



ERV / ERV-V 100 / 200 / 300 / 400 / 500 / 700 / 900 / 1100

Packaged Type Energy Recovery Unit



Assembly & Maintenance Guide



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## INTRODUCTION

Installation & Operation Manual has been prepared and given to customer as a guide for easy installation&operation units manufactured by ENEKO A.Ş. The manual contains description of the unit, components and basic informations and recommendations for proper and fail free operation. Please read the instructions and warnings given in this manual before starting installation, operation and maintenance works and keep this manual near the unit, within easy reach of service personnel.



Any damage, failure or hazard occurred because of use except this purpose is beyond the responsibility of manufacturer.



For technical service and questions, please contact with following information.



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# WARNINGS & SAFETY INFORMATION



## PROHIBITED

- ◆ This unit has to be used under proper conditions according to its technical specification and design purpose. (Otherwise responsibility belongs to practitioner)
- ◆ Unauthorized personnel must not interfere in unit and/or must not use unoriginal spare parts. (Otherwise responsibility of failure that may occur belongs to practitioner)
- ◆ Do not install this product in a refrigerated warehouse, heated swimming pool or other location where temperature and humidity are significantly different. (Failure to heed this warning may result in electrical shock or malfunctioning.)
- ◆ Do not install this product where it will be directly exposed to rain. (Failure to heed this warning may result in electrical shock or malfunctioning.)
- ◆ Do not install this product in a location where acid, alkali or organic solvent vapors, paints or other toxic gases, gases containing corrosive components or high concentrations of oily smoke are present (Failure to heed this warning may result not only in malfunctioning but also fire, power leakage and electrical shock.)
- ◆ Do not use this product outside the range of its rated voltage and control capacity.



## ATTENTION

- ◆ Install this product in an environment where the temperature ranges from -10 °C to +40 °C and the relative humidity is less than 60%. If condensation is expected to form, heat up the fresh outside air by a duct heater etc.
- ◆ Select an adequately sturdy position for installing the product and install it properly and securely.
- ◆ Use the designated electrical wires for the terminal board connections and connect the wires securely so that they will not be disconnected. (Failure to ensure proper connections may result in fire.)
- ◆ When passing metal ducts through wooden buildings clad with metal laths, wire laths or metal, these ducts must be installed in such a way that they will not make electrical contact with metal laths, wire laths or metal sheets. (Power leakage can cause ignition.)
- ◆ The outside ducts must be tilted at a gradient (1/30 or more) downwards toward the outdoor area from the main unit, and properly insulated. (The entry of rain water may cause power leaks, fire or damage to household property.)
- ◆ Gloves should be worn while installation. (Failure to heed this warning may result in injury.)
- ◆ A dedicated circuit breaker must be installed at the origin of mains power supply. This circuit breaker must be provided with a means for locking (lock and key).
- ◆ The body of the unit, room control panel and cables keep away the unit 3 m. distance.



- ◆ This product must not be disassembled under any circumstances. Only authorized repair technicians are qualified to conduct disassembly and repairs. (Failure to heed this warning may result in fire, electrical shock or injury.)



- ◆ Connect the product properly to the ground. (Malfunctioning or power leaks can cause electrical shock.)



- ◆ An isolator switch having minimum contact gap of 3 mm in all poles must be provided as a means of disconnecting the power supply.

**NOTE:** The installations, which is not available for installation and operation manual, is out of guarantee.

# CHECK LIST

In the event of unit failure and pre-commissioning checks to be made are determined as follows; after checking this information, please contact our company in case failure continues.

## Controls

√

Make sure that the unit receives power and electrical grounding is made!

Make sure that the electricity cables are drawn from in the correct cross section!  
(Please check whether there is heating on cables or not.)

Please check whether the cables in unit control panel are shielded (shielded magnetic field) or not; make sure shielding is grounded. If not, please change them!

Make sure that fresh air and exhaust air filters are clean and they do not block the flow of air!

Make sure there is the connection of drainage on the unit, check any possible clogging in drainage line and clean if necessary!

Please check whether the diameter of the air duct connection of the unit and the diameter of the spigot are the same. If the duct connection is smaller, change it with the correct one.

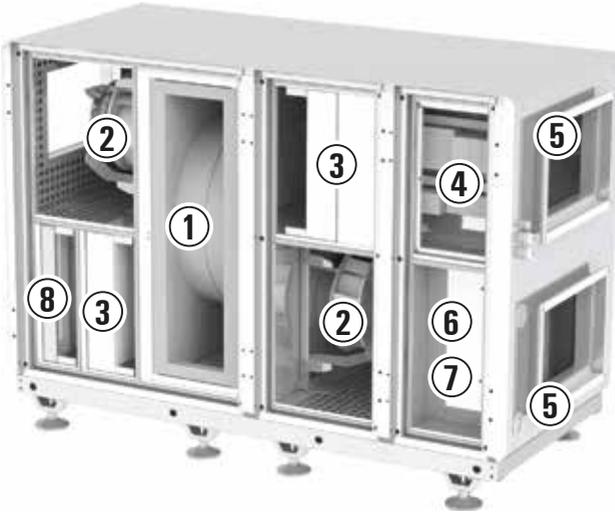
Make sure the electrical connections of the unit are made as suggested on the unit and in this guide, check if there is incorrect connection.

Make sure during the installation of the unit there is enough space for the service and if there is not enough space, re-install again.

In extremely cold climate applications, frost may occur on the exchanger, apply electric heater in fresh air intake section of the unit to get the temperature to -10 °C and above.

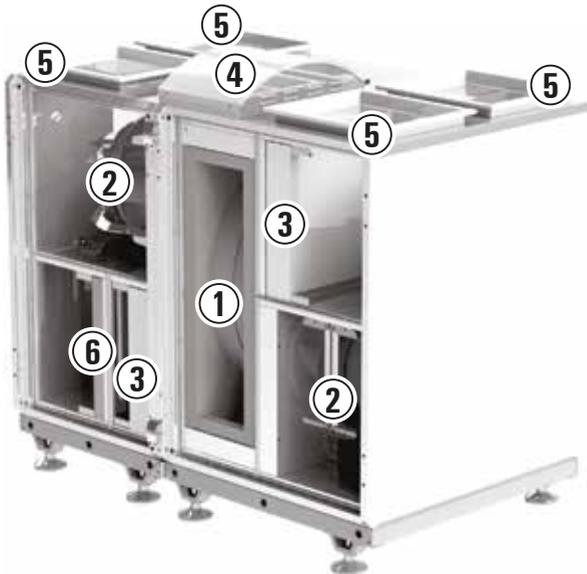
After installing the unit, make sure that it does not create an abnormal sound or vibration, if there is, make sure that rubber pads are used.

## ERV Series Units



- ① Rotary energy recovery
- ② Exhaust and supply air fans
- ③ Exhaust and supply air filters
- ④ Control
- ⑤ Duct connections
- ⑥ Heating coil (Optional)
- ⑦ Electric heater (Optional)
- ⑧ Pre-filter (Optional)

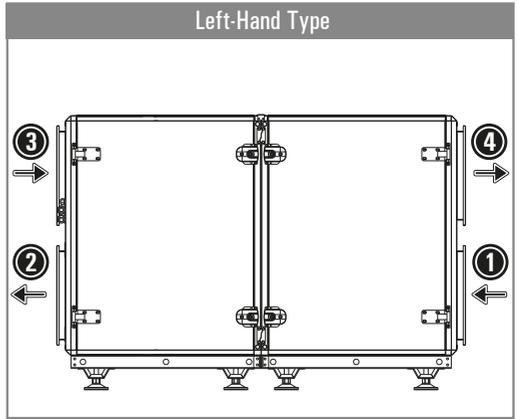
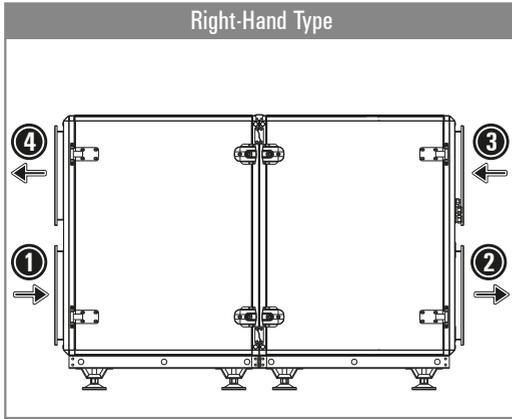
## ERV-V Series Units



- ① Rotary energy recovery
- ② Exhaust and supply air fans
- ③ Exhaust and supply air filters
- ④ Control
- ⑤ Duct connections
- ⑥ Pre-filter (Optional)

# UNIT CONFIGURATION

## ERV Series Units



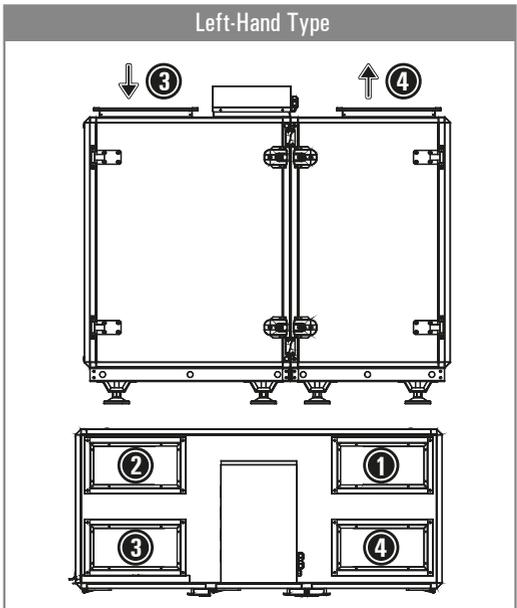
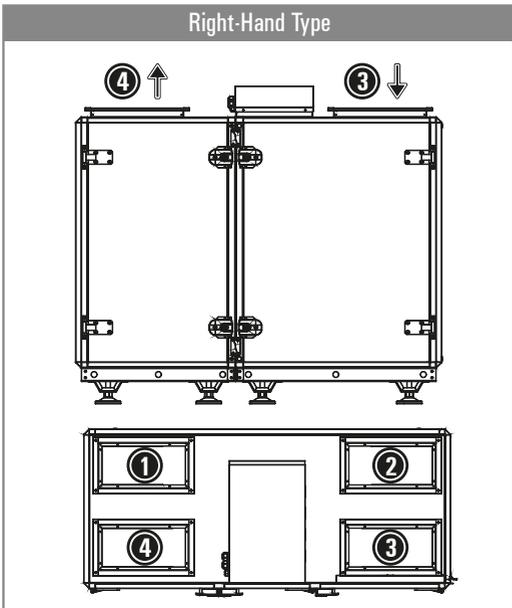
① Outdoor air - OA

② Supply air - SA

③ Return air - RA

④ Exhaust air - EA

## ERV-V Series Units



① Outdoor air - OA

② Supply air - SA

③ Return air - RA

④ Exhaust air - EA

# TECHNICAL SPECIFICATIONS

## ERV Series

		ERV 100	ERV 200	ERV 300	ERV 400	ERV 500	ERV 700	ERV 900	ERV 1100
Manufacturer		ENEKO							
ERP		ERP 2018							
Declared typology		NRVU							
Type of drive installed or intended to be installed		variable speed drive							
Type of HRS		Rotor							
Thermal efficiency of heat recovery <sup>1</sup>	%	75,9	75,9	75	75,7	76,3	76,8	77,7	76,8
Nominal flow rate (Max ERP flow rate)	m <sup>3</sup> /h	1150	1150	1800	2800	3300	4500	6250	6650
Max flow rate (200 Pa External Pressure Drop)	m <sup>3</sup> /h	1550	1550	2200	3050	5200	6400	8300	10500
Effective electric power input	W	820	820	1190	2040	2440	3270	4250	4300
SFPint <sup>1</sup>	W(m <sup>3</sup> /s)	1126	1126	1083	1043	1058	1026	980	934
SFPint_limit1	W(m <sup>3</sup> /s)	1138	1138	1085	1063	1061	1026	1048	937
Face velocity at nominal flow rate	m/s	1,39	1,39	1,65	2,04	1,94	2,32	2,14	2,28
Nominal External Pressure Drop ( $\Delta P_s, ext$ ) <sup>1</sup>	Pa	200	200	200	200	200	200	200	200
Internal pressure drop of ventilation components ( $\Delta P_s, int$ ) (Outdoor Air/Exhaust Air)	Pa	317/297	317/297	337/317	340/320	309/289	316/296	301/281	319/299
Internal pressure drop of non-ventilation components ( $\Delta P_s, add$ ) (Outdoor air/Exhaust Air)	Pa	There is no "non-ventilation" components							
Static efficiency of fans used in accordance with Regulation (EU) No. 327/2001 (Supply Fan/Exhaust Fan)	%	54.5/ 54.6	54.5/ 54.6	60.2/ 60.4	63.1/ 63.3	56.6/ 56.4	59.7/ 59.4	59.7/ 59.4	66.2/ 66
Maximum external leakage	%	< = 3							
Maximum internal leakage	%	NA							
Energy classification of filters (Energy performance) (Supply Air Side/Exhaust Air Side)	Kwh	440/369	440/369	653/551	1043/892	1340/1150	1860/1616	2537/2170	2565/2123
Description of visual filter warning for NRVUs intended for use with filters <sup>2</sup>	Differential pressure measurement								
Sound power level (L <sub>WA</sub> )		53,8	53,8	51,4	58,7	54,9	57	58,1	55,7
Internet adress for pre-/dis-assembly instructions	www.eneko.com.tr								

<sup>1</sup> Measured at balanced flow, EN308. Performance values will be change different working condition.

<sup>2</sup> Including test pointing out the importance of regular filter changes for performance and energy efficiency of the unit.

Note: ePM1 ≥ 50% (F7) class filter at supply side, ePM10 ≥ 50% (M5) class filter at exhaust side are used accordin to ISO 16890.

# TECHNICAL SPECIFICATIONS

## ERV-V Series

		ERV-V 100	ERV-V 200	ERV-V 300	ERV-V 400	ERV-V 500	ERV-V 700	ERV-V 900	ERV-V 1100
Manufacturer		ENEKO							
ERP		ERP 2018							
Declared typology		NRVU							
Type of drive installed or intended to be installed		variable speed drive							
Type of HRS		Rotor							
Thermal efficiency of heat recovery <sup>1</sup>	%	76,5	76,5	75,4	75,7	76,3	76,8	77,7	76,8
Nominal flow rate (Max ERP flow rate)	m <sup>3</sup> /h	1150	1150	1800	2800	3300	4500	6250	6650
Max flow rate (200 Pa External Pressure Drop)	m <sup>3</sup> /h	1550	1550	2150	2900	5100	6150	8150	9950
Effective electric power input	W	820	820	1200	2230	2690	3340	4250	4300
SFPint <sup>1</sup>	W(m <sup>3</sup> /s)	1127	1127	1084	1048	1048	1026	978	934
SFPint_limit1	W(m <sup>3</sup> /s)	1139	1139	1085	1061	1061	1026	979	937
Face velocity at nominal flow rate	m/s	1,39	1,39	1,65	2,04	1,94	2,32	2,14	2,28
Nominal External Pressure Drop ( $\Delta P_s, ext$ ) <sup>1</sup>	Pa	200	200	200	200	200	200	200	200
Internal pressure drop of ventilation components ( $\Delta P_s, int$ ) (Outdoor Air/Exhaust Air)	Pa	317/297	317/297	337/317	340/320	309/289	316/296	301/281	319/299
Internal pressure drop of non-ventilation components ( $\Delta P_s, add$ ) (Outdoor air/Exhaust Air)	Pa	There is no "non-ventilation" components							
Static efficiency of fans used in accordance with Regulation (EU) No. 327/2001 (Supply Fan/Exhaust Fan)	%	54.5/ 54.5	54.5/ 54.5	60.2/ 60.3	62.5/ 62.7	57.1/ 57	59.7/ 59.4	59.7/ 59.4	66.2/ 66
Maximum external leakage	%	< = 3							
Maximum internal leakage	%	NA							
Energy classification of filters (Energy performance) (Supply Air Side/Exhaust Air Side)	Kwh	440/369	440/369	653/552	1053/901	1329/1139	1859/1616	2512/2170	2461/2123
Description of visual filter warning for NRVUs intended for use with filters <sup>2</sup>	Differential pressure measurement								
Sound power level (L <sub>WA</sub> )		53,8	53,8	51,4	58,7	54,9	57	58,1	55,7
Internet adress for pre-/dis-assembly instructions	www.eneko.com.tr								

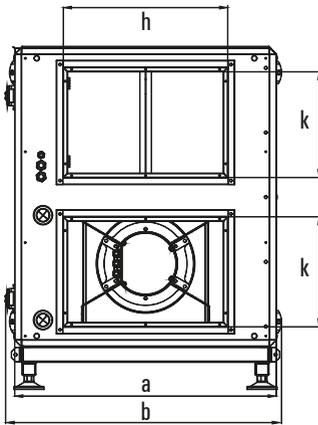
<sup>1</sup> Measured at balanced flow, EN308. Performance values will be change different working condition.

<sup>2</sup> Including test pointing out the importance of regular filter changes for performance and energy efficiency of the unit.

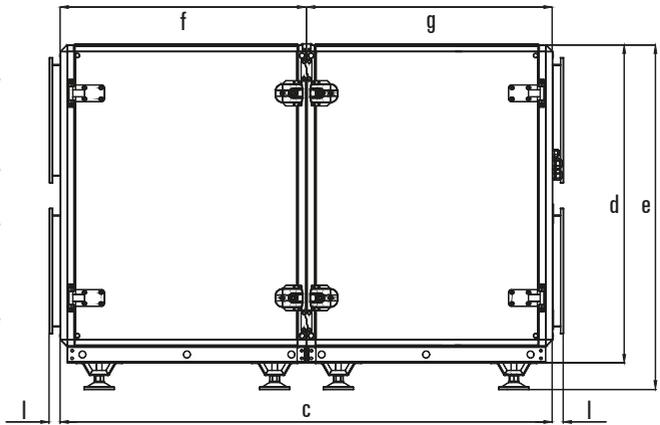
Note: ePM1 ≥ 50% (F7) class filter at supply side, ePM10 ≥ 50% (M5) class filter at exhaust side are used accordin to ISO 16890.

# UNIT DIMENSIONS

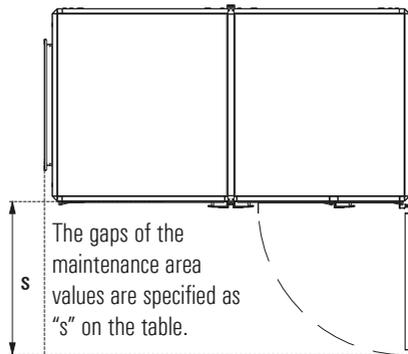
## ERV Series



\*Side View



\*Front View

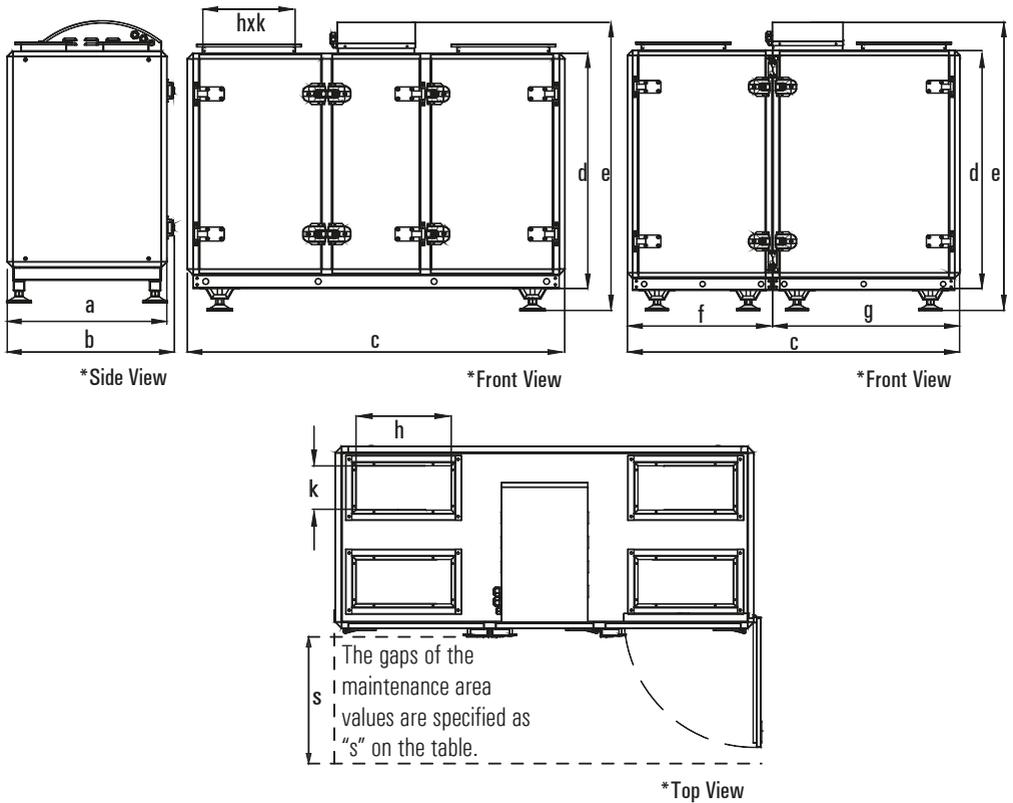


\*Top View

	ERV 100	ERV 200	ERV 300	ERV 400	ERV 500	ERV 700	ERV 900	ERV 1100
a	705	705	805	955	1055	1185	1405	1405
b	740	740	840	1010	1110	1240	1460	1460
c	1630	1630	1700	1780	1780	1780	2070	2070
d	1010	1010	1110	1145	1245	1245	1405	1405
e	1110	1110	1210	1245	1345	1345	1560	1560
f	-	-	-	890	890	890	1070	1070
g	-	-	-	890	890	890	1000	1000
hxk	350x300	350x300	450x300	600x400	700x400	800x400	1000x500	1000x500
l	40	40	40	40	40	40	40	40
s	700	700	800	950	1050	1200	1300	1300
weight(kg)	250	250	290	360	400	440	525	540

# UNIT DIMENSIONS

## ERV-V Series



	ERV-V 100	ERV-V 200	ERV-V 300	ERV-V 400	ERV-V 500	ERV-V 700	ERV-V 900	ERV-V 1100
<b>a</b>	705	705	805	955	1055	1185	1405	1405
<b>b</b>	740	740	840	1010	1110	1240	1460	1460
<b>c</b>	1630	1630	1630	1580	1580	1580	1930	1930
<b>d</b>	1010	1010	1110	1145	1245	1245	1405	1405
<b>e</b>	1245	1245	1345	1380	1480	1480	1680	1680
<b>f</b>	-	-	-	690	690	690	860	860
<b>g</b>	-	-	-	890	890	890	1070	1070
<b>hxk</b>	400x200	400x200	400x250	400x350	400x400	400x450	550x500	550x500
<b>s</b>	700	700	800	950	1050	1200	1300	1300
<b>weight(kg)</b>	250	250	280	340	370	410	485	500

\*All measurement values are mm.

## Lifting Considerations

- Do not lift the unit when it is windy and while a personnel is working under the unit.
- Use lifting chain as shown below. Lifting chains must be capable of supporting the entire weight of the device.
- Lifting chains may not be the same length. Set lifting chains to balance the device.
- If possible, create a parallel loop straps to the air flow direction.
- For your safety, when unit is lifted up, you may use appropriate equipment method such as belts, straps.
- Determine center of gravity of unit and test it by lifting up about 500 mm. If lifting point is not appropriate, re-determine it to prevent falls. Not lifting the unit properly may cause serious injury even death.



Failure to follow the instructions above may cause damage of equipment, serious injury, or even death.

Subassemblies and parts of unit are equipped as shipped from the factory.

For units that are dispatched as one piece, please place minimum 4 pipes into carrying holes which are located on the unit and affix them to the carrying handle then carry the units as it is shown in **figure a**.

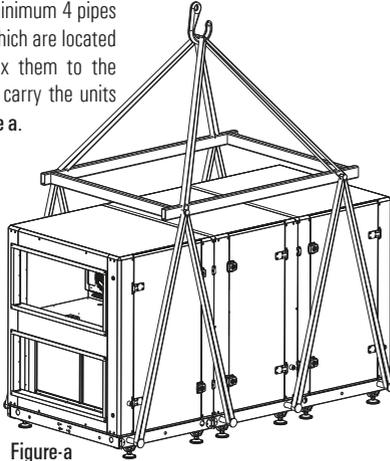


Figure-a

For units that are dispatched as modular, please affix pipes into holes which are located on the units and carry with ropes as it is shown in **figure b**.

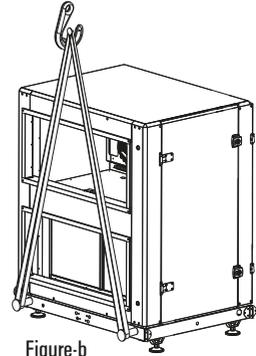
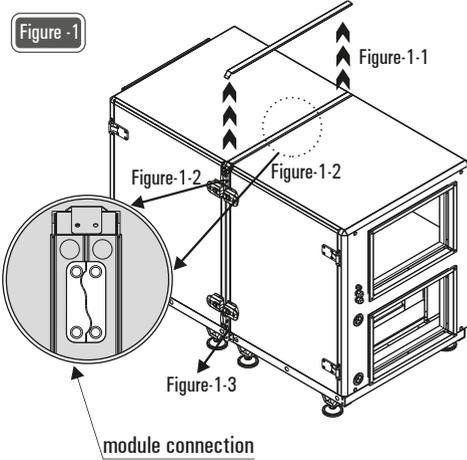


Figure-b

## Disassembly of ERV Modular Units

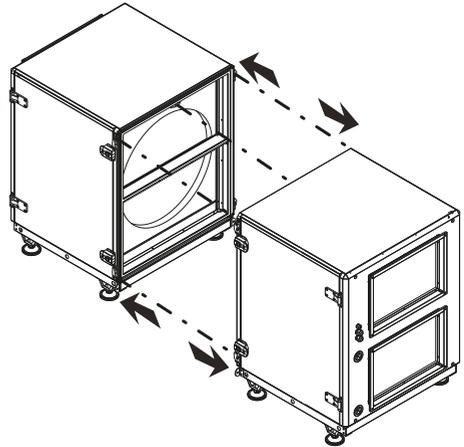


The following information is available for modular ERV 400/500/700/900/1100 series.



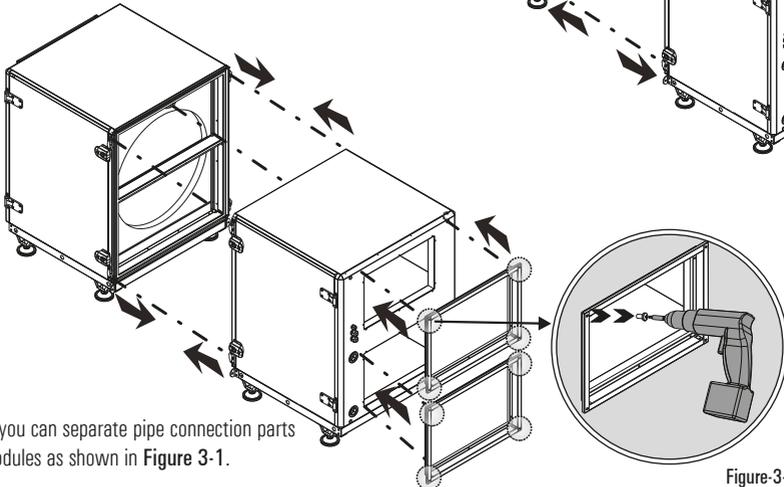
- Remove the rain protection cover which is assembled on the unit. (Figure-1-1)
- Unscrew the bolts of connecting parts of the module. (Figure-1-2)
- Unscrew the bolts of connecting parts of the module base frame. (Figure-1-3)

Figure-2



Modules can be separated from each other. (Figure-2)

Figure-3



If necessary; you can separate pipe connection parts from their modules as shown in Figure 3-1.

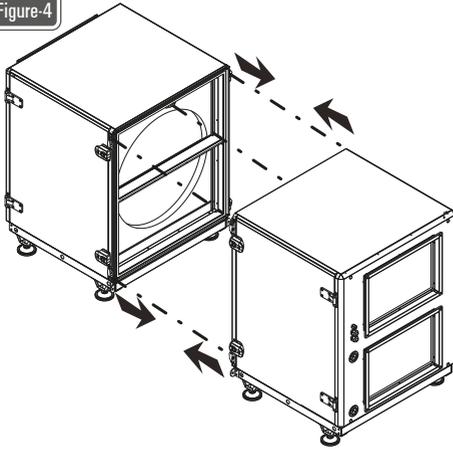
Figure-3-1

## Assembly of ERV Modular Units



The following information is available for modular ERV 400/500/700/900/1100 series.

Figure-4



- Prepare the installation parts.
- Remove shipping bolts on the mounting surface.
- Assemble the contact surfaces of the unit with the help of sealing as show in **Figure 4**.
- Check the seals in between the modules. Change if it damaged.
- Assemble the modules.

Figure-5

- Screw the bolts of connecting parts of the module base frame.(**Figure-5-1**)
- Screw the bolts of connecting parts of the module.(**Figure-5-2**)

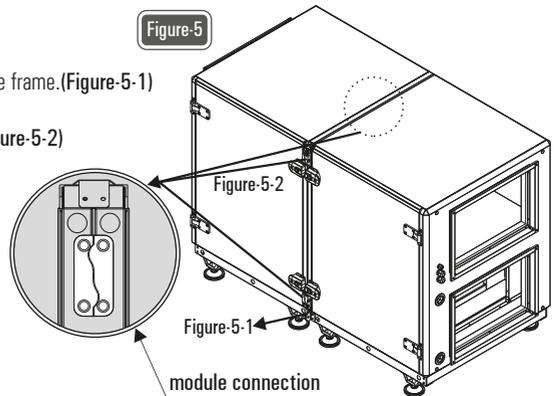
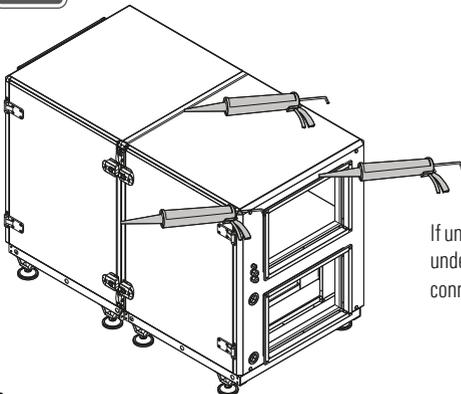


Figure-6



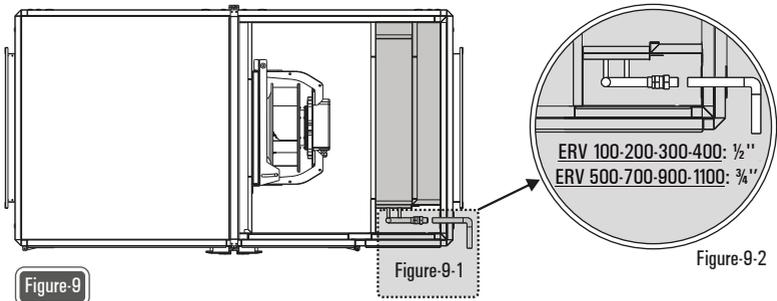
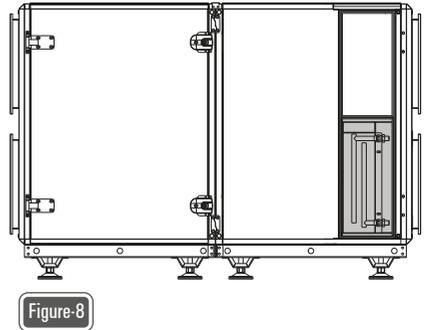
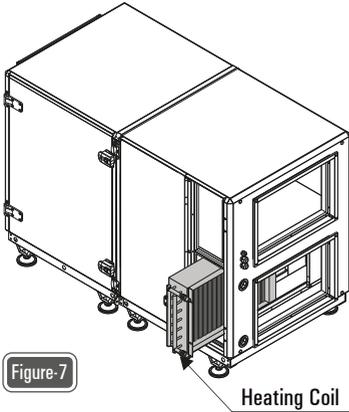
If unit is an outdoor unit, apply silicon to the edges of module connections, underneath and edge of the rain protection cover and the edge of duct connections as shown in **Figure 6**.

## Installation of Heating Coil



"Heating Coil" is used optional for ERV series units.

- Prepare the installation materials.
- Turn off the unit.
- Turn off the power of the unit.
- Place the Heating Coil. (Figure-7 and Figure-8)
- Make hot water pipe connection by using pipe outlets on the unit. (Figure-9-1 and Figure-9-2)

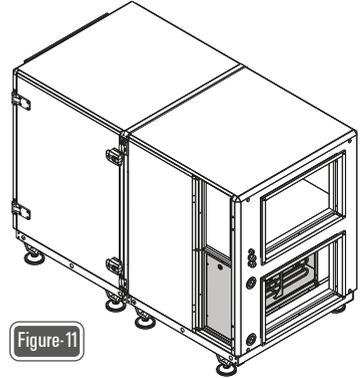
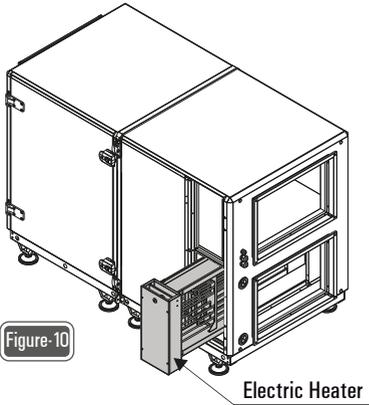


## Installation of Electric Heater



"Electric Heater" is used optional for ERV series units.

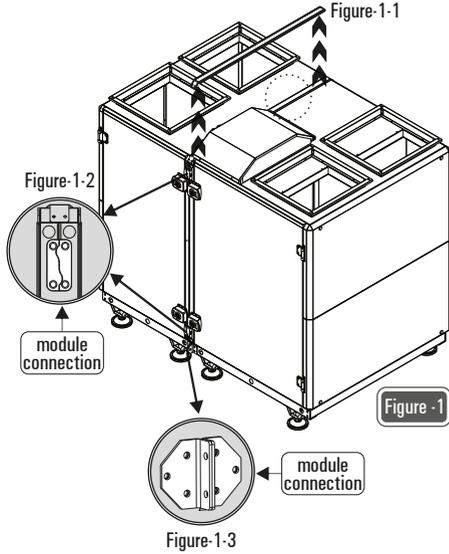
- Prepare the installation materials.
- Turn off the unit.
- Turn off the power of the unit.
- Place the Electric Heater. (Figure-10 and Figure-11)
- Connect the power and control cables to the appropriate place on the electric heater on the automation panel.



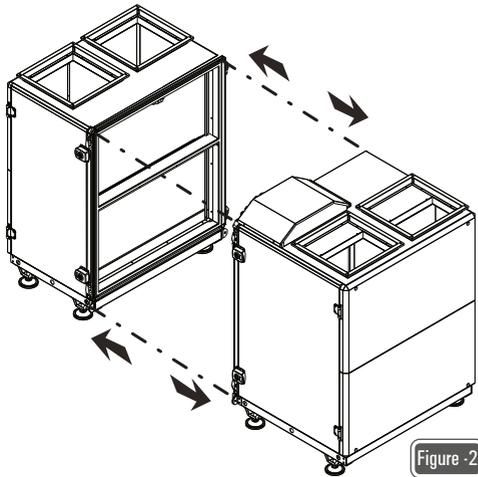
## Disassembly of ERV-V Series Modular Units



The following information is available for modular ERV-V 400 / 500 / 700 / 900 / 1100 series.



- Remove the rain protection cover which is assembled on the unit. (Figure-1-1)
- Unscrew the bolts of connecting parts of the module. (Figure-1-2)
- Unscrew the bolts of connecting parts of the module base frame. (Figure-1-3)

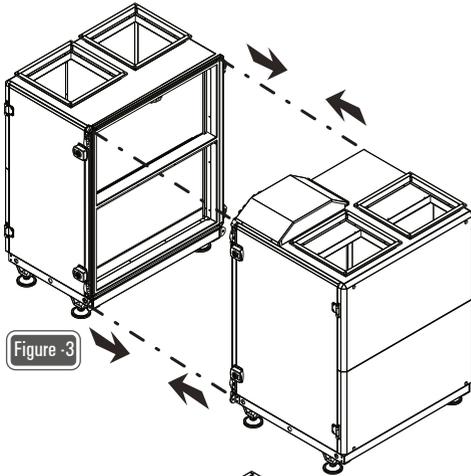


Modules can be separated from each other. (Figure-2)

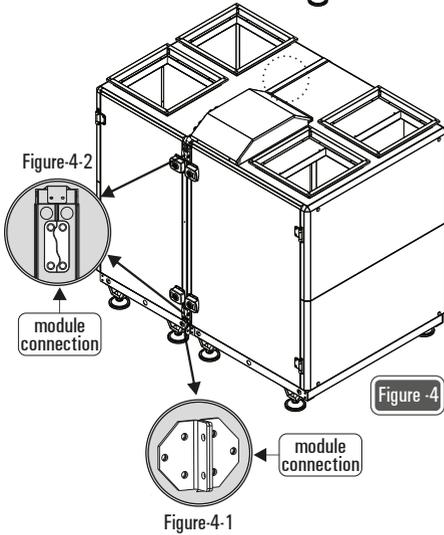
## Assembly of ERV-V Series Modular Units



The following information is available for modular ERV-V 400 / 500 / 700 / 900 / 1100 series.

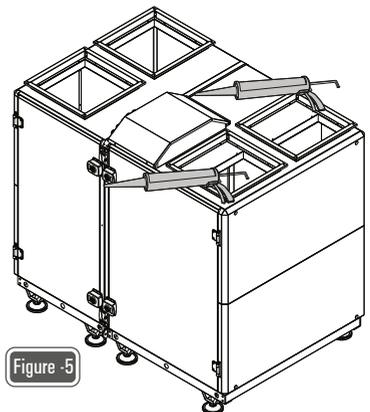


- Prepare the installation parts.
- Remove shipping bolts on the mounting surface.
- Assemble the contact surfaces of the unit with the help of sealing as shown in **Figure 3**.
- Check the seals in between the modules. Change it if damaged.
- Assemble the modules.



- Screw the bolts of connecting parts of the module base frame. (**Figure 4-1**)
- Screw the bolts of connecting parts of the module. (**Figure 4-2**)

If unit is an outdoor unit, apply silicon to the edges of module connections, underneath and edge of the rain protection cover and the edge of duct connections as shown as in **Figure 5**.

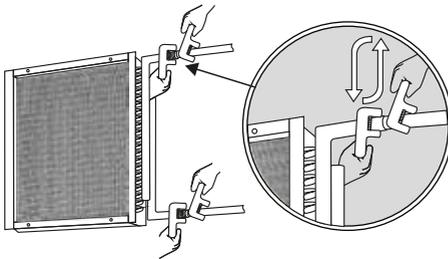


## Assembly of Duct Connections

- Ductwork connections should be connected to the unit by flexible duct connectors. Air tightness should be maintained to achieve required air flow conditions. Incorrect ductwork connections can change airflow conditions.
- Make sure that duct connections are connected in correct way using suitable duct sizes. Incorrect assembly directly affects the airflow and sound level.
- Insulate the ductworks or use insulated ductworks.
- Do not allow use elbow joints greater than 90° along with ducting.
- Do not allow use different duct size other than stated in the project.
- Make sure that all ductwork connections are air tight.
- If the ductwork connections are passing through a metal surface wall or metal construction area, make sure that there is ground connection between duct and these surfaces.

## Coil Connections

- Use a double wrench while attaching piping to DX / Heating / Cooling coils to prevent damage. It can be damaged fragile copper pipe of the coils while using a single wrench. In this case, unit can be damaged seriously.
- The pipes of coils must be supported separately and insulated thermally.
- Coils, filters and drop eliminators are demounted carefully while connecting piping to coils.
- Please check whether or not to crush on the heat exchanger surface.
- Please check the drainage system is available.



 Use counter-holding for the connection!

## Drainage Connections

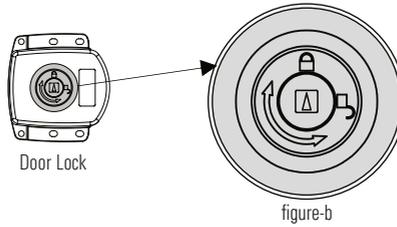
- If there is more than one drain pan, mount siphon to each individual section.
- Never connect the drain pan outlet to drain system without siphon.
- Using only one siphon for all drainage connected to common line may cause overflow in the condensation pan.
- Avoid applications prevent the flow of water in the drain line.
- Drain line should never be on higher level than the condensate pan.

## Air Dampers

- Please make sure that the damper flaps are in the closed position in case of power failure during operation.
- Observe whether all damper flaps are in positions suitable for the unit operating principle or not.
- Check that all damper flaps move easily or not.
- Be careful that the damper motor does not force the damper further than the open and fully closed positions.
- Duct load should never place on dampers.

## Unit Service Door

- Service doors of the unit are designed to prevent air leakage and to interfere with the unit components. Be careful that the unit doors are locked correctly to make sure there is no air leakage.
- Make sure that the unit doors are locked by inserting the lock key in the middle of the door lock and turning it in the direction of  in figure b.



## Inner Casing

- The inner surface of the unit consists of corrosion-resistant galvanized / stainless steel. Also, cleaning and disinfection is easy because the inner surface of the unit is smooth.
- The galvanized steel design prevents oxidation of the inner surface of the unit caused by humidity or condensation in the air.
- The inner surface of the unit is resistant to disinfectant and similar applications.
- By applying mastic sealant to the gaps at the panel profile joints of the unit, sealing is increased, and dust and dirt accumulation is prevented.

## Drop Eliminator

- For the drop eliminator to perform its function, it must be checked whether the position is suitable for the airflow direction or not.
- Check whether the drop eliminator moves smoothly on the slide mechanism.
- Check whether there is a gap between the drop eliminator outlet and the drain pan.



Please find in the table below the basic problems that you may encounter with the unit and their solutions. In case of any malfunctions other than those listed below, you should definitely inform ENEKO Technical Service. Please disconnect the power line until the service teams arrives.

Problem	Control
Unit doesn't work	<ul style="list-style-type: none"> <li>- Make sure there is energy in the power supply and the main switch on the unit panel is turned on.</li> <li>- Make sure the fan connectors are plugged in emergency stop may be pressed, please check.</li> <li>- Fire alarm might be working, please check.</li> <li>- If the device is in auto mode, the time program may not have been made, set the time program.</li> </ul>
Air flow is not enough	<ul style="list-style-type: none"> <li>- Make sure that the air dampers installed in the unit or air ducts are open.</li> <li>- Check the duct pressure. If there is a higher pressure loss than specified in the project, the fan or motor may be inadequate.</li> <li>- Check the fan rotation direction.</li> <li>- Check whether the filters are extremely dirty or clogged.</li> <li>- Remove any air leaks from the unit's casing or air ducts.</li> </ul>
There is odor in the environment.	<ul style="list-style-type: none"> <li>- Check whether there is enough level of water in the drainage line.</li> <li>- Make sure the drainage line is not connected directly to the sewage line.</li> <li>- Make sure the filters has been replaced on time.</li> <li>- Make sure inside the unit and ducts are clean.</li> </ul>
Although filter is not full, there is a filter full alert appears.	<ul style="list-style-type: none"> <li>- Check the inlet-outlet hoses of the differential pressure switch. (Hoses may be disconnected, crushed, or torn)</li> </ul>
Sensors differ from what they should be and show instant variability.	<ul style="list-style-type: none"> <li>- Interference may have occurred. Check the unit grounding line. The grounding line may be poor or the ground connection may not be exist. Reinforce the grounding.</li> </ul>

Problem	Control
<p>Unit works noisy</p>	<ul style="list-style-type: none"> <li>- The air flow may be higher than it should be. Measure the flow and adjust the flow to the appropriate values.</li> <li>- Make sure that the duct sections and conduits are selected according to the air velocity.</li> <li>- Make sure that the fan blade does not rub against the suction nozzle or any surrounding parts. Check the fan balance.</li> <li>- Make sure that the fixing bolts of the fan-motor system are not loose and that the vibration pads work.</li> <li>- Check that the components(exchanger, coil box, filter, damper etc.) inside the device sit vibratively and do not shake.</li> <li>- Make sure that the channels plugged into the unit input-output do not cause sudden contraction and expansion. Use transition channels with an appropriate angle.</li> </ul>
<p>Heating and cooling of the unit has poor performance.</p>	<ul style="list-style-type: none"> <li>- Check the dirtiness of the filter and internal equipment (coils).</li> <li>- Check that the fluid regime from cold and hot fluid providers complies with the project design requirements.</li> <li>- There may not be enough fluid in the cold and hot water battery. The inlet water strainer may be clogged. The control valve motor may be installed loose or locked / malfunction. Please check.</li> <li>- Check for air leaks on the device or in the duct system.</li> <li>- Check the duct insulation and conduit designs. Check the unit blowing temperature.</li> <li>- If the unit has a rotor, make sure that the rotor is working. Even if it is working information, check it visually. The strap may be broken.</li> </ul>

# SELECTION OF ELECTRICAL CABLE CROSS-SECTION

Unit Model	Unit Voltage (V)	Unit Power Input (kW)	Current (A)	Fuse (A)	Cable Cross-Section(mm <sup>2</sup> ) for 50M and PF=0.8
ERV / ERV-V					
100	400	1,14	4,6	3 x 10	2,5
200	400	1,14	4,6	3 x 10	2,5
300	400	1,64	6,6	3 x 10	2,5
400	400	2,34	3,4	3 x 10	2,5
500	400	5,94	8,8	3 x 16	2,5
700	400	5,94	8,8	3 x 16	2,5
900	400	6,95	11,16	3 x 16	2,5
1100	400	10,88	14,4	3 x 20	2,5

The data in the table shows the maximum power/current values. Please check unit label for updated values.

## Cable Cross-Section Formulas

1  

$$I_{\text{current}} = \frac{P}{\sqrt{3} \cdot U \cdot \cos\phi}$$

$I_{\text{cable}} > I_{\text{current}}$

2  

$$\%e = \frac{100 \cdot P \cdot L}{k \cdot S \cdot U^2}, S = \frac{100 \cdot P \cdot L}{k \cdot \%e \cdot U^2}$$

$\%e = \%3$

3  
 $I_{\text{cable}} > I_{\text{fuse}} \geq I_{\text{current}}$

Cable Cross-Section  $S = \text{Max}(S1, S2, S3, 1.5\text{mm}^2)$

**P** : Power

**I** : Current

**U** : Voltage

**S** : Conductor cross section

**k** : Conductor coefficient

**L** : Conductor length

**%e** : The voltage drop

## Example of Cable Cross-Section Calculation

**P** : 10,8kW      **L** : 50m  
**U** : 400V      **%e** : %3  
**PF** :  $\cos\phi$ : 0,8      **k** : 56m / Ω

1  

$$I_{\text{current}} = \frac{10800 \text{ W}}{\sqrt{3} \cdot 400 \cdot 0,8} = 19.5 \text{ A}$$

The cable will be used, is selected from the cable cross-section table so that the equivalent ampere value in the table should be higher than calculated "I<sub>current</sub>" value.

$S1 = 1.5 \text{ mm}^2$

2  
 $\%e = \%3$

$$S = \frac{100 \cdot 10800 \cdot 50}{56 \cdot 3 \cdot 400^2}$$

$S2 \geq 2 \text{ mm}^2$

$S2 = 2 \text{ mm}^2$

3  
 $I_{\text{cable}} > I_{\text{fuse}} \geq I_{\text{current}}$   
 $I_{\text{cable}} > 25 \text{ A} \geq 19.5 \text{ A}$

"I<sub>fuse</sub>" which will be higher than "I<sub>current</sub>", is selected.

The cable will be used, is selected from the cable cross-section table so that the equivalent ampere value in the table should be higher than selected "I<sub>fuse</sub>" value.

$I_{\text{cable}} = 32 \text{ A}$

$S3 = 2.5 \text{ mm}^2$

Cable cross-section  $S = \text{Max}(S1, S2, S3, 1.5 \text{ mm}^2)$

$S = \text{Max}(1.5, 2, 2.5, 1.5)$

$S = 2.5 \text{ mm}^2$



TURN OFF all the power switches before the maintenance is performed.

Do not operate the system without the air filter to protect the components of the unit against being clogged.



Please, read the instructions carefully on this manual before operating the system.

## Filter Maintenance

### To clean up G class filters;

- Turn off the unit.
- Remove dirty filters.
- Use a vacuum cleaner to clean the dust from the air filter.
- Place the filters in the filter slots.
- Close the service cover and be sure it is closed tightly.

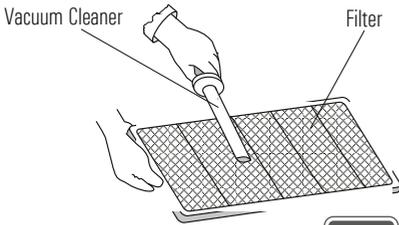


Figure-1

### To clean up F / M class filters ;

- Turn off the unit.
- Remove dirty filters.
- Place new bag filters in the filter slots.
- Close the service cover and be sure it is closed tightly.

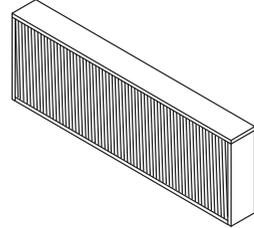


Figure-2

## Heat Exchanger Maintenance

- Turn off the power of the unit.
- Remove the electrical connection of rotary heat exchanger.
- Remove rotary heat exchanger carefully out of the unit.
- Clean fins of storage medium with compressed air.
- Check tension of the drive belt and be sure the belt is running properly.

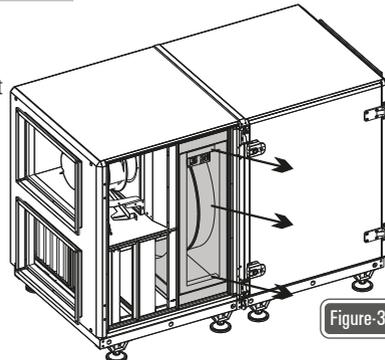


Figure-3

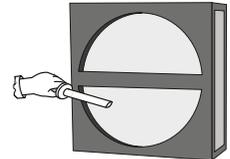


Figure-3-1

## Fan Maintenance

- Turn off the power of the unit.
- Remove the fan out of the unit carefully.
- Clean the fan with vacuum cleaner.
- Clean the dirty areas of the fan with warm water with natural detergent or soap powder.
- Dry wet surfaces to prevent corrosion on metal surfaces.
- Place cleaned fan in the slots.

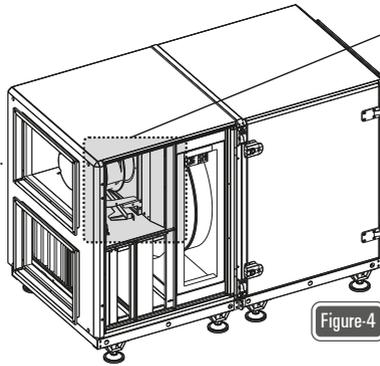


Figure-4-1

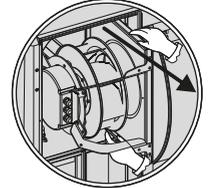


Figure-4-2

## Coils (Heating/Cooling/DX)

- It should be checked once every 6 months whether there is any dust accumulation and leakage (leakage) on the air inlet side of the coils.
- In the return section of the coils, water condensation can be seen. It must be checked if the condensate drain is working or not.
- If water freezes in the pipes inside the battery, the pipes will be seriously damaged. Therefore, if there is a danger of freezing in the battery, antifreeze should be added to the circulation water or partial water circulation should be provided in the pipes if the battery will not be operated for a short time.
- If there is serious contamination in the coils, the coil parts should have disassembled and cleaned with compressed air or water in the opposite direction of the air flow.

## Service Doors

- All unit service doors have leakproof gaskets.
- Make sure that there are leakproof gaskets on unit service doors.
- Always replace when the leakproof gaskets are worn or damaged.

## Drop Eliminators

- Droplet Eliminator is made of galvanized coated steel / stainless steel and can be completely withdrawn and disassembled. For easy cleaning it is possible to take out all blades by pulling out.

## Maintenance Period

### Every year;

- Check tension of the drive belt and be sure the belt is running properly.
- Paint the exterior surface of casing to prevent corrosion on metal surfaces of the unit.
- Clean fan propeller and fan shaft of the fan.
- Check and clean the drain pan.
- If the unit has damper, check the connection of damper, set screw and rigging.
- Check all electrical connections and isolation.
- Check if there is any damaged cable connections.
- Check if there is any damaged on all gaskets around door and buffer. Check the situation of all isolation materials.
- Check all connections to prevent fracture and leakage, and if there is any repair it.

### Every 3-6 months;

- Check all electrical connections.
- Check the accumulated dirt on coils.
- If the unit has damper, clean damper and its components.
- Clean or change clogged or dirty filters. If the pressure drop of a bag filter is higher than 300 Pa, change the bag filter.



## Warranty Certificate

- \* If the unit is used according to the instructions given in user manual and interfered in only authorized technical service that we authorize about any maintenance and repair reasons, all spare parts will be under warranty for 2 years against material, labor and production faults except motor components.
- \* Identifying of parts replaced and determining troubleshooting technical procedure applied, will belong to our company.
- \* After ex-works of goods, all faults during loading, unloading and shipment will be out of guarantee. If a falsify has been made on documents or any falsify and changing have been made on serial number, goods will be out of guarantee.

## Terms of Guarantee

1. Guarantee period is 2 years as from the time of delivery.
2. All spare parts except motor components are under warranty.
3. If the goods break down during guarantee period, the time spent for maintenance will be added to guarantee period. Maintenance period is 30 days at most. 30 days begin with the notice to a service station. If there is no service station, 30 days begin with the notice to the seller, dealer, agency, agent, importer or manufacturer of the goods.
4. If production fault occurs during guarantee period; the cost of new spare part and labor will not be claimed from the customer.
5. If a fault occurs because of not using or assembling according to the instructions given in user manual, goods will be out of guarantee.

**UNIT TYPE**

**SERIAL NO**

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