

INSTALLATION – OPERATION & MAINTENANCE INSTRUCTION



HEAT RECOVERY UNITS VHR MODELS



CONTENTS	Page
1. INTRODUCTION	2
2. HEAT RECOVERY UNITS and VHR MODELS	2
3. TECHNICAL SPECIFICATIONS for HEAT RECOVERY UNITS	3
4. WORKING CONDITIONS	6
5. TRANSPORTATION – STORAGE – INSTALLATION	6
6. CONNECTIONS	
6.1. DUCT CONNECTIONS	8
6.2. DRAINAGE CONNECTIONS	9
6.3. ELECTRICAL CONNECTIONS	9
7. SAFETY REQUIREMENTS	9
8. SAFETY LABELS	10
9. CONTROLS BEFORE START-UP	11
10. TRAINING of TECHNICIANS	11
11. RECOMMENDATIONS FOR SAFETY	12
12. START-UP	12
13. MAINTENANCE	12
14. CONTROL FUNCTIONS	13
15. TROUBLESHOOTING	15
16. SPARE PARTS	16
17. APPENDIX	
17.1. APPENDIX-1 VHR UNIT ELECTRICAL WIRING DIAGRAM	17
17.2. APPENDIX-2 DUCT TYPE ELECTRICAL HEATER WIRING DIAGRAM	18
17.3. APPENDIX-3 ELECTRICAL CABLE AND FUSE SELECTION TABLE	19

1. INTRODUCTION

Installation, Operation and Maintenance Instruction concerns heat recovery units manufactured by Mech-Elec. It consists of basic information and recommendation concerning the design, technical specifications, installation, operation and maintenance of the heat recovery unit which shall be obeyed to ensure proper fail-safe operation of the unit. The key to proper and safe operating of the unit, read thoroughly this instruction, use the unit according to guidelines given in it and follow all safety requirements. The instruction should always be in proximity of the unit and within easy reach of the service technician.



READ THE INSTRUCTION BEFORE START-UP THE UNIT and KEEP IT IN PROXIMITY OF THE UNIT and WITHIN EASY REACH OF SERVICE TECHNICIAN.



THE APPLIER WILL BE RESPONSIBLE FOR DEFECTS OCCURED DUE TO OPERATING THE UNIT BY NOT AUTHORIZED PERSONEL or USING THE SPARE PARTS NOT ORIGINAL.



THE UNIT MUST BE OPERATED APPROPRIATE APPLICATIONS FOR PURPOSES DESIGN and TECHNICAL SPECIFICATIONS



THE UNIT MUST NOT USED IN THE ENVIROMENTS WHERE CORROSION and EXPLOSIVE GASSES EXIST

2. HEAT RECOVERY UNITS and VHR MODELS

Mech-Elec Heat Recovery Units are classified 7-different models; VHR 04-09-16-20-29-36-51 (Figure 2.1). In all models, the housing is made from galvanised sheet metal (1mm thickness) and the cabinet is fully insulated for sound and heat isolation. The surface of the unit is lacquered with the electrostatic RAL colors. All models contain two access doors for the service to fresh and exhaust air filters.



Figure2.1. Mech-Elec Heat Recovery Units

Heat Recovery units as standard consist of five different parts as described; Exhaust Fan, Supply Fan, Fresh Air Filter, Exhaust Air Filter, Plate Type Heat Recovery Exchanger.

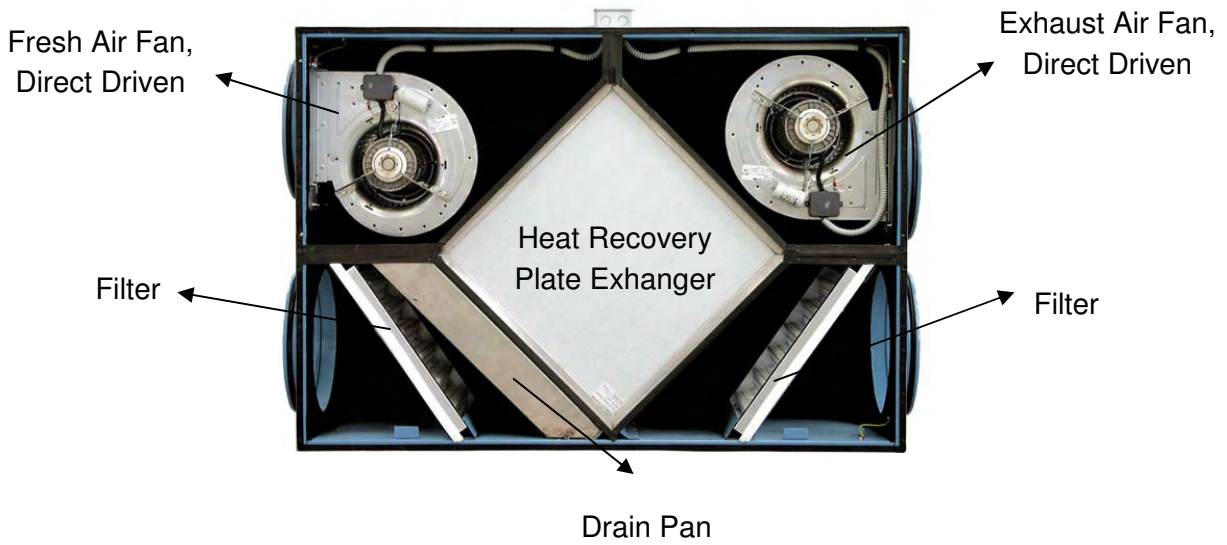


Figure2.2. Heat Recovery Unit Schmatic

3. TECHNICAL SPECIFICATION for HEAT RECOVERY UNITS

Technical specifications, which are valid for the heat recovery units as standard manufactured by Mech-Elec, are given in the table below.

Table3.1. Technical Specifications for VHR Models

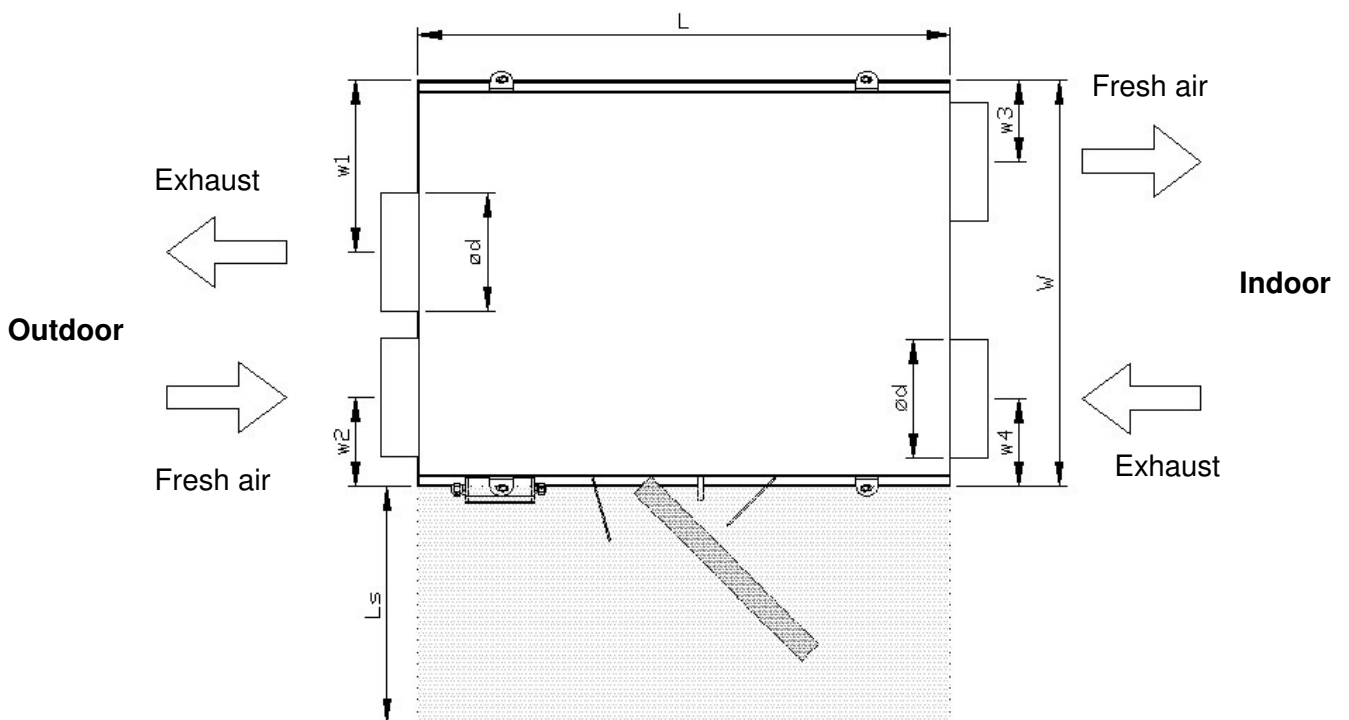
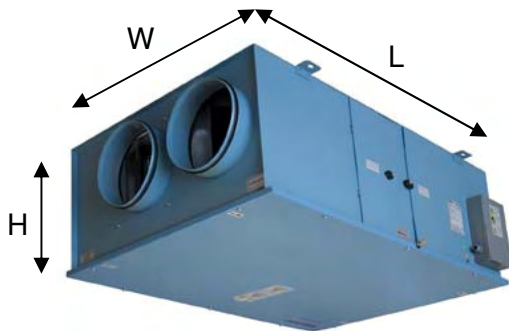
MODEL		VHR 04	VHR 09	VHR 15	VHR 20	VHR 29	VHR 36	VHR 51	
Air Flow	0 Pa* m³h	450	905	1500	2000	2950	3600	5100	
Efficiency	%	Efficiency up to 70%, depending on working conditions							
ELECTRICAL	Voltage	230Volt / 50Hz							
	Motor Power	Watt	160	294	746	746	1.100	1.100	1.472
	Maximum current	A	0,68	4,6	7,8	7,8	11,0	11,0	12,0
Air Filter		Syntetic Filter – For Exhaust and Fresh Air							
OOPTIONAL	Electrical Heater	1	3	4	5	7	10	12	
	or Heater for Hot Water 90/70°C	kW	230 V 1~	230 V 1~	400V 3~	400 V 3~	400 V 3~	400 V 3~	400 V 3~
*External static pressure									

VHR Heat Recovery Units are controlled with Standard Electronic Controller (SEC), supplied as standard with the unit. The supply air fan and return air fan are driven as 5 speeds with SEC. Also the electrical heater (optional) can be controlled by SEC manually or automatically depending on the room set temperature by the user.

Functional Electronic Controller (FEC) could be supplied optionally. FEC has a protection system against the frost formation at the temperatures below -5 °C. Moreover, pressure sensor for filter, CO2 sensor or air quality sensor could be used optionally connected. The fan speed automatically changes by regarding to the sensor value.

The unit can be connected to Building Management System or VRF (VRV) System also.

MODEL		VHR 04	VHR 09	VHR 15	VHR 20	VHR 29	VHR 36	VHR 51
Lenght [mm]	L	550	850	1.120	1.120	1.400	1.450	1.650
Width [mm]	W	400	700	850	850	980	1.100	1.250
Height [mm]	H	600	325	420	420	420	600	690
Duct Connection [mm]	ød	ø160	ø200	Ø300	Ø300	ø355	ø400	ø450
Weight [kg]		34	44	80	80	100	130	180
Dimentiones of connection [mm]	W1	---	150	185	185	240	240	275
	W2	---	296	360	360	320	350	435
	W3	---	150	185	185	240	240	275
	W4	---	140	165	165	230	240	265
Service Clearance [mm]	Ls	---	300	350	350	450	450	500



4. WORKING CONDITIONS

The heat recovery units with SEC effectively work at the temperatures between -5°C and $+40^{\circ}\text{C}$ at the relative humidity 80%. The unit is not applicable for the corrosive conditions.

The unit continues working by heat recovery, as long as, the difference between exhaust and fresh air temperature is 5°C and more. If it is not, the unit will work by only ventilation.

If the outside temperature is less than -5°C , the unit must be stopped

The condense water can be frozen at the temperature less than -5°C , it can be damaged to the exchanger.

When Funtional Electronic Controller (FEC) is used, the unit can work at minimum -30°C and maximum 40°C .

5. TRANSPORTATION – STORAGE – INSTALLATION

All heat recovery units are controlled and tested according to the standards before the transportation.

During transportation, lifting and landing, heat recovery units are damaged especially due to wrong methods usage. Appropriate lifting methods should be used in order to minimize any possible damage. Transpalet or forklift can be used for lifting or transporting small units. Lifting and transportation should be done with trained and experienced personnel and security precautions should be taken to prevent the unit to fall over or slide. During lifting and transportation of the unit, nobody should stay under the unit or in the front of the unit (Figure 5.1.).

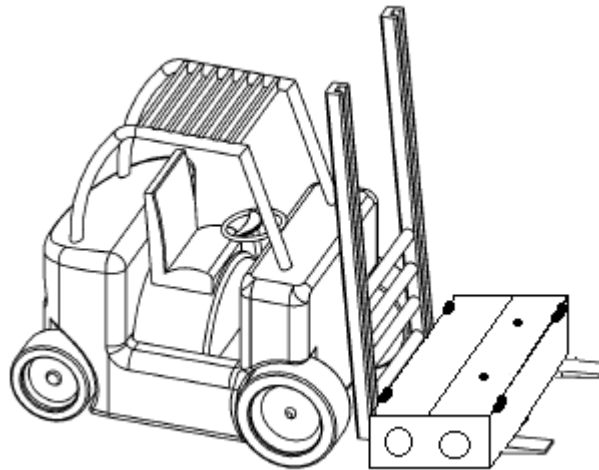
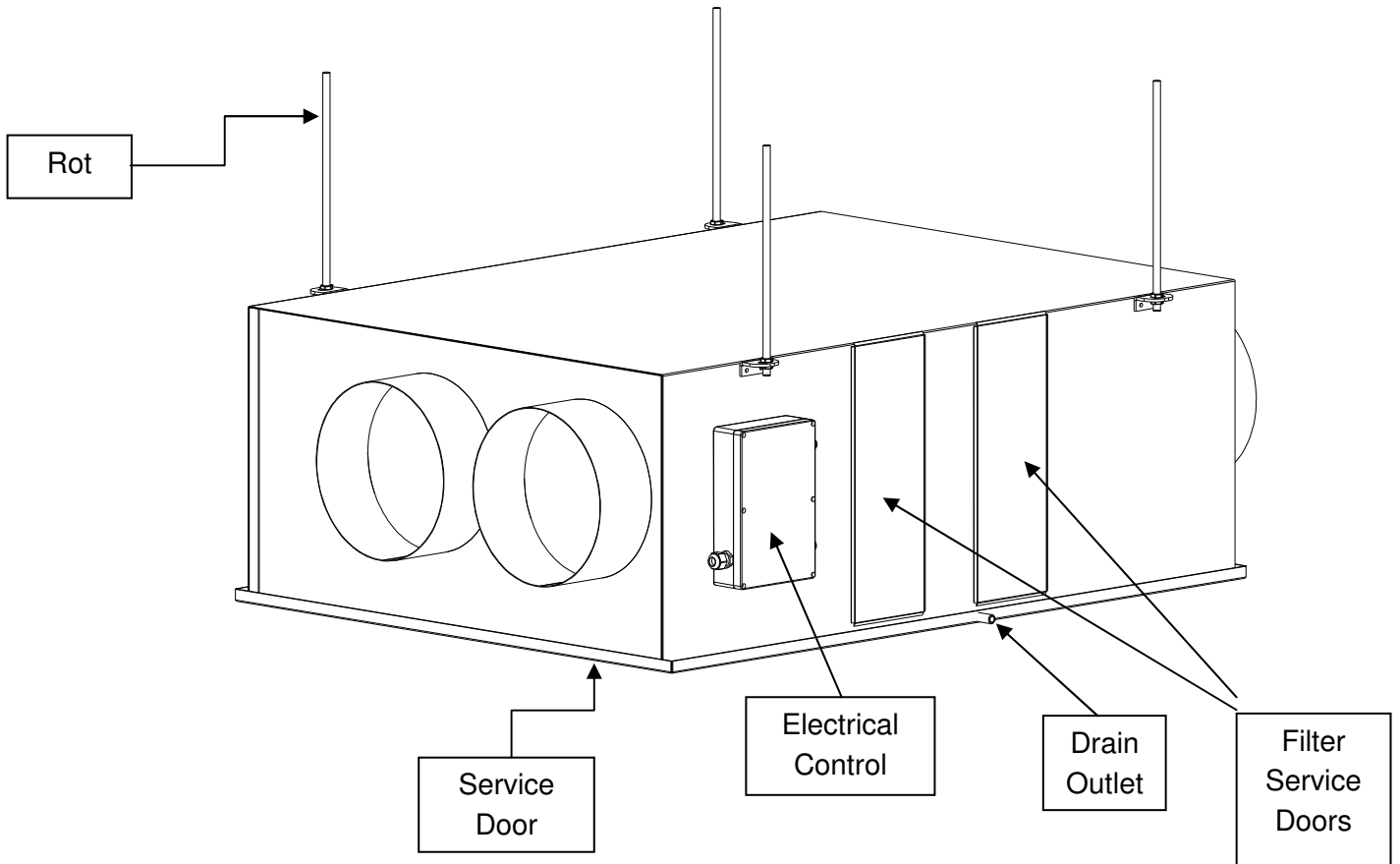


Figure5.1. Lifting Schematic

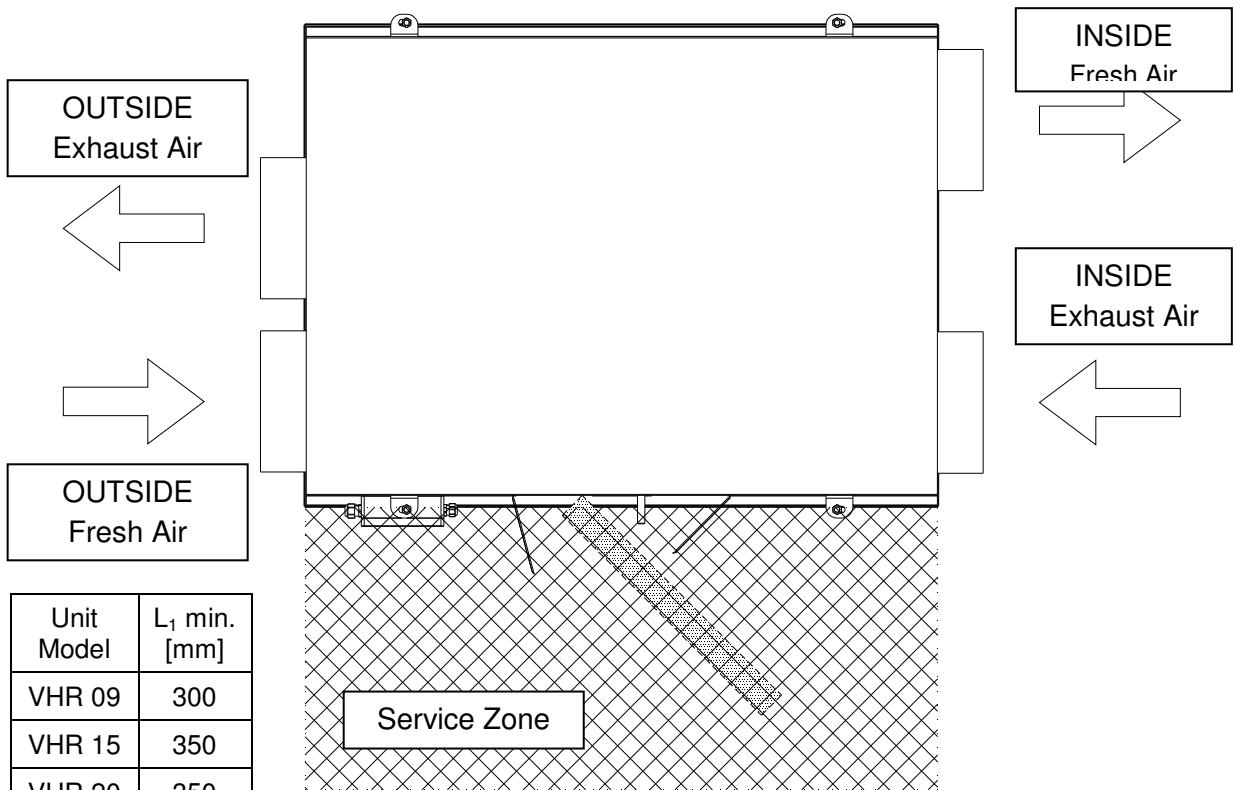
During Storage: heat recovery units have to be kept in a closed area where the heat should be between -20°C and $+40^{\circ}\text{C}$ and relative humidity should not exceed 80%. Also the unit should be kept away from dust, gas, corrosive streams and effects causing corrosion.

During Installation: EN 60204-1 rules should be implemented during the final assembly. Before the ordering of heat recovery units, customers should control whether weight and dimensions of the stations are suitable for the places from where stations will pass through and assembly will be carried out. There should be sufficient amount of place around the unit to be able to give service and for piping connections. Heat recovery units should be assembled onto a hard and flat base.

Damages due to wrong transportation-storage-installation are not covered under warranty.

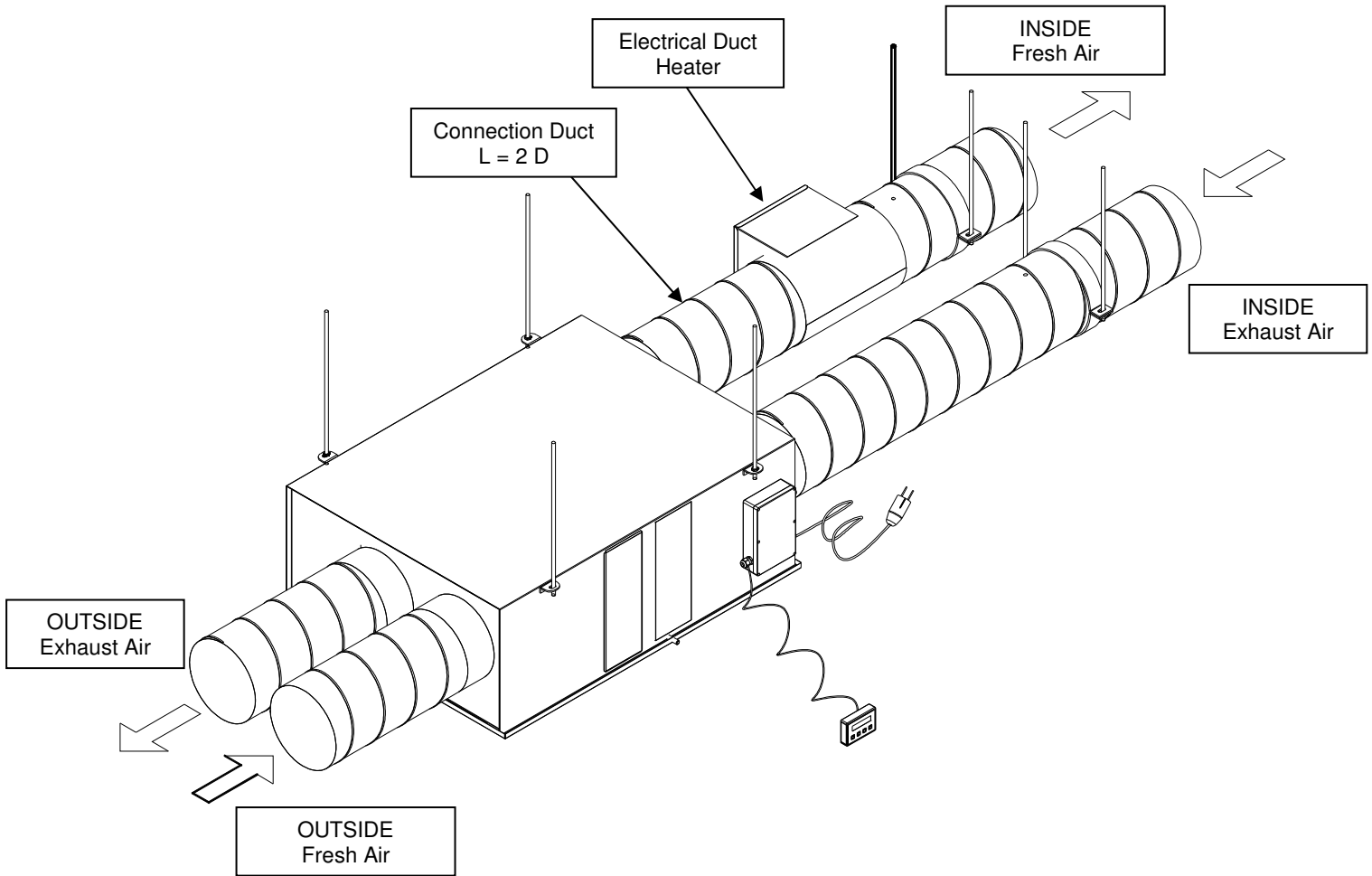


5.2. Installation Schematic



5.3. Connection Schematic (Top View)

Unit Model	L ₁ min. [mm]
VHR 09	300
VHR 15	350
VHR 20	350
VHR 29	450
VHR 36	450
VHR 51	500



5.4 Connection Schematic

6. CONNECTIONS

6.1. DUCT CONNECTIONS

Return air, fresh air, exhaust air and supply air ducts should be fixed (connected) to the unit with flexible connection. Required leakproofing should be obtained in order to ensure desirable air flow. Having improper (bad) unit – duct connections and wrong dimension, shape and duct fragments inside of the connection may cause a change in air flow.

When air flow direction is changed at fan blowing outlet, excessive losses may occur. If this is compulsory, connections should be done as Figure 6.1. The length of duct, before the elbow or electrical heater, should be double of the outlet-diameter.

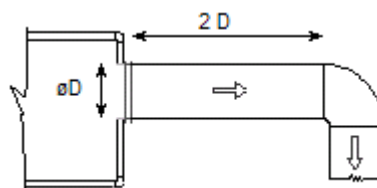


Figure6.1. Duct Connections Schematic (Chancing the direction of air flow)

6.2. DRAIN CONNECTIONS

The diameter of drain pipe should be equal the diameter of drain pipe on the unit. Drainage pipe and drain pan connections should be made by ripple and flange to be able to dismantle pipe connections easily in order to clean up the residue occurred on drain pan and pipes.

The pipe coming out of the drain pan should be connected to a U or P shaped flusher pipe and should be filled with water in order to not to cause air suction as described below.(Figure 7.1)



Figure7.1. P-Shaped Flusher Application

6.3. ELECTRICAL CONNECTIONS



ALL ELECTRICAL CONNECTIONS SHALL BE DONE ACCORDING TO EN 60204-1 BY TRAINED and AUTHORIZED PERSONEL



ELECTRICAL CONNECTIONS ARE READY FOR PLUG-IN CONNECTION. DO NOT CUT CABLE AND PREPARE PROPER EQUIPMENT TO CONNECT.

All electricity connections should be designed and prepared according to EN 60204 – 1 Standards. The electrical materials, cables and all relevant control and remote control equipments should be chosen and desinged suitable to unit peculiarities and requirements. Electrical wiring diagram is given in Figure 19.1 – Appendix 1.

7. SAFETY REQUIREMENTS

Mech-Elec heat recovery units are produced according to EN 60204-1 Standards and MD 98/37 EC numbered European Union Directives and carry the CE signs on themselves. However, the unit can be dangerous if the unit is not used or the service is given by trained and experienced technicians, and indicated security precautions are not followed. For this reason the necessity was felt to explain security rules of heat recovery units and explain possible dangers and precautions.

Possible dangers related to heat recovery units are as follow;

- Dangers directed to operator security

- Dangers directed to unit damage
- Dangers directed to unit operation productivity.
- Never expose the unit to moisture, strokes and external effects.
- The unit should not be used in the environment where corrosion and explosive gasses exist.
- The unit should be maintained by trained technicians.
- Do not repair or adjust, when the unit is running.
- Turn the electrical switch off and wait for the motor blades stop, before open the unit.
- Never expose fans, cables and connections to the water.
- If the outside temperature is less than -5°C, the unit must be stopped
The condense water can be frozen at the temperature less than -5°C, it can be damaged to the exchanger.
- Do not operate the unit, when the access doors open and the duct connections are not completed.

8. SAFETY LABELS

Necessary warning labels are placed onto unit for the users or service personnel. When the unit is put into the operation, following stickers have to be controlled whether they are exist or not.



Figure 10.1. Manuel label

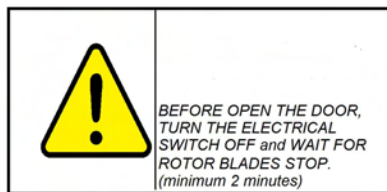


Figure 10.2. Electrical warning label



Figure 10.3. Temperature warning label

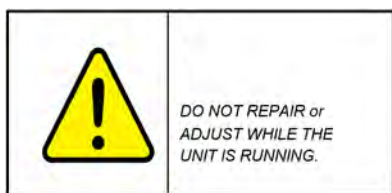


Figure 10.4. Repair warning label

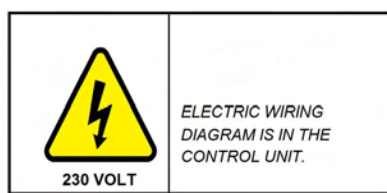


Figure 10.5. Wiring diagram label



Figure 10.6. Ground label



Figure 10.7. Fan label



Figure 10.8. Electrical warning label

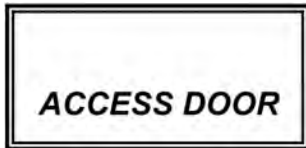


Figure 10.9. Access door label



Figure 10.10. Filter access door label



Figure 10.11. Drain label



Figure 10.12. Fresh air label



Figure 10.13. Exhaust air label



Figure 10.14. Air flow direction label

9. CONTROLS BEFORE START-UP

- Please make sure that all electricity cables are made according to (EN 60204 -1) standards and security and protection units belong to all elements.
- Please make sure that all parts of the unit are clean. There can be channel insulation residues. Bands etc.
- If the outside temperature is less than -5°C , the unit must be stopped
The condense water can be frozen at the temperature less than -5°C , it can be damaged to the exchanger.

Following points have to be controlled periodically.

- Isolation materials used for heat and sound isolations
- Cable isolation
- Control panel
- Electrical cables and other electromechanical parts
- Metal ve painted surfaces
- Connection elements such as screw, turnscrew and joint washer

FILTERS; Maintenance of the filters should be done regularly. Dirty filters can decrease air flow and consequently the capacity. Synthetic or metal filters can be cleaned or washed. However it is advised to change synthetic filters every two years. While changing other type filters; bag, hepa filters with the new ones, new ones should have same dimension, type and features.

HEAT RECOVERY UNIT; is controlled before transportation. The plates of heat recovery exchanger should be checked, after transportation.

FANS and MOTORS; Wiring shall be done, according to international standards. The turning way of fan-blades should be checked, according to the air-flow direction label on the fan.

10. TRAINING of TECHNICIANS

Assembly, putting into operation and maintenance works can only be done by authorized and trained technicians. The technician has to be informed by the owner of the unit or it's user about possible dangers he/she may face during following phases:

- Electrical Connections
- Duct Connections
- Putting Into Operation
- Maintenance

For the continuity of the warranty, control and maintenance responsibilities have to be accepted and followed strictly.

11. RECOMMENDATIONS FOR SAFETY

This user manual is prepared to provide correct usage and assembling of the heat recovery unit and warn the maintenance personnel for the possible dangers they may face. Apart from instructions and warnings of the producers, legal rules and standards have to be taken into consideration as well.

12. START-UP

Instructions have to be followed before operating the unit first time (or after yearly maintenance). Additionally following controls have to be followed.

- Please make sure that all parts of the unit is clean. There can be duct insulation residuals, bands etc.
- Please make sure that all electrical cables are made according to (EN 60204-1) standards and security and protection units belong to all elements.
- Please take out filters after the first operation and clean them properly. Then insert the filters in it.
- If all access doors are taken out during the assembly, please make sure that service doors are closed.

Control the adjustment of thermal over load relay. Give electricity and provide the fan to operate in the highest speed. Control the following points carefully:

- Unexpected noise
- Engine flow and voltage values

13. MAINTENANCE

Protection maintenance program is an important part of an effective security program. Maintenance works have to be carried out by experienced and trained personnel with wearing protection clothings. Please do not try doing any maintenance before switching off the electricity and having fan security. Generally heat recovery units do not require special maintenance apart from its routin cleaning and maintenance. Maintenance period changes according to work conditions. Advised maintenance program is given below:

Drain Outlet: Once in 3 months, please check water flow from drain pipe.

Air Filters: Once in 3 months, please check the filters. Please wash it or change it when necessary.

Fans and Motors: Once every-season, please check them by opening acces door.

Wiring and Electrical Connections: Once a year, please check the amper, the voltage.

Construciton and Housing: Once a year, please check it for resistenace to corozion.

Heat Recovery Exchanger: Once in two years, check it by taking it out for preventing creation of high pressure. Exchanger can be cleaned by using the warm water&light-detergant. After cleaning, all plates surface of exchanger should be dried.




14. CONTROL FUNCTIONS



Figure 16.1. Standart Electronic Controller (SEC)






VHR type heat recovery unit control functions are;

- Unit On / Off
- FAN 1 (Supply fan) Speed control as 5 steps
- FAN 2 (Exhaust fan) Speed control as 5 steps
- Duct type electrical heater control – On / Off / Auto

When it is pressed to MODE  button, it flushes over the FAN 1, FAN 2 and Heater. Requested operating value is selected by pressing  or  buttons. Supply and exhaust fan speeds could be adjusted separately.

Duct Type Electrical Heater controlled manually (ON or OFF) or automatically. When AUTO function is selected, the requested room temperature must be set. The heater will operate by regarding to this set temperature.

If there is no electrical heater, nothing appears on the electrical heater part of the screen.

Buttons	Name	Description
	ON / OFF	Unit will be ON or OFF.
	MODE	The change requested area must be selected. FAN1: Supply fan FAN2: Exhaust fan  : Duct Type Electrical Heater (optional)
	Value Increase	Increases the value of selected area
	Value Decrease	Decreases the value of selected area

Tablo 16.1.1. Electronic Controller Buttons

If required optional electric duct heater, it is interlocked against the airflow that passes the heater. That's why; FAN 1 is automatically operated, before starting up of the heater. Wiring diagram for optional electric duct heater is given in Figure 19.1 - Appendix 1.

15. TROUBLESHOOTING

Table17.1. Troubleshooting Table

PROBLEM	INDICATIONS	POSSIBLE REASON	OTHER RESONS and REMEDIES
NO AIR FLOW Motor is not working	No current	No power	Check the power supply
		Thermal protection is open	Fan motor cables at the main controller board are not tight
		Control panel failure	Check the socket behind the the controller
LOW AIR FLOW		Pressure loss in the ducts are higher than calculated	Check the duct design
		Filters clogged or dirty	Clean filter or change it if necessary
	Too much leakage at the pressure side of system	Filter doors are not closed or duct connections are not completed	Check the doors and duct connections.
HIGH AIR FLOW	Too much leakage at the suction side of system	Duct connections are not completed	Check the duct connections
	Overcurrent of fan motors	Supply voltage is low	Engine is over loaded. Measure the current taken by engine.
		Grills are not installed	Install the grills
		Filters are not installed	Put the filters in

16. SPARE PART LIST

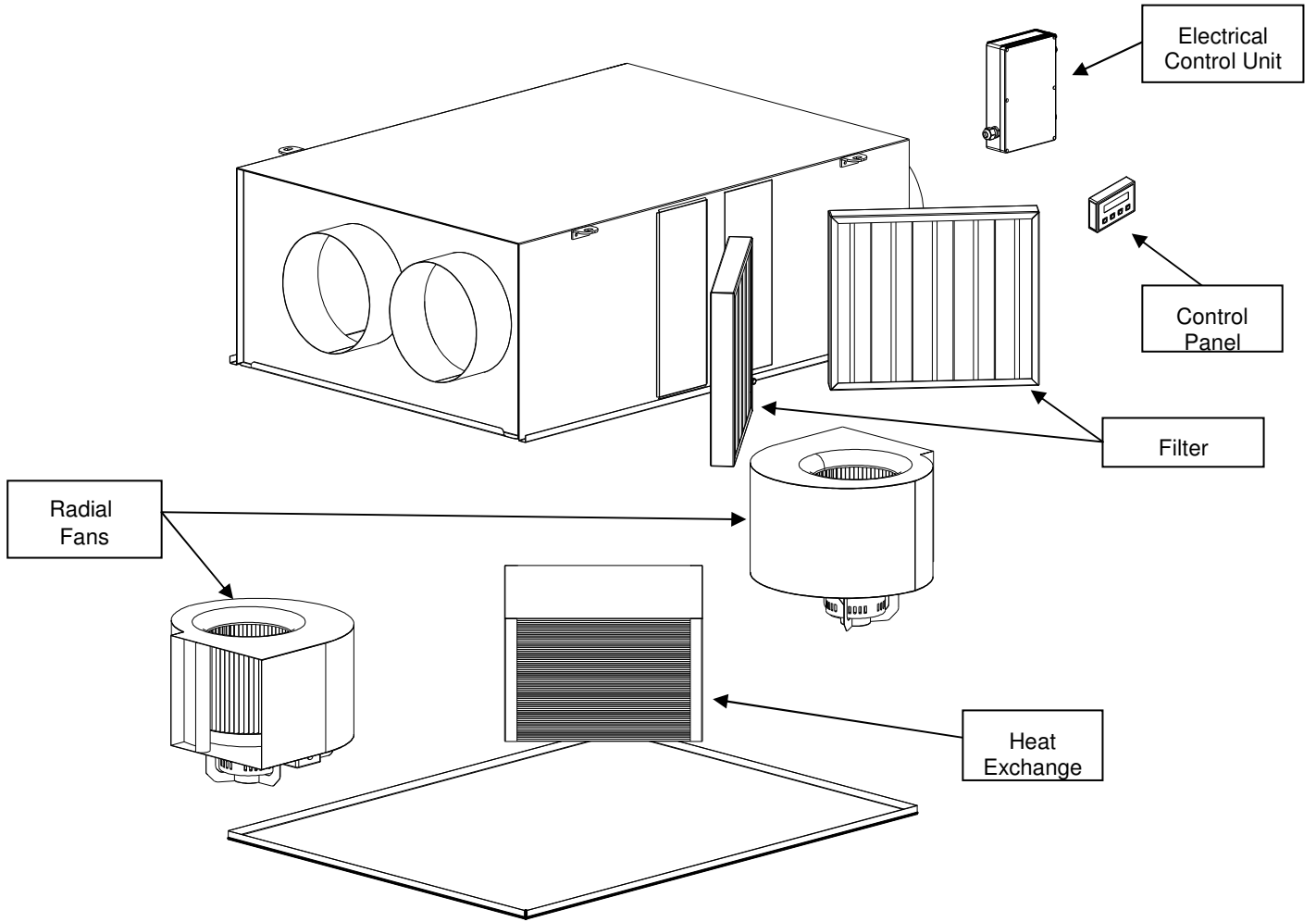
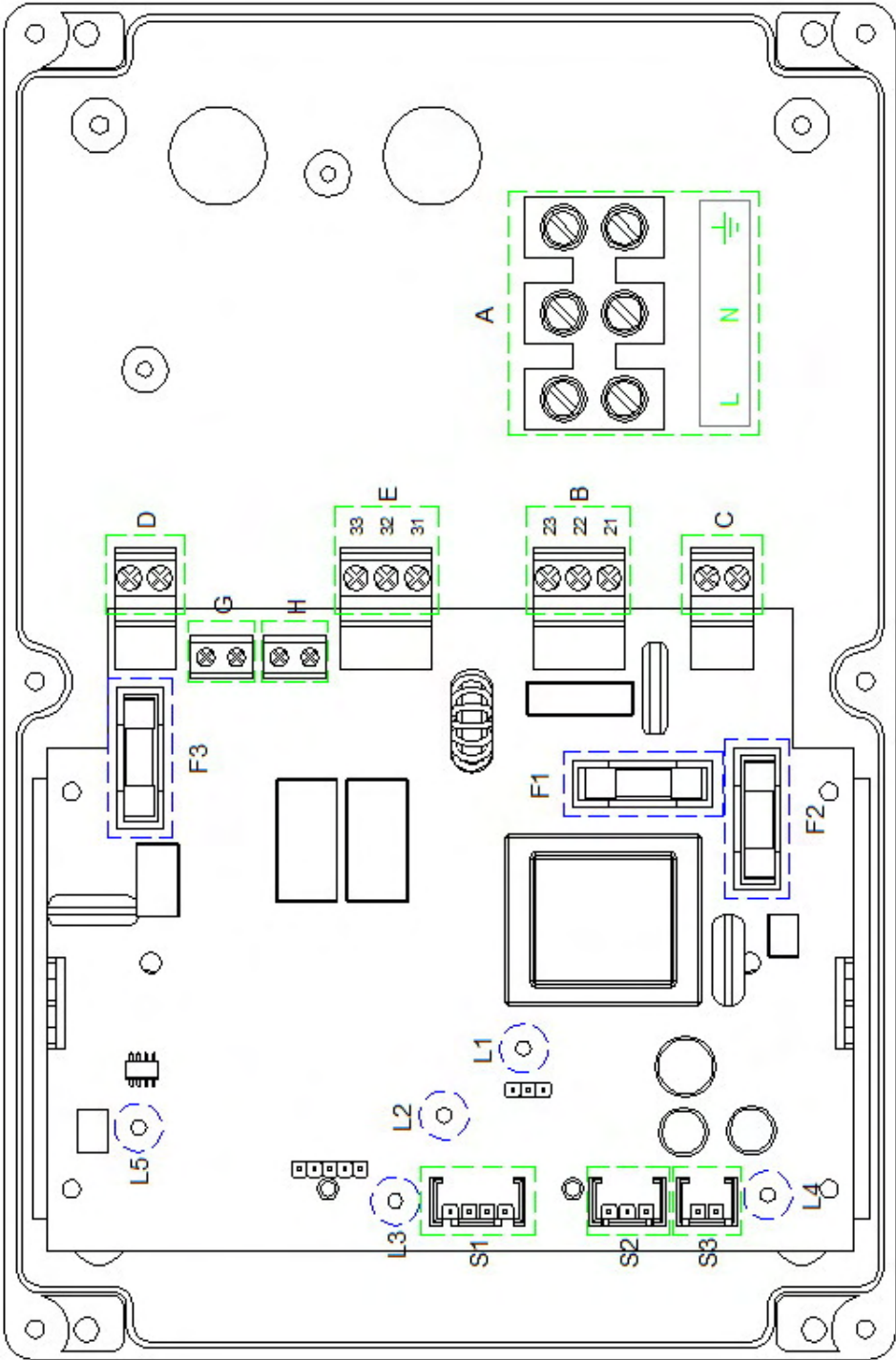


Figure18.1. Heat Recovery Spare Parts

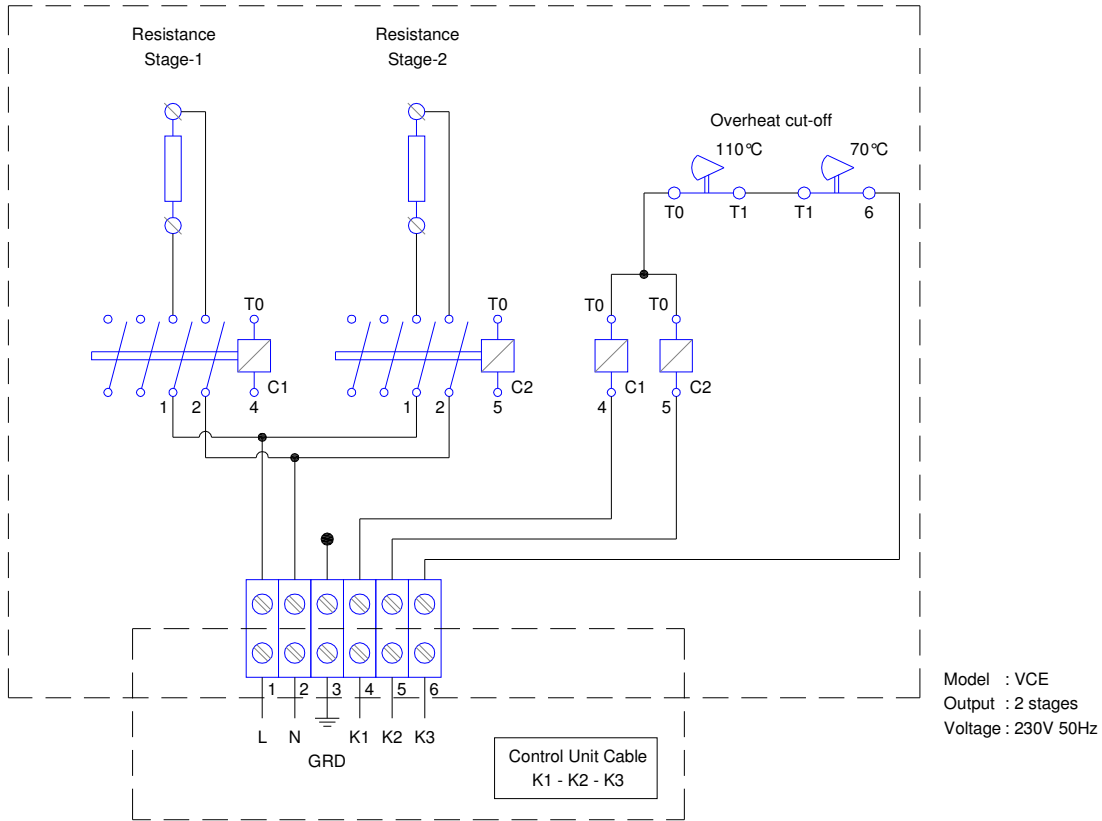
17. APPENDIX

17.1. APPENDIX-1 ELECTRICAL WIRING DIAGRAM

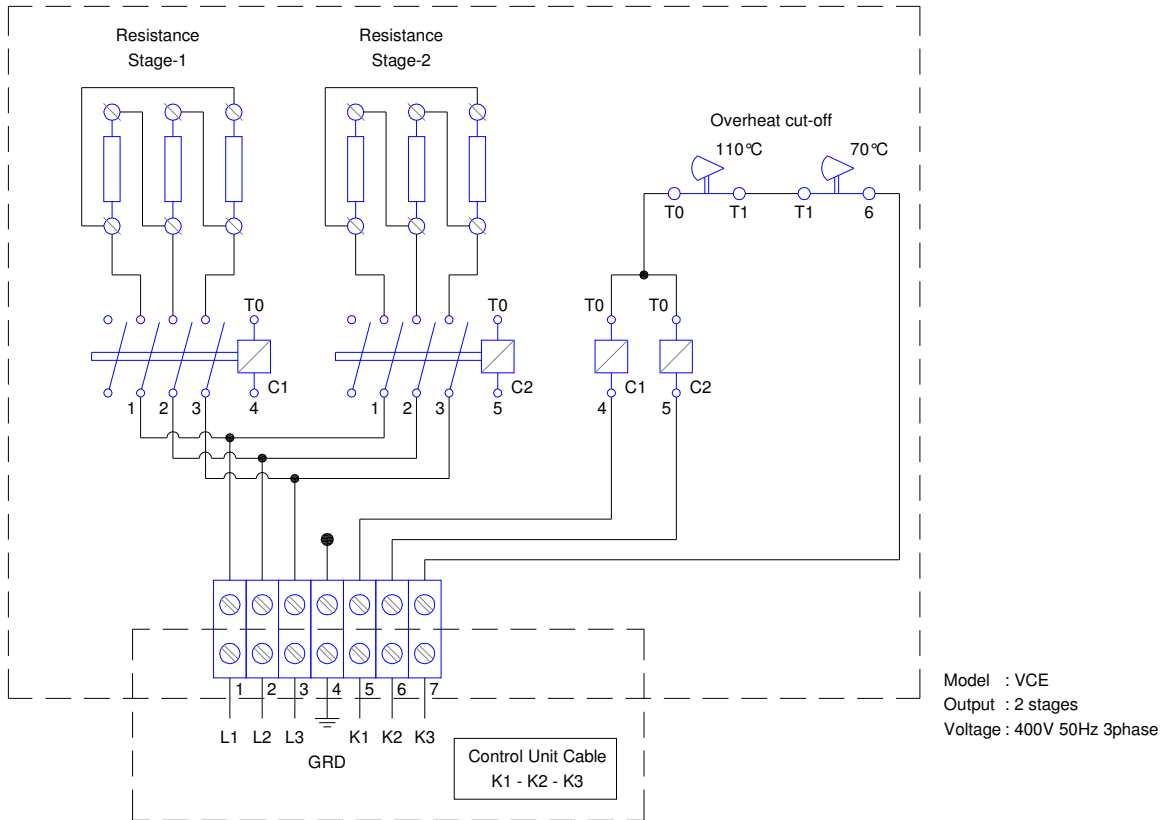
- A** Power Connection (230V 50Hz 1phase)
11 L
12 N
13 GRD
- B** Power Connection (230V 50Hz 1phase)
21 L
22 N
23 GRD
- C** Supply Fan Connection
- D** Return Fan Connection
- E** Electrical Heater Control Cables
31 K1
32 K2
33 K3
- F** Glass Fuse
F1 Board Fuse (0,5A)
F2 Supply fan fuse (10A)
F3 Return fan fuse (10A)
- S1** Control panel connection socket
- L** Led



17.2. APPENDIX-2 DUCT TYPE ELECTRICAL HEATER WIRING DIAGRAM



2008-01



2008-01

17.3. APPENDIX-3 ELECTRICAL CABLE AND FUSE SELECTION TABLE

APPENDIX 3.1. Heat Recovery Unit Electrical Power Supply and Circuit Breaker Selection Table

MODEL	POWER CONSUMPTION	ELECTRICAL CONNECTION	CIRCUIT BRAKER
VHR 04	160 watt	230 volt – 50 Hz	1 Amper
VHR 09	294 watt	230 volt – 50 Hz	2 Amper
VHR 15	746 watt	230 volt – 50 Hz	6 Amper
VHR 20	746 watt	230 volt – 50 Hz	6 Amper
VHR 29	1100 watt	230 volt – 50 Hz	10 Amper
VHR 36	1100 watt	230 volt – 50 Hz	10 Amper
VHR 51	1500 watt	230 volt – 50 Hz	10 Amper

P.S. : The circuit braker must cut L/N at the same time.

APPENDIX 3.2. Duct Type Electrical Heater Power Supply and Circuit Breaker Selection Table

MODEL	POWER CONSUMPTION	ELECTRICAL CONNECTION	CIRCUIT BRAKER
VHR 04	1 kW	230 volt – 50 Hz	10 Amper
VHR 09	3 kW	230 volt – 50 Hz	16 Amper
VHR 15	4 kW	400 volt – 50 Hz – 3 ph.	3 x 16 Amper
VHR 20	5 kW	400 volt – 50 Hz – 3 ph.	3 x 16 Amper
VHR 29	7 kW	400 volt – 50 Hz – 3 ph.	3 x 16 Amper
VHR 36	10 kW	400 volt – 50 Hz – 3 ph.	3 x 20 Amper
VHR 51	12 kW	400 volt – 50 Hz – 3 ph.	3 x 25 Amper

P.S. : The circuit braker must cut L/N at the same time.