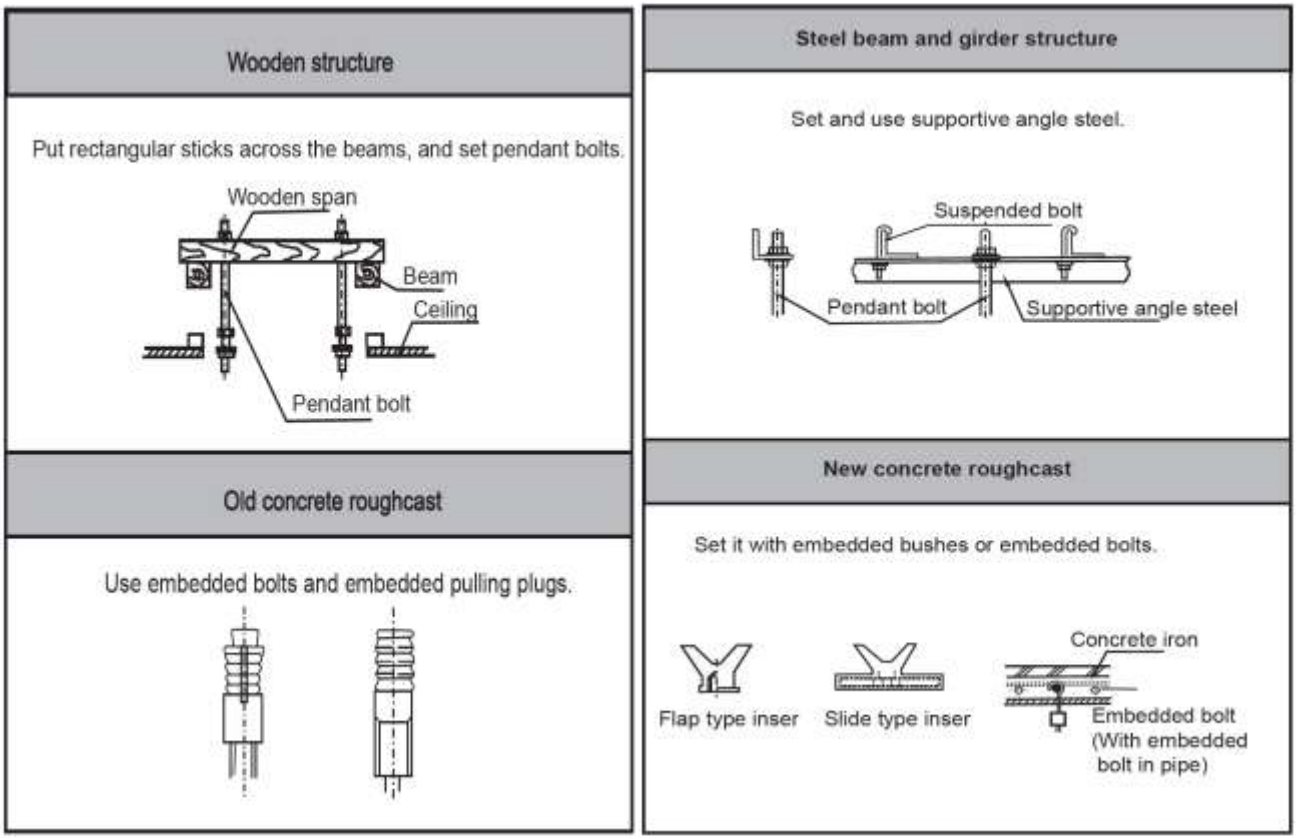
Once the installation hole is opened in the ceiling where the unit is to be installed, pass transmission wiring, and remote controller wiring to the unit's wiring holes.

After opening the ceiling hole, make sure ceiling is level if needed. It might be necessary to reinforce the ceiling frame to prevent shaking.

Please consult architect or woodworker, if necessary.

4. Install the suspension bolts. (Use M10 to M12 suspension bolts.) Use a hole-in anchor, sunken insert anchor for existing ceilings, or other parts to be procures in the field to reinforce the ceiling to bearing the weight of the unit.

5. Install vibration damping feet. (For vibration damping)



13.4 Installation the Unit

1. Before installation, please confirm all external parts are stand in their place and without damage.
2. The surrounding environment of the unit, especially the sides of wiring cabinet and water collecting side should reserve sufficient wiring and maintenance and space; additionally, one should ensure the removing space for filter griller.
3. Unit should mount steadily and without sustain the weight form condensate water pipe and air duct. The vents of air inlet/outlet and return should be connected with flexible tube.
4. Unit in AC 220-240V/50Hz、220-240V/60Hz, reliable grounding; each one possesses of independent cut-off and protection device.
5. The installation dimension and maintenance space. (See the maintenance space.)

14. Wiring

Warning: Before obtaining access to terminal device, all power supply circuits must be interrupted.

14.1 Precautions When Laying Power Supply Wiring

A circuit breaker of shutting down power supply to the entire system be installed.
A single switch can be used to supply power to units on the same system. However, branch switches and circuit breakers must be selected carefully.
Fit the power supply wiring of each unit with a switch and fuse as shown in the drawing.
Install a wiring interrupter or ground-fault circuit interrupter for the power wiring.
Make sure the ground resistance is no greater than 100Ω.
This value can be as high as 500Ω when using a grounding fault circuit interrupter since the protective ground resistance can be applied.
Be sure to give the electric grounding (earth) connection.
Do not let the grounding wire should come in contact with gas pipes, water pipes, lighting rods, or telephone ground wires.

- Gas pipes: gas leaks can cause explosions and fire.

Water pipes: cannot be grounded if hard vinyl pipes are used.

- Telephone grounded and lightning rods: The ground potential when struck by lightning gets extremely high.

Do no turn on the power supply (wiring interrupter or ground-fault circuit interrupter) until all other work is done.
Tightening torque for the terminal screws.
Use the correct screwdriver for lighting the terminal screws. If the blade of screwdriver is too small, the head of the screw might be damaged, and the will not be properly tightened.

If the terminal screws are tightened too hard, screws might be damaged.
Refer to the table below for the tightening torque of the terminal screws.

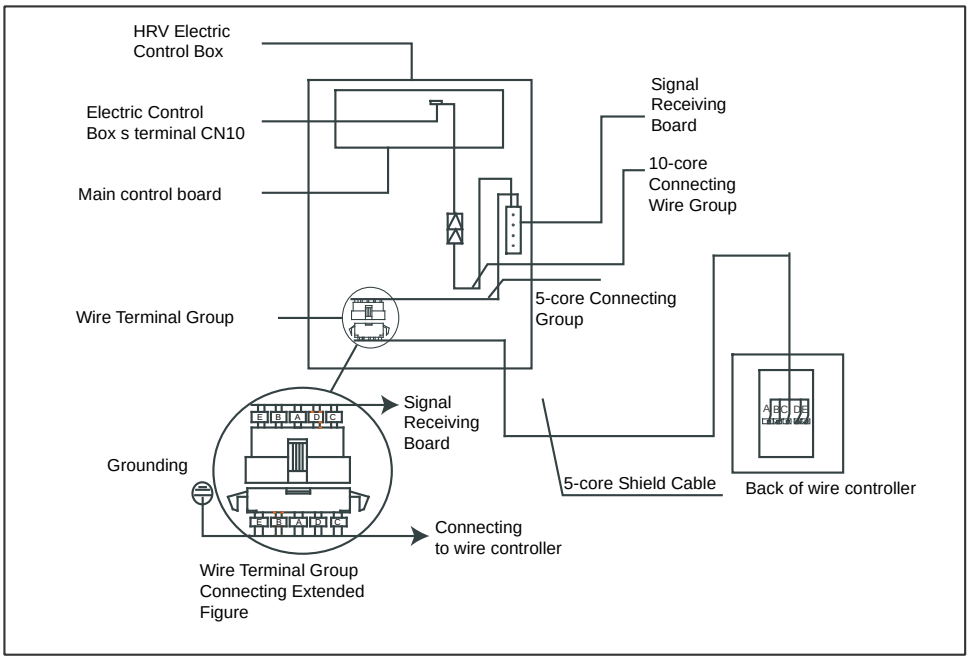
	Tightening torque (N•m)
Terminal base of remote controller/ Signal transmission wire (X2M)	0.79-0.97
Terminal base of power supply (XIM)	1.18-1.44
Grounding terminal (M4)	1.44-1.94

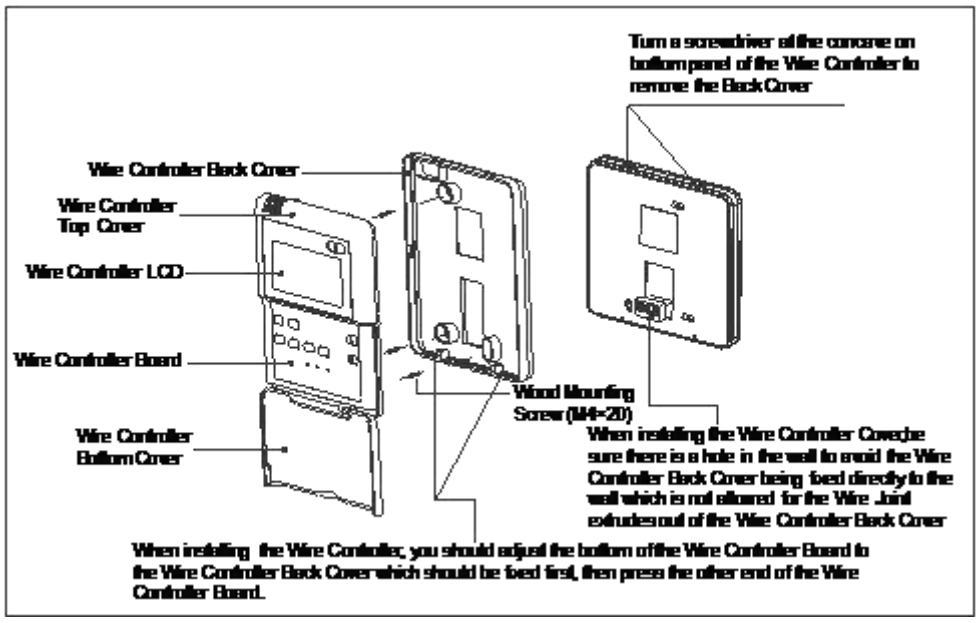
- After wiring, please confirm all connections are correct, and then power to the unit.
- Pay attention to the power supply wire.

14.2 Power Specification

Model	Power supply		Input current main switch /fuse(A)	Power supply wire dimension	
HRV-D	Phase	Frequency/voltage		Wire's quantity	Code wire cross-section (mm^2)
200,300,400, 500, 800, 1000,1500,2000	Single phase	220-240V~ 50/60Hz	15/15	3 (Yellow/green wireis grounding wire)	2.5

14.3 System connection diagram





Caution:
1. Never turn screws too tightly, or else the cover would be dented or the Liquid Crystal breaks.
2. Please leave enough space for maintain and upkeep the wire controller.

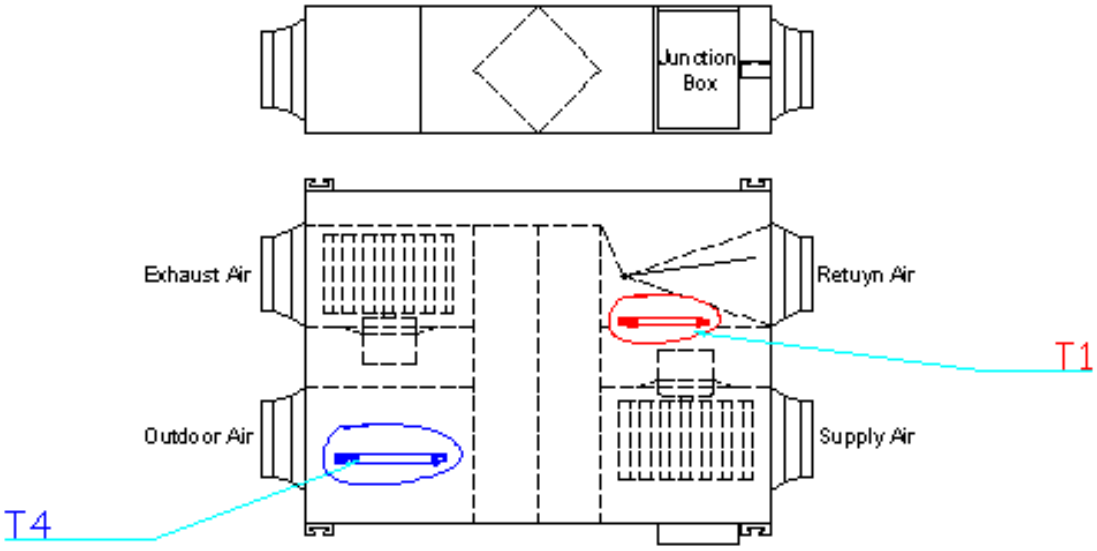
15. Troubleshooting

15.1 Lamp flashes

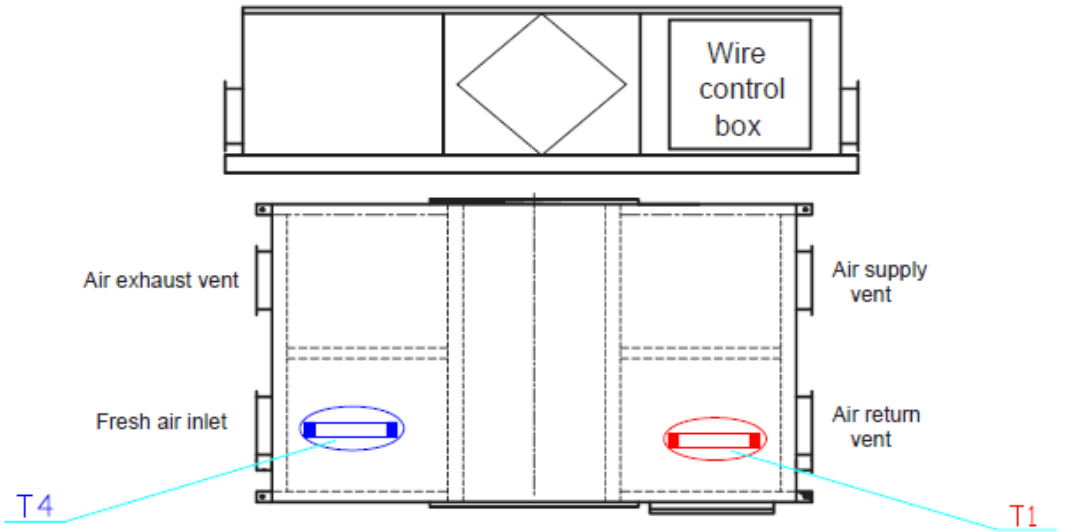
No.	Operation lamp	Timer lamp	Defrosting lamp	Alarm lamp	Explanation	Solution
1	★	○	○	○	T1/T4 sensor error	See 15.2 troubleshooting
2	☆	☆	○	○	No address	Set address by wired controller
3	○	☆	○	○	DC fan error	Check whether the DC fan motor is damaged or it is not reliably connected,
4	○	○	☆	○	EEprom error	Check whether the EEprom is damaged or it is not connected well

Note: ●：Light, ○：Extinguish, ☆：Slow flash, ★：Quick flash

HRV-D200 HRV-D300 HRV-D400 HRV-D500 HRV-D800 HRV-D1000

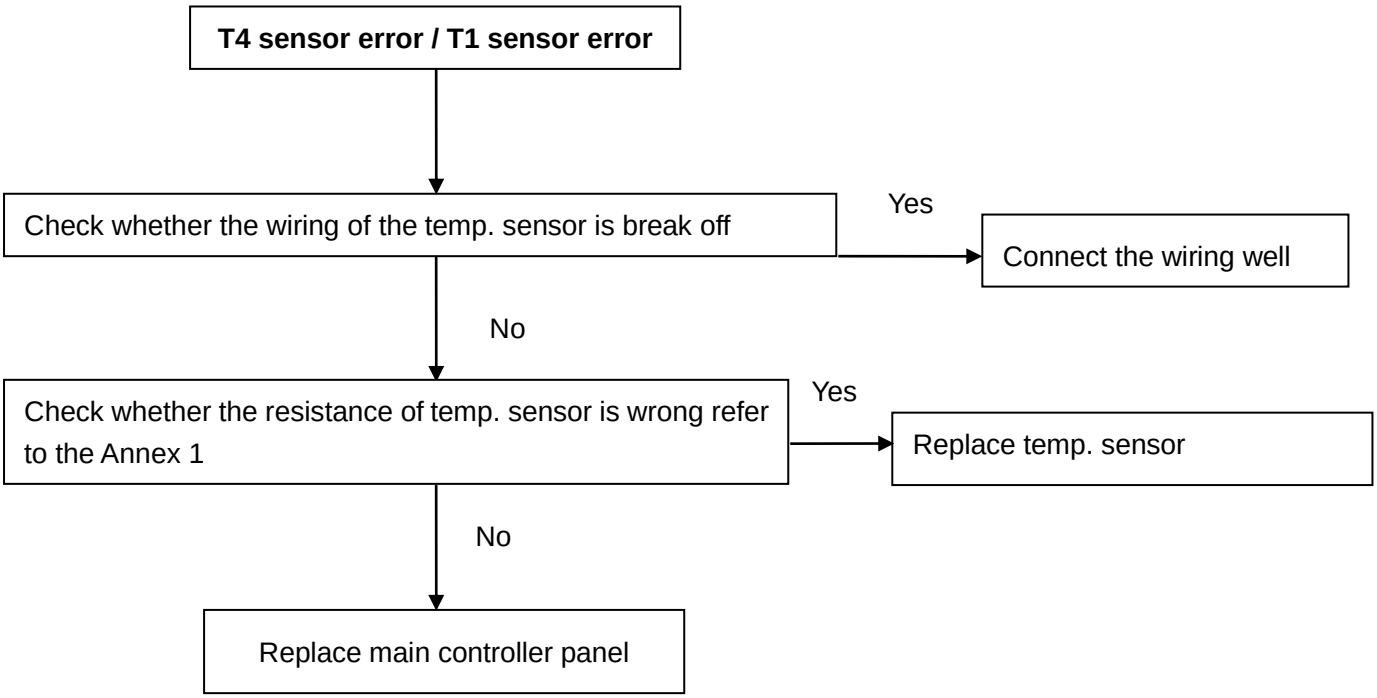


HRV-D1500 HRV-D2000



T1 temperature sensor: site at the return air cavity.
T4 temperature sensor: site at the outdoor air inlet cavity.

15.2 Troubleshooting



16. Maintenance

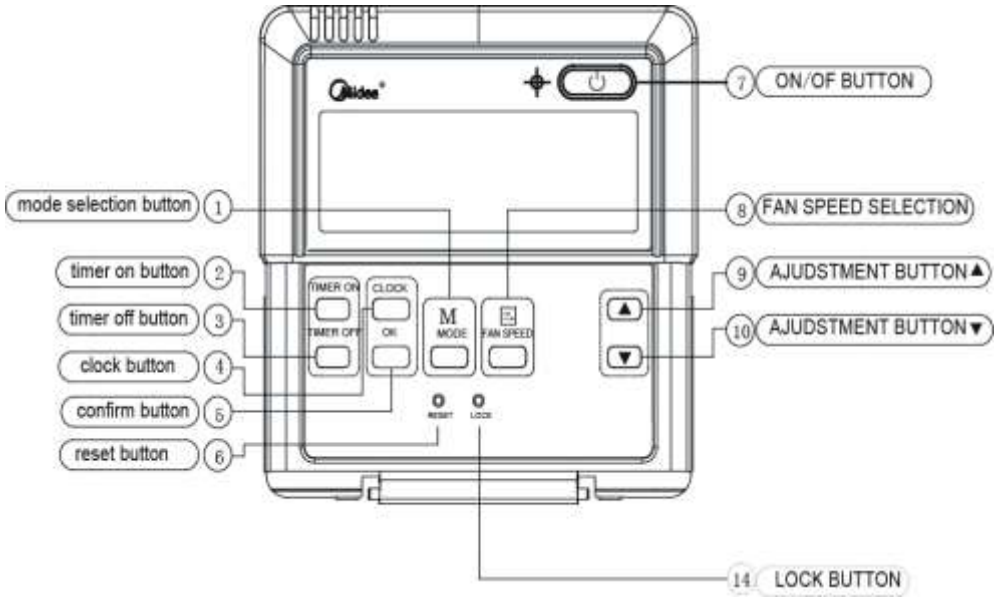
1.During new use stage, one should check the fan operation regularly.

2.The cleaning regulation for filter mesh depends on local environment. It could be clean by vacuum dirt exhauster or water, if heavy dust accumulates, it should use neutral detergent to clean it, and then dry it in shady and cool place for 20 to 30 minutes and replace it.

3.Clean the core at least 2 years a time by vacuum dirt exhauster to remove dust and foreign substance in the unit assemblies, do not touch the assemblies by exhauster and flush by water to avoid core damage.

4.Check the fan every half a year to maintain the well balance of it and check whether the axletree has loosed.

17. Controller



The basic operation conditions ofwired controller are as follows:

1. The range of power supply voltage: the voltage input is 5V DC.
2. Ambient temperature range: -15℃～+43℃.
3. Ambient humidity range: RH40%～RH90%.
4. The safety certification of electric control should conform to GB4706.32-2004, GB/T7725-2004.

17.1 Name and functions of buttons on wired controller

1 Mode selection button:

It is used to select mode, push the button one time, then the operation modes will change in turn as follows: AUTO→HEAT RECOVERY→EXHAUST→BYPASS→SUPPLY

2 Timer on button:

Push the button to set TIMER ON, each time you push the button the time moves forward by o.5 hours. When the set time is over 10 hours, each time you push the button the time moves forward by 1 hour. If want to cancel the TIMER ON, then adjust the time of TIMER ON as 0.0

3 Timer off button:

Push the button to set TIMER OFF, each time you push the button the time moves forward by o.5 hours. When the set time is over 10 hours, each time you push the button the time moves forward by 1 hour. If want to cancel the TIMER OFF, then adjust the time of TIMER OFF as 0.0

4 CLOCK button:

Normally display the clock set currently (display 12:00 for the first electrifying or resetting). When push the button for 4 seconds, the hour part on the clock display flashes every 0.5 seconds, then push button ▲ and ▼ to adjust hour; Push the button CLOCK again, the minute part flashes every 0.5 seconds, then push and button to adjust minute. When set clock or alter clock setting, must push the confirm button to complete the setting.

5 Confirm button:

The button is used at the state of CLOCK adjustment. After select the time, push the button to confirm then exit, the current clock will display.

6 RESET button (hidden):

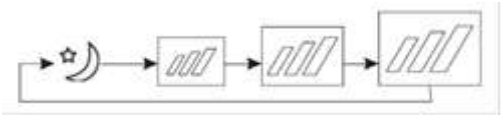
Use a small stick with a diameter of 1mm to push the RESET button to cancel the current settings and get into the condition of resetting

7 ON/OFF button:

Push the button at the condition of OFF, the OPERATION lamp lights, and the wire controller enters into ON operation, simultaneously sends the information of operation mode set currently, temperature, fan speed, timer etc. Push the button at the condition of ON, the OPERATION lamp extinguishes simultaneously sends the OFF. If having set TIMER ON or TIMER OFF, the wire controller will cancel these settings before entering into OFF, close the concern indicator, and then send the OFF information.

8 Fan speed selection button (FAN SPEED)

Select any one fan speed from "", "LOW"," MED", and "HIGH". Each time push the button, the fan speed will change in turn as follow.



9 Adjustment button:

The button is only for time adjustment. Push the ▲ button, time increases.

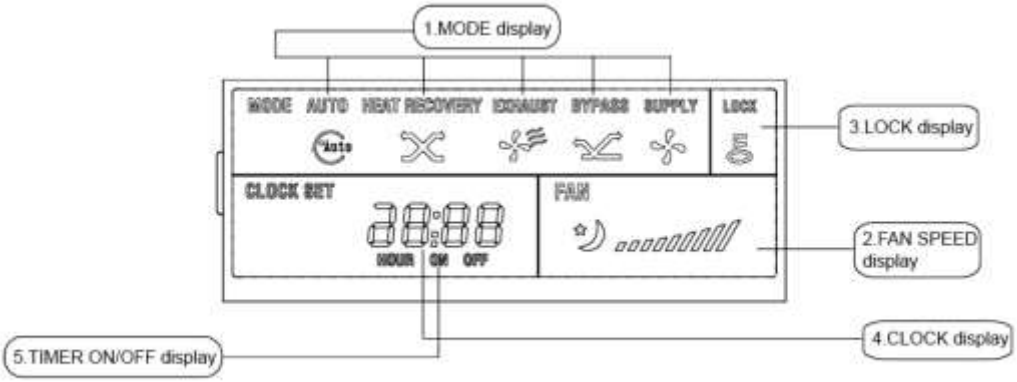
10 Adjustment button:

The button is only for time adjustment. Push the ▼ button, time decreases.

11 LOCK button (hidden):

Use a small stick with the diameter of 1mm to push the LOCK button to lock the current setting, push the button again then cancel the setting.

17.2 Name and functions of LCD on wired controller



1 Mode select display (MODE):

Press MODE button to select “AUTO”, “HEAT RECOVERY”, "EXHAUST","BYPASS", or "SUPPLY” mode.

2 Fan speed display (FAN SPEED)

Press FAN SPEED to select fan speed from "", "LOW"," MED”, and "HIGH".

NOTE: "" stand for fan working speed in sleep mode.

3 Lock display

Press LOCK to display the icon of LOCK. Press the button again then the icon of LOCK disappears. In the mode of LOCK, all the buttons are invalid except for LOCK button.

4 CLOCK display

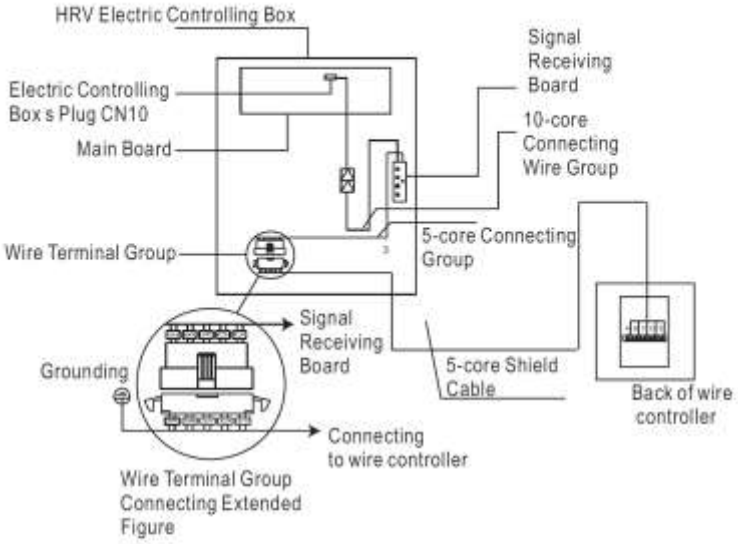
Usually display the clock set currently. Press the button CLOCK for 4 seconds, the HOUR part will flash, press button ▲and▼ to adjust HOUR. Press the button CLOCK again, the minute part flash, press button ▲or▼to adjust MINUTE. After clock set or clock operation, it must press CONFIRM to complete the set.

5 TIMER ON/OFF display:

Display ON at the state of TIMER ON adjustment or after only set the TIMER ON; Display OFF at the state of TIMER OFF adjustment or after only set the TIMER OFF; Display ON/OFF if simultaneously set the mode of TIMER ON and TIMER OFF.

17.3 Installation

Connection method and the principle diagram show as follow:



18. Accessory

Name	Quantity	shape	Purpose
Installation and owner's manual	1		must be delivered to the customer
Butt-joint wire of wire control display panel (6 meters) (RoHS)	1		For connect wire control and display control box
HRV wire controller (RoHS)	1		For controlling HRV units

Annex 1

Characteristic of temperature sensor

Temp.˚C	Resistance KΩ		Temp.˚C	Resistance KΩ		Temp.˚C	Resistance KΩ
-10	62.2756		17	14.6181		44	4.3874
-9	58.7079		18	13.918		45	4.2126
-8	56.3694		19	13.2631		46	4.0459
-7	52.2438		20	12.6431		47	3.8867
-6	49.3161		21	12.0561		48	3.7348
-5	46.5725		22	11.5		49	3.5896
-4	44		23	10.9731		50	3.451
-3	41.5878		24	10.4736		51	3.3185
-2	39.8239		25	10		52	3.1918
-1	37.1988		26	9.5507		53	3.0707
0	35.2024		27	9.1245		54	2.959
1	33.3269		28	8.7198		55	2.8442
2	31.5635		29	8.3357		56	2.7382
3	29.9058		30	7.9708		57	2.6368
4	28.3459		31	7.6241		58	2.5397
5	26.8778		32	7.2946		59	2.4468
6	25.4954		33	6.9814		60	2.3577
7	24.1932		34	6.6835		61	2.2725
8	22.5662		35	6.4002		62	2.1907
9	21.8094		36	6.1306		63	2.1124
10	20.7184		37	5.8736		64	2.0373
11	19.6891		38	5.6296		65	1.9653
12	18.7177		39	5.3969		66	1.8963
13	17.8005		40	5.1752		67	1.830
14	16.9341		41	4.9639		68	1.7665
15	16.1156		42	4.7625		69	1.7055
16	15.3418		43	4.5705		70	1.6469

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