



An **Airedale**  Company



# MECHANICAL VENTILATION AND HEAT RECOVERY UNITS

## HRFL II CEILING VOID UNITS

### TECHNICAL MANUAL



Version 2.4, 18/09/2020

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## 1. INTRODUCTION

Especially designed for false ceiling installation the **Therm-X HRFL II** range of units offers a compact and packaged solution of mechanical supply and extract ventilation with heat recovery.

To suit the increasingly stringent requirements for local ventilation systems installed in ceiling voids the units have been designed with **reduced height** (down to 310mm) and **facilitated maintenance access**.

Also equipped with state-of-the-art **plug and play integral controls** the Therm-X units offer the all-in-one heat recovery solution for local mechanical ventilation.

These features make these units ideal for installation in commercial interior applications, such as **shops, offices, coffee bars, restaurants, gyms, sport facilities and schools**.

The units are fully compliant with the requirements for the **UK Building Regulations** and the **European Eco-design directive**.

The units are intended to be operated in a dry indoor environment (+5 to 40°C) handling air that is free of heavy dust, grease, chemical emissions or other abrasive pollutants with temperature ranging from -15°C (-20°C with electric pre heater) up to +40°C and a maximum relative humidity up to 90%.

- **4 models** covering airflows from  $0.03 \text{ m}^3 \cdot \text{s}^{-1}$  ( $108 \text{ m}^3 \cdot \text{h}^{-1}$ ) to  $0.47 \text{ m}^3 \cdot \text{s}^{-1}$  ( $1692 \text{ m}^3 \cdot \text{h}^{-1}$ ) at an ESP of 200Pa
- **Compact in size** with low installation height (down to 310mm) for efficient space usage
- Fully removable **bottom access** panels for quick and easy maintenance
- Fully compliant with the requirements for **Part L of the UK Building Regulations** and the **Eco-design directive**
- **Quiet operation**
- **Low leakage** and solid galvanized frameless construction
- **Painted bottom panel** for exposed installation
- Aluminium counter flow plate heat exchanger with bypass facility and **heat recovery efficiency up to 93%**, exceeding ErP 2018
- **Energy-efficient EC fans** with integral electronic control and silent operation
- Low energy consumption **F7 (ePM<sub>2.5</sub> 65%)** **supply filter** as standard for enhanced IAQ (F9 (ePM<sub>2.5</sub> 80%) optional)
- **Intelligent integral control system with touch screen controller** (CAV, VAV, DCV, time scheduling, boost & trickle, free-cooling, supply and room temperature control, anti-frost, cooling and heating coil control, etc...)
- **Modbus & BacNet** communication
- **Optional integral electric pre-heating coil**
- **Optional integral electric or LPHW post heating coil**
- **Optional external cooling module** (supplied loose) with **water changeover (WCO)** or **direct expansion (DX) coil**
- Extensive range of complimentary accessories for installation and control
- Detailed and accurate software selections with the **THERM-X CHOOSE&GO software**
- **Service software** for easy commissioning

## 2. PRODUCT OVERVIEW

### 2.1. CONSTRUCTION

The Therm-X HRFL II unit casing is assembled from a self-supporting frameless construction, manufactured with **double skinned**, corrosion resistant, **30mm deep hot dip galvanized sandwich panels** (thick.: 0.8mm).



The outstanding mechanical strength, thermal and acoustic performance of the casing is assured by packing the panels with **high density rockwool** (88 kg.m<sup>-3</sup>) with excellent thermal and acoustic performance (0.041 W.(m.K)<sup>-1</sup>, fire resistance class A1 to 13501-1 + A1: 2009 - non-combustible).

The panels are joined with internally enclosed self-drilling fixings resulting in a smooth internal surface, crevice free, which contributes to the cleanliness of the unit and the quality of the air supplied through it.

The **bottom panels** are finished with an **RAL 9010 powder coated paint** to allow exposed installation.

To avoid external air leakage both fixed and access panels are sealed with a high tightness, **EPDM closed cell gasket**.

### 2.2. INSTALLATION



The unit is suitable for **indoor installation** by suspension on the **ceiling void** and is supplied as standard with factory fitted support brackets equipped with anti-vibration mounts to ensure a quick and reliable installation.

### 2.3. ACCESS AND MAINTENANCE

Access to all the unit compartments is available through the **bottom tool operated access panels**.



All access panels are equipped with **hinges and handles** to facilitate handling during maintenance operations. The panel is fitted with a lock to prevent the panel from opening at once when unbolted.

All the panels are fully removable allowing access to the plate heat exchanger, drain tray, fan, filter and ancillary coil sections as well as facilitating access for periodic inspection.

The control panel is installed in an easily accessible enclosure located on the outside of the unit.

### 2.4. COMPONENTS



The unit fan section comprises of high-performance supply and extract, **single inlet-backward curved plug fans**.

The fans are directly driven by low energy consumption **IE4 electronically commutated (EC) motors**.

The fans exceed the 2015 efficiency requirements of regulation 327/2011 of the Eco-design directive for fans.

The assembly is statically and dynamically balanced as per DIN/ISO 1940 to balancing grade G 6.3.

The highly efficient **aluminium impellers** and aerodynamic design of the casing ensures low noise levels especially on the discharge from the fan.

The fan assembly is installed on a **highly rigid galvanized support structure** mounted with an aerodynamically designed galvanized inlet.

The EC motors offer intelligent integral control electronics allowing **soft start-up** as well as **over-temperature and short circuit protection**.

The motor insulation is Class 'B', rated IP 54 (acc. to EN 60529) and meets all relevant EMC directives and requirements.

## 2.5. FILTERS



Filtration for protection of the finned heat exchanger and treatment of the supply air is provided by **compact synthetic media filters** mounted in a **plastic frame** (Fiberplast).

Grade of filtration according to **BS EN779:2012 / ISO16890** is **class F7 / ePM<sub>2.5</sub> 65%** on supply and **M5 / ePM<sub>10</sub> 70%** on extract.

The low pressure drop synthetic media makes for a **low energy consumption filter** that helps reduce the overall energy consumption of the unit.

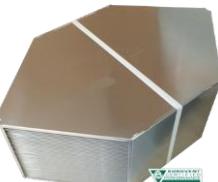
For stricter indoor air quality requirements, a **F9 / ePM<sub>2.5</sub> 80%** supply air filter is **optionally available** (supplied loose for installation by others on site).

The filters are mounted on **slides** for easy removal and **tightly sealed against the slide rails** to ensure reduced filter bypass leakage.

## 2.6. COUNTER FLOW PLATE HEAT EXCHANGER

The heat recovery section is equipped with a highly efficient **counter-flow air to air heat exchanger**, exceeding the 2018 requirements of regulation 1253/2014 of the Eco-design directive for ventilation units, with **operational efficiency up to 93%**.

The heat exchanger finned block and casing are manufactured from **high thermal transmittance and corrosion resistant aluminium**.



**The exchanger is Eurovent certified and fully tested to EN308:1997.**

The heat recovery section is also provided with **fully modulating face and by-pass damper** to provide control of the supply air temperature and enable **free cooling operation** when the conditions are favourable (i.e. summer night ventilation).

In extreme conditions when the exhaust temperature drops below the frost risk limit the unit controls strategy provides **frost protection** for the heat exchanger by bypassing some of the cold air.

Where it's not desirable to impact the unit operation during the frost protection strategy, an **electric pre-heating coil (frost coil)** can be offered to provide improved frost protection.

A fully removable, **epoxy coated, galvanized condensate tray** fitted with a 18mm OD drain connection is provided for condensate collection and disposal. The condensate tray is equipped with a **water level sensor** to avoid overflow of the tray by stopping operation.

A **pumped drainage system** can be offered as an **option** and where the depth of the ceiling void allows, an alternative **gravity assisted condensate trap system** can also be offered.

## 2.7. OPTIONAL FEATURES

### 2.7.1. INTEGRAL ELECTRICAL PRE/POST-HEATING COIL

The unit can **optionally be fitted with an electrical pre-heater and/or post-heater** manufactured with open coil heating elements and galvanized casing.

The heater is complete with fully modulating **SCR (Silicon Controlled Rectifier) control (0-100%)** and **2 stages of overheat protection** (automatic and manual reset) all integral to the unit's control strategy.

The SCR control provides accurate, supply air temperature modulation.

The heat output is precisely controlled from 0 to 100% to a user defined setpoint by using the **unit in-built temperature sensors** or a **room temperature**

**sensor** (supplied with every unit for installation and wiring by others on site).

The electric pre-heating coil is recommended where sub-zero temperatures are expected.

The electrical post-heating coil is recommended where no hot water supply is available on site and there is need for top-up heating of the supply air.

### 2.7.2. INTEGRAL LPHW POST-HEATING COIL

The unit can **optionally be supplied with an integral water heater operating with LPHW** to provide supply air top up heating.

The coils are manufactured with **aluminium fins, copper tubes** and assembled on a corrosion resistant **galvanized casing**.

The maximum operating pressure is 16bar at 110°C.



The heating output is automatically modulated by the in-built temperature sensors and the integral unit controls.

Valves and actuators are not included and must be ordered separately

### 2.7.3. EXTERNAL COOLING MODULE (DX OR WCO)

Where cooling is required an **optional water changeover (WCO) coil** can be provided operating with either chilled and/or hot water (depending on the seasonal requirements) on a common water circuit.

Alternatively a single circuit **reverse cycle direct expansion (DX)** coil operating with **R410A refrigerant** can be offered.

All refrigerant coils are tested to 46bar.

Both DX and WCO coils are manufactured with **aluminium fins with hydrophilic coating, copper tubes** and assembled on a corrosion resistant **galvanized casing**.

The cooling coil section is also equipped with a **plastic droplet eliminator to avoid moisture carryover**.

A fully **removable, epoxy coated, galvanized condensate tray** fitted with a 22mm OD drain connection is provided for condensate collection and disposal.

The condensate tray is equipped with a **water level sensor** to avoid overflow of the tray by stopping operation.

These coils are provided on an **externally mounted module** with equivalent construction to the heat recovery unit (supplied loose for installation and wiring by others on site).



After installed the module requires wiring of the integral temperature sensors to the unit control panel (by others on site).

The external module cooling/heating output is modulated by the unit controller.

### 2.7.4. ACCESSORIES

All Therm-X units have available a wide range of mechanical and control accessories to facilitate installation and enhance the product functionality.

The accessories available for the HRFL II range:

- ➔ Motorized shut off dampers
- ➔ Backdraft dampers
- ➔ Square to round duct transitions
- ➔ Spare filters
- ➔ Duct mounted electrical heaters
- ➔ Duct mounted LPHW heaters
- ➔ Duct mounted circular attenuators
- ➔ Matched straight and bend rectangular attenuators
- ➔ Condensate pump kit
- ➔ Condensate trap
- ➔ Duct and room mounted IAQ sensors (CO<sub>2</sub>, humidity)
- ➔ PIR motion sensor
- ➔ Valve kits
- ➔ Matched refrigeration systems

## 2.8. TESTING

All models undergo a stringent set of tests to the relevant European standards at an accredited laboratory to ensure accurate catalogue data.

**Performance is tested to ISO 5801:2007** Industrial fans – performance testing using standardized airways.

**Casing radiated noise acoustically tested to BS EN 3744:2010** – Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane.

Published figures are for a **non-punctiform source** and **spherical propagation** as described in **ISO 3744**.

**In duct noise acoustically tested to BS EN ISO 5136:2010** - Acoustics – Determination of sound power radiated into a duct by fans and other air-moving devices - In-duct method.

**Heat recovery efficiency tested to EN 308:1997** - Heat exchangers - Test procedures for establishing performance of air to air and flue gases heat recovery devices.

Testing tolerances in accordance with **COMMISSION REGULATION (EU) No 1253/2014** are as follows:

- ☛ SFPint – Declared value x 1.07
- ☛ Thermal Efficiency – Declared value x 0.93
- ☛ Sound power levels – Declared value + 5 dB

## 2.9. BUILDING REGULATIONS AND ECO-DESIGN DIRECTIVE

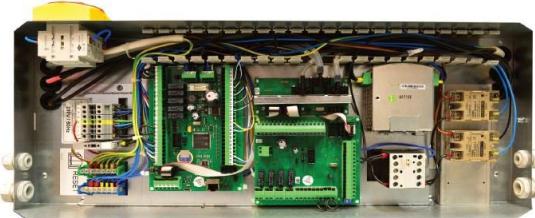
All models are performance tested and measurements are performed to obtain the power consumption of the units at several operating points.

These test are conducted to evaluate the performance of the equipment at its standard configuration (F7/M5 filters) as per the ErP directive.

The units are able to operate within the limits of both of these regulations under most conditions. To provide accurate performance data a detailed software selection can be produced.

## 2.10. CONTROLS

All Therm-X MVHR units are factory fitted with a **Plug&Play fully integral intelligent control package**.



The factory fitted controls include:

- ☛ Sealed controls enclosure with unit PCB and all electrics
- ☛ Mains switch isolator
- ☛ Face and bypass damper actuator
- ☛ 4 temperature sensors (fresh air, supply air (x2), return air)
- ☛ 1 sensor for antifreeze protection (exhaust air)
- ☛ 2 digital pressure sensors for filters
- ☛ 3 digital pressure sensors for airflow measurement and constant pressure operation
- ☛ 2 water temperature sensors (only versions with water or direct expansion coils)
- ☛ 1 condensate level sensor (x2 for versions with cooling coil option)
- ☛ Automatic and manual thermal reset for electric heaters (only versions with electric heaters)

All units are also provided with the following loose items (installation and wiring by others):

- ☛ 1 room temperature sensor
- ☛ 1 handheld touchscreen controller (wiring on site by others, cable not supplied, CAT5 UTP cable recommended as minimum)



The in-built controls are pre-configured and offer several alternatives to operate your Therm-X unit.

**The controls are ready to go from the moment the unit is turned ON**, and can be easily configured with the help of the handheld controller provided (excludes externally mounted sensors which are supplied loose and require installation and wiring by others on site).



Some of the features offered by the controller are listed below:

### 2.10.1. AIRFLOW CONTROL

The controls offer continuous modulation of the airflow range of the unit in 10% steps.

The ratio of airflows for supply and exhaust can be adjusted according to the requirements of the project (+-50%).

The unit can be set to operate in distinct ventilation modes to control the supply of outside air for ventilation purposes.

#### CAV (Constant Air Volume) mode

The unit is programmed to supply a constant amount of air to the ventilated space.

The unit will adjust the output of the fans according to the internal or external pressure changes in order to maintain the amount of air being supplied to the rooms constant.

#### VAV (Variable Air Volume) mode

The unit is programmed to adjust the fans output to maintain a constant pressure in the supply duct while varying the air volume according to the demand of the ventilated space.

The unit adjusts the supply flow rate according to the overall opening of the supply VAV terminal units in the ductwork system.

### DCV (Demand Controlled Ventilation) mode

The unit is programmed to adjust the supply airflow according to the occupancy on the ventilated space by matching the outdoor air supply to the ventilation demand.

The fan output is determined by a 0-10V input from an air quality sensor (CO<sub>2</sub>, RH, VOC, etc., can be ordered from Barkell, installation and wiring by others on site).

The flow rate is controlled according to the 0-10V signal.

### “Breathing”

The unit can be set to turn OFF when the IAQ requirements on the ventilated space are satisfied in order to save energy.

The unit then turns ON regularly to “breathe” and check the concentration of pollutants, returning to normal operation if required.

### Trickle mode

If a PIR motion sensor is installed in the ventilated space (can be ordered from Barkell, installation and wiring by others on site), in the event of no occupancy the unit provides only minimum background ventilation to save energy.

### Boost mode

When there is a high demand for ventilation or swift heating or cooling of the space is necessary (i.e. unit start up) the boost mode overrides the operation of the unit and runs the fans at the maximum defined airflow for the time period determined by the user.

The boost mode can be enabled with the supplied handheld controller or an external switch (by others on site).

### Time scheduling

The unit can be set to operate on timed operation on a weekly and/or yearly schedule with individual settings for up to six time blocks per day/year.

### 2.10.2. TEMPERATURE CONTROL

The unit is able to control the conditioned space temperature based on the temperature of the supply or return air.



Temperature control based on room temperature is also possible given the room temperature sensor is installed (room sensor supplied with every unit, installation and wiring by others on site).

The unit automatically and continuously controls the output of the heat recovery device and the optional integral and external heat exchangers (if installed) in order to achieve the set-point temperature defined by the user.

The supply air temperature is kept in between the limits defined during commissioning to avoid very cold or hot air being supplied to the room.

### Automatic free cooling

The unit automatically detects favourable conditions for free-cooling and ventilates using the cold outside air to achieve space cooling savings.

### 2.10.3. OTHER CONTROL FEATURES

In addition to the basic ventilation and temperature control the Therm-X controller offers a range of features to extend the functionality, facilitate commissioning operation and maintenance of the equipment.

### Safety

- ➔ FIRE MODE interlock with BMS
- ➔ Soft start up
- ➔ Frost protection of the heat exchangers
- ➔ Overheat protection of the electric heaters
- ➔ Condensate tray overflow protection
- ➔ Fault and emergency alarms on the handheld controller
- ➔ Memory of last operational state in event of power outage

## Commissioning

- ☛ Automatic calibration of filters and fans during commissioning
- ☛ Component test mode
- ☛ PID tuning

## Maintenance

- ☛ Continuous monitoring of the filter status
- ☛ Dirty filter alarm

## External control

- ☛ External **enable/disable, error and run signalisation relay contacts**
- ☛ Control of external **heat pump** via ON/OFF or proportional 0-10V enable, error and defrost signal
- ☛ Control of up to two **external shut-off dampers** (can be ordered from Barkell, installation and wiring by others on site)
- ☛ Control of 2<sup>nd</sup> **external pre-heating coil** – water or electric (can be ordered from Barkell, installation and wiring by others on site)
- ☛ Control of 2<sup>nd</sup> **external post-heating coil** – water, electric or direct expansion (can be ordered from Barkell, installation and wiring by others on site)

For further information about the external control functions of the Therm-X controls please contact our offices.

### 2.10.4. COMMUNICATION

The unit can be set-up and controlled via the handheld touchscreen controller supplied or via the BMS.

#### Handheld Controller



The handheld control panel is a powerful tool for setting up and operating the Therm-X units.

## End user level functions:

- ☛ Adjusting operational parameters – set point temperature, airflow
- ☛ Activate BOOST MODE
- ☛ Set TIME SCHEDULING
- ☛ Display alarms and faults in detail
- ☛ Monitor the unit operation
- ☛ Near Field Communication (NFC)

## Commissioning level functions:

- ☛ Full set-up and calibration of the unit
- ☛ Select and set up ventilation modes
- ☛ Set-up secondary ventilation modes – BOOST, TRICKLE, FREECOOLING
- ☛ Set airflow offset, temperature limits, etc..
- ☛ Test individual components
- ☛ Set end-user level access protection

The handheld controller has a fully touchscreen based interface with full RGB colour scheme and supports NFC communication.

The controller must be wired to the unit with a suitable communication cable (not supplied by Barkell, UTP CAT5 cable as minimum is recommended, by others on site) not exceeding a length of 50m.

#### BMS integration

BMS integration is provided by connecting the unit control panel through a **BacNet TCP/IP**, **MODBUS RTU (RS485)** and **MODBUS TCP/IP** protocol allowing full control and monitoring of the unit.

Other protocols can be enabled with the use of an gateway converter (not sold by Barkell, must be programmed by a BMS or controls specialist).

## 2.10.5. CONTROLS SET-UP

The set-up of the controls on the Therm-X unit can be performed by one of our experienced commissioning teams.

We offer the following options to perform the commissioning of your Therm-X units:

### Site attendance for demonstration of controls set-up

With this option one of our experienced engineers will attend to site for one day and demonstrate how to calibrate and set the controls for one Therm-X unit.

### Site attendance for controls set-up

With this option one of our experienced engineers will attend to site to check the installation and wiring of every unit as well as calibrate and set up the controls to the required project design conditions.

For additional information about our commissioning options please contact our offices.

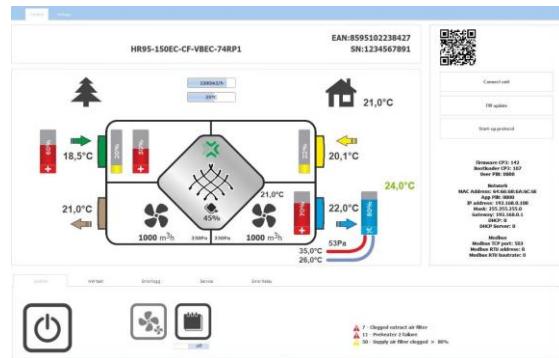
#### Please note:

- ☛ Any mechanical or electrical works must be completed before our engineers attend to site to set-up the controls
- ☛ Barkell will not perform the integration of the units to the BMS
- ☛ Demonstration of specific controls functionality and witnessing is not included and must be requested separately

## 2.11. SERVICE SOFTWARE

The Therm-X service software allows full control of the equipment and easy commissioning with a user-friendly interface.

The software can also be used to easily transfer settings between units making the commissioning of large identical installations much swifter.

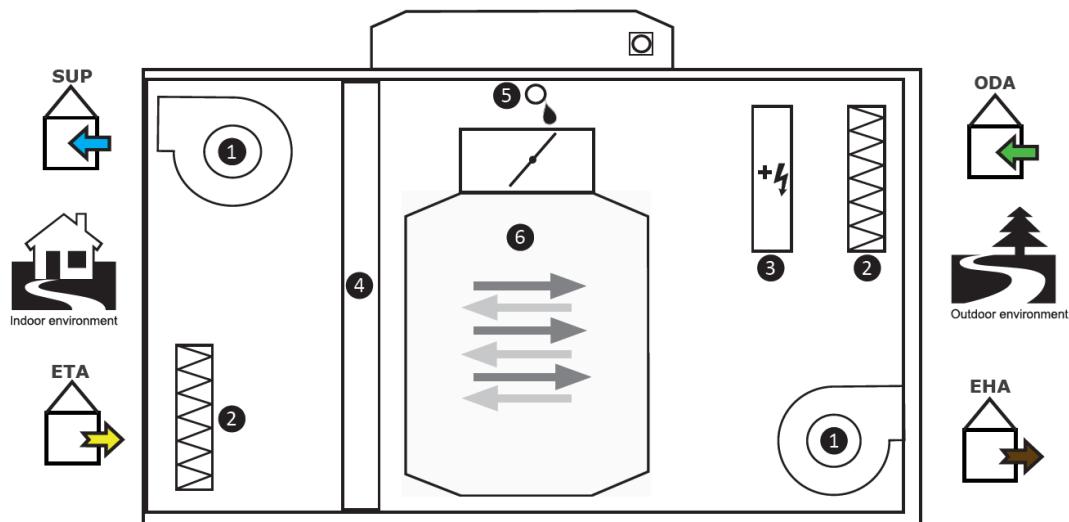


## 2.12. WARRANTY

All units are provided with 36 months warranty starting from the date of delivery.

The warranty covers replacement parts only.

### 3. OPERATIONAL DIAGRAM



**PLAN VIEW (BOTTOM)**

Key:	
OTA - Outside air	1 EC plenum fan
SUP - Supply air	2 Panel filter - supply F7**, return M5
ETA - Extract air	3 Optional electric pre-heating coil
EHA - Exhaust air	4 Optional post-heating coil - Electric or LPHW*

5	Condensate collection and disposal
6	PHE with bypass damper

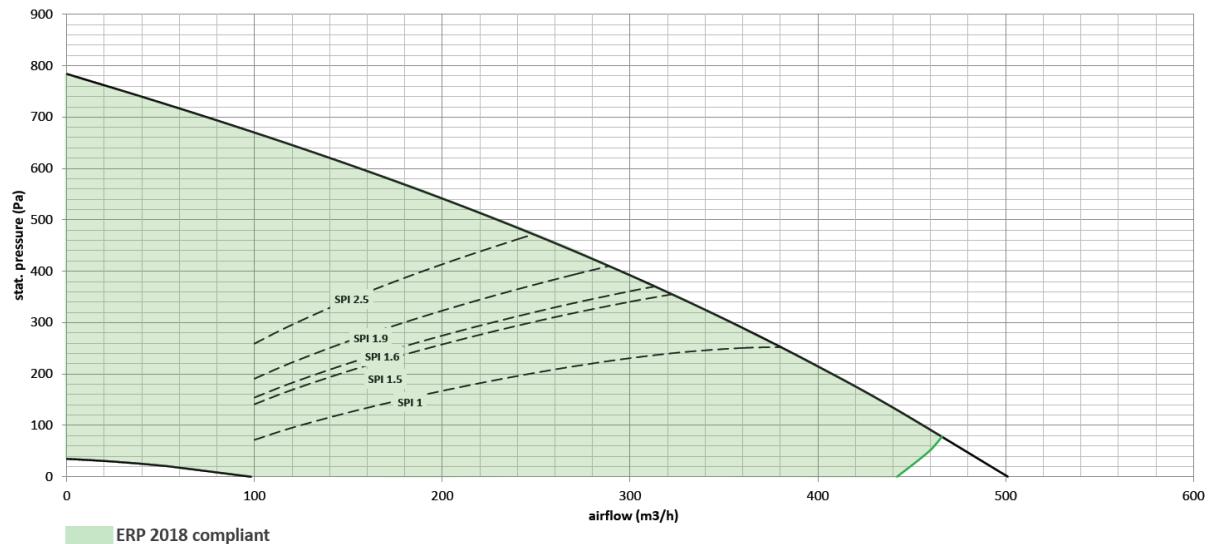
\*External cooling modules with DX and WCO coils are also available (supplied loose, installation and wiring on site by others)

\*\*Optional F9 supply filter available

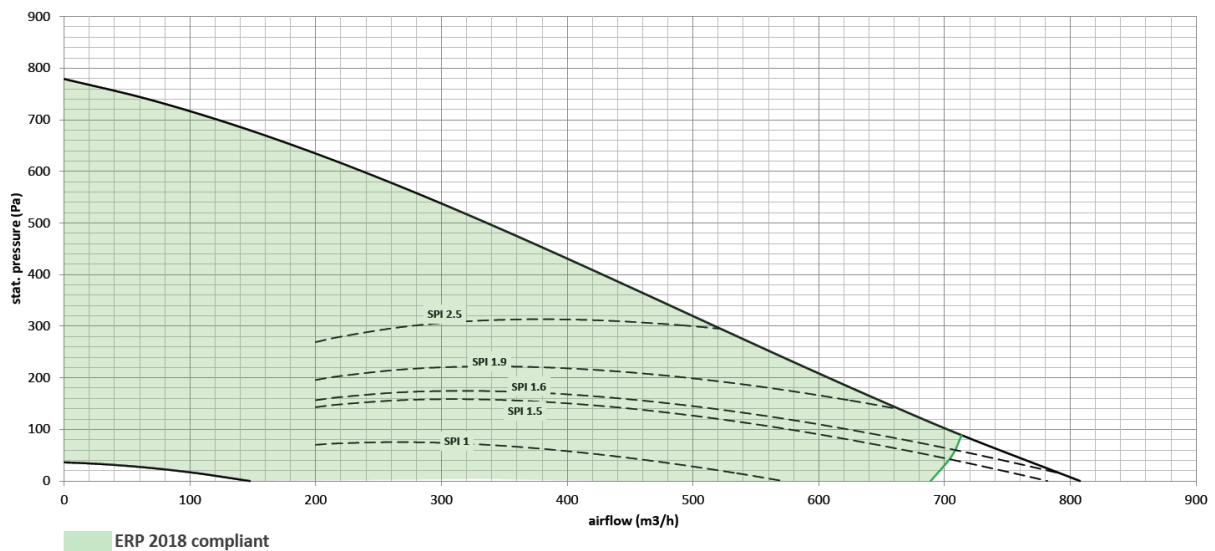
#### 4. AIRFLOW PERFORMANCE

Airflow performance as tested to ISO 5801:2007, Installation category D:

##### HRFL2-040



##### HRFL2-070

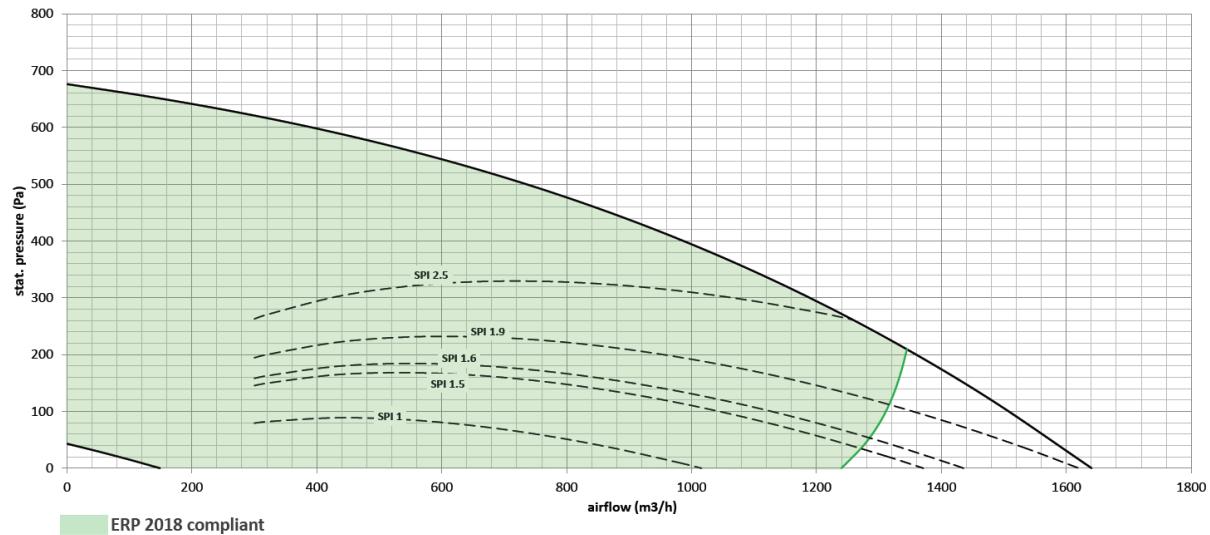


##### PLEASE NOTE:

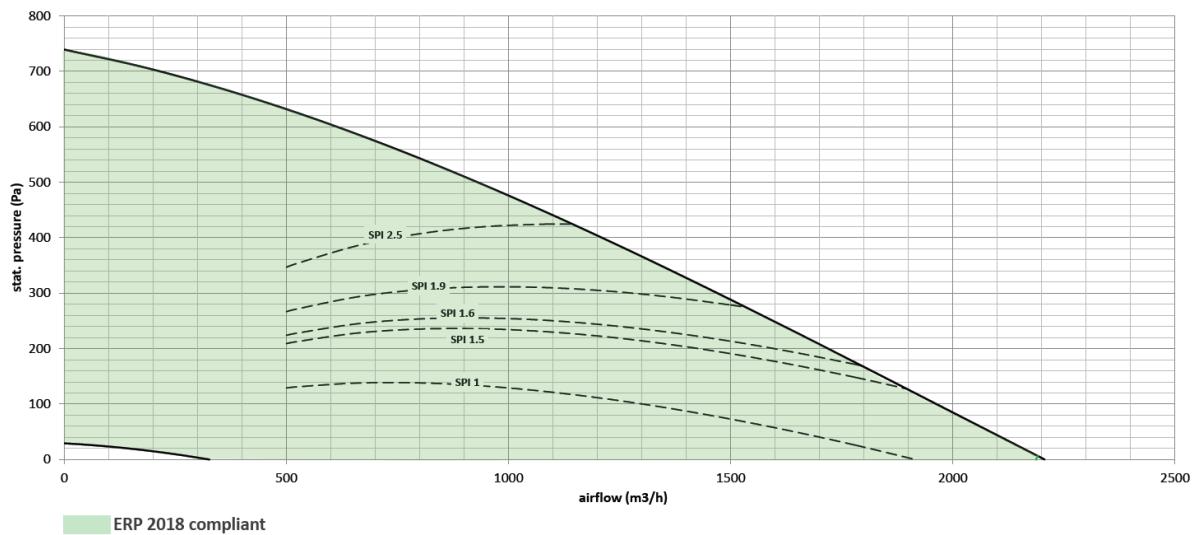
- Performance is shown for standard configuration with F7 supply and M5 extract filters, clean filters, SPI is for both fans
- For accurate performance data please request a detailed software selection

Airflow performance as tested to ISO 5801:2007, Installation category D:

### HRFL2-150



### HRFL2-200

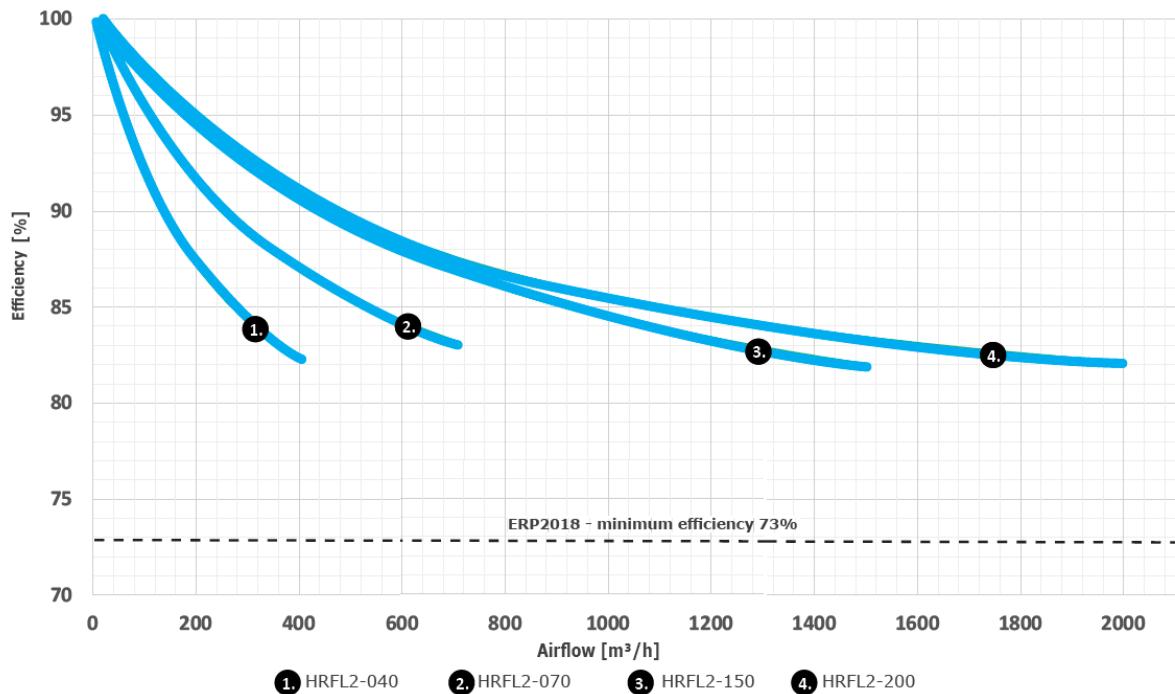


#### PLEASE NOTE:

- Performance is shown for standard configuration with F7 supply and M5 extract filters, clean filters, SPI is for both fans
- For accurate performance data please request a detailed software selection

## 5. HEAT RECOVERY PERFORMANCE

Heat recovery efficiency as tested to EN 308:1997:



### PLEASE NOTE:

- Heat recovery efficiency is measured under the following conditions:
  - Outdoor air conditions: 5°C / 72%
  - Indoor air conditions: 25°C / 28%
  - Efficiencies stated are for dry conditions
- For accurate heat recovery performance data please request a detailed software selection

## 6. ACOUSTIC PERFORMANCE

### HRFL2-040

Air Volume [m <sup>3</sup> .h <sup>-1</sup> ]	Air Volume [m <sup>3</sup> .s <sup>-1</sup> ]	ESP [Pa]	SFP [W.(l.s) <sup>-1</sup> ]	Casing Breakout @ 3m [dB(A)]
340	0.09	200	1.90	34
255	0.07	200	1.67	31
170	0.05	200	1.62	28
403	0.11	150	1.90	35
302	0.08	150	1.52	31
202	0.06	150	1.32	27
450	0.13	100	1.90	36
338	0.09	100	1.40	32
225	0.06	100	1.07	26
480	0.13	50	1.84	36
360	0.10	50	1.26	33
240	0.07	50	0.85	26

### HRFL2-070

Air Volume [m <sup>3</sup> .h <sup>-1</sup> ]	Air Volume [m <sup>3</sup> .s <sup>-1</sup> ]	ESP [Pa]	SFP [W.(l.s) <sup>-1</sup> ]	Casing Breakout @ 3m [dB(A)]
420	0.12	200	1.90	33
315	0.09	200	1.78	33
210	0.06	200	1.82	33
555	0.15	150	1.90	33
416	0.12	150	1.59	32
278	0.08	150	1.43	31
650	0.18	100	1.90	34
488	0.14	100	1.46	30
325	0.09	100	1.17	29
730	0.20	50	1.89	35
548	0.15	50	1.34	30
365	0.10	50	0.95	26



#### PLEASE NOTE:

- Performance is shown for standard configuration with F7 supply and M5 extract filters, midpoint filters
- Casing breakout at 3 meters calculated for a non-punctiform source and spherical propagation as described in ISO 3744
- For accurate acoustic performance data please request a detailed software selection

**HRFL2-150**

Air Volume [m <sup>3</sup> .h <sup>-1</sup> ]	Air Volume [m <sup>3</sup> .s <sup>-1</sup> ]	ESP [Pa]	SFP [W.(l.s) <sup>-1</sup> ]	Casing Breakout @ 3m [dB(A)]
<b>800</b>	<b>0.22</b>	<b>200</b>	<b>1.90</b>	<b>36</b>
600	0.17	200	1.76	32
400	0.11	200	1.77	29
<b>1035</b>	<b>0.29</b>	<b>150</b>	<b>1.90</b>	<b>37</b>
776	0.22	150	1.60	32
518	0.14	150	1.42	28
<b>1200</b>	<b>0.33</b>	<b>100</b>	<b>1.90</b>	<b>37</b>
900	0.25	100	1.47	31
600	0.17	100	1.16	26
<b>1339</b>	<b>0.37</b>	<b>50</b>	<b>1.90</b>	<b>38</b>
1004	0.28	50	1.37	30
670	0.19	50	0.95	24

**HRFL2-200**

Air Volume [m <sup>3</sup> .h <sup>-1</sup> ]	Air Volume [m <sup>3</sup> .s <sup>-1</sup> ]	ESP [Pa]	SFP [W.(l.s) <sup>-1</sup> ]	Casing Breakout @ 3m [dB(A)]
<b>1733</b>	<b>0.48</b>	<b>200</b>	<b>1.88</b>	<b>41</b>
1300	0.36	200	1.44	38
867	0.24	200	0.00	36
<b>1850</b>	<b>0.51</b>	<b>150</b>	<b>1.76</b>	<b>39</b>
1388	0.39	150	1.27	36
925	0.26	150	1.06	34
<b>1965</b>	<b>0.55</b>	<b>100</b>	<b>1.66</b>	<b>38</b>
1474	0.41	100	1.11	34
983	0.27	100	0.85	31
<b>2075</b>	<b>0.58</b>	<b>50</b>	<b>1.56</b>	<b>37</b>
1556	0.43	50	0.96	31
1038	0.29	50	0.67	28


**PLEASE NOTE:**

- Performance is shown for standard configuration with F7 supply and M5 extract filters, midpoint filters
- Casing breakout at 3 meters calculated for a non-punctiform source and spherical propagation as described in ISO 3744
- For accurate acoustic performance data please request a detailed software selection

## 7. TECHNICAL DATA

### 7.1. ELECTRICAL CHARACTERISTICS

**Models without electric pre-heating coil and... without coil / with water heating coil / with WCO coil / with DX coil**

Unit Type	Phase	Voltage [V]	Frequency [Hz]	Power Input [kW]	Full load current per phase [A]
HRFL2-040	1	230 V	50 Hz	0.23	2.2
HRFL2-070	1	230 V	50 Hz	0.33	2.5
HRFL2-150	1	230 V	50 Hz	1.10	6.8
HRFL2-200	1	230 V	50 Hz	1.10	6.3

**Models without electric pre-heating coil and... with electric post heating coil**

Unit Type	Phase	Voltage [V]	Frequency [Hz]	Power Input [kW]	Full load current per phase [A]
HRFL2-040	1	230 V	50 Hz	1.10	5.7
HRFL2-070	1	230 V	50 Hz	1.80	8.6
HRFL2-150	1	230 V	50 Hz	3.80	18.5
HRFL2-200	3	400 V	50 Hz	5.90	12.3

**Model with electric pre-heating coil and... without coil / with water heating coil / with WCO coil / with DX coil**

Unit Type	Phase	Voltage [V]	Frequency [Hz]	Power Input [kW]	Full load current per phase [A]
HRFL2-040	1	230 V	50 Hz	1.70	8.3
HRFL2-070	1	230 V	50 Hz	3.10	14.3
HRFL2-150	3	400 V	50 Hz	6.40	13.3
HRFL2-200	3	400 V	50 Hz	8.30	16.7

**Model with electric pre-heating coil and with electric post heating coil**

Unit Type	Phase	Voltage [V]	Frequency [Hz]	Power Input [kW]	Full load current per phase [A]
HRFL2-040	1	230 V	50 Hz	2.50	11.8
HRFL2-070	3	400 V	50 Hz	4.50	11.8
HRFL2-150	3	400 V	50 Hz	9.10	18.5
HRFL2-200	3	400 V	50 Hz	13.10	22.5

**Fan electric motor (per fan)**

Unit Type	Phase	Voltage [V]	Frequency [Hz]	Power Input [kW]	Full Load Current [A]	Speed [rpm]	Protection IP	Insulation class
HRFL2-040	1	230 V	50 Hz	0.12	1.10	3640	54	B
HRFL2-070	1	230 V	50 Hz	0.17	1.25	2530	44	B
HRFL2-150	1	230 V	50 Hz	0.46	2.80	2600	54	B
HRFL2-200	1	230 V	50 Hz	0.50	3.15	1890	54	B



### Electric post heating coil

Unit Type	Phase	Voltage [V]	Frequency [Hz]	Power Input [kW]
HRFL2-040	1	230 V	50 Hz	0.80
HRFL2-070	1	230 V	50 Hz	1.40
HRFL2-150	1	230 V	50 Hz	2.70
HRFL2-200	3	400 V	50 Hz	4.80

### Electric pre heating coil

Unit Type	Phase	Voltage [V]	Frequency [Hz]	Power Input [kW]
HRFL2-040	1	230 V	50 Hz	1.40
HRFL2-070	1	230 V	50 Hz	2.70
HRFL2-150	3	400 V	50 Hz	5.30
HRFL2-200	3	400 V	50 Hz	7.20

## 8. OPTIONAL COIL PERFORMANCE

### LPHW

Unit Type	Air Volume [m <sup>3</sup> .h <sup>-1</sup> ]	Air Volume [m <sup>3</sup> .s <sup>-1</sup> ]	Without Heat Recovery				With Heat Recovery			
			Air On [°C]	Air Off [°C]	Capacity [kW]	Fluid Pd [kPa]	Air On [°C]	Air Off [°C]	Capacity [kW]	Fluid Pd [kPa]
HRFL2-040	410	0.11	-5.0	18.5	3.2	2.0	16.7	32.5	2.2	1.0
HRFL2-070	615	0.17	-5.0	20.3	5.2	6.0	17.4	34.5	3.5	3.0
HRFL2-150	1150	0.32	-5.0	20.3	9.8	26.0	17.2	34.6	6.7	14.0
HRFL2-200	1875	0.52	-5.0	20.4	16.0	9.0	16.6	34.1	11.0	5.0



#### PLEASE NOTE

- Heat recovery calculated based on the following conditions:
  - Ambient: -5 °C / 90% RH
  - Room: 21 °C / 50% RH
- Coil capacity calculated based on the following conditions:
  - Air density: 1.2 kg.m<sup>-3</sup>
  - LPHW Flow: 80 °C, LPHW Return: 60 °C, no glycol
- For accurate coil performance data please request a detailed software selection

### WCO

#### Cooling

Unit Type	Air Volume [m <sup>3</sup> .h <sup>-1</sup> ]	Air Volume [m <sup>3</sup> .s <sup>-1</sup> ]	Without Heat Recovery				With Heat Recovery			
			Air On [°C]	Air Off [°C/%]	Capacity [kW]	Fluid Pd [kPa]	Air On [°C]	Air Off [°C]	Capacity [kW]	Fluid Pd [kPa]
HRFL2-040	410	0.11	28.0	17.5	1.7	5.0	24.8	16.9	1.4	4.0
HRFL2-070	615	0.17	28.0	16.3	3.1	6.0	24.6	15.7	2.6	4.0
HRFL2-150	1150	0.32	28.0	16.8	5.4	3.0	24.7	16.2	4.4	3.0
HRFL2-200	1875	0.52	28.0	16.1	9.9	5.0	24.8	15.5	8.3	3.0



#### PLEASE NOTE

- Heat recovery calculated based on the following conditions:
  - Ambient: 28 °C / 50% RH
  - Room: 24 °C / 50% RH
- Coil capacity calculated based on the following conditions:
  - Air density: 1.2 kg.m<sup>-3</sup>
  - CHW Flow: 6 °C, CHW Return: 12 °C, no glycol
- For accurate coil performance data please request a detailed software selection

## DX

### Heating

Unit Type	Air Volume [m <sup>3</sup> .h <sup>-1</sup> ]	Air Volume [m <sup>3</sup> .s <sup>-1</sup> ]	Without Heat Recovery				With Heat Recovery			
			Air On [°C]	Air Off [°C]	Capacity [kW]	Fluid Pd [kPa]	Air On [°C]	Air Off [°C]	Capacity [kW]	Fluid Pd [kPa]
HRFL2-040	410	0.11	-5	28.5	4.6	31.0	16.7	35.3	2.6	11.0
HRFL2-070	615	0.17	-5	29.8	7.2	13.0	17.4	36.2	3.9	5.0
HRFL2-150	1150	0.32	-5	30.2	13.6	15.0	17.2	36.4	7.4	5.0
HRFL2-200	1875	0.52	-5	30.3	22.2	11.0	16.6	36.3	12.4	4.0



#### PLEASE NOTE

- Heat recovery calculated based on the following conditions:
  - Ambient: -5 °C / 90% RH
  - Room: 21 °C / 50% RH
- Coil capacity calculated based on the following conditions:
  - Air density: 1.2 kg.m<sup>-3</sup>
  - Condensing: 40 °C
- For accurate coil performance data please request a detailed software selection

### Cooling

Unit Type	Air Volume [m <sup>3</sup> .h <sup>-1</sup> ]	Air Volume [m <sup>3</sup> .s <sup>-1</sup> ]	Without Heat Recovery				With Heat Recovery			
			Air On [°C]	Air Off [°C]	Capacity [kW]	Fluid Pd [kPa]	Air On [°C]	Air Off [°C]	Capacity [kW]	Fluid Pd [kPa]
HRFL2-040	410	0.11	28.0	16.6	2.2	53.0	24.8	15.6	1.9	43.0
HRFL2-070	615	0.17	28.0	15.7	3.6	76.0	24.6	16.7	2.3	61.0
HRFL2-150	1150	0.32	28.0	15.5	7.1	20.0	24.7	14.2	4.9	10.0
HRFL2-200	1875	0.52	28.0	15.4	11.7	15.0	24.8	14.6	10.3	12.0

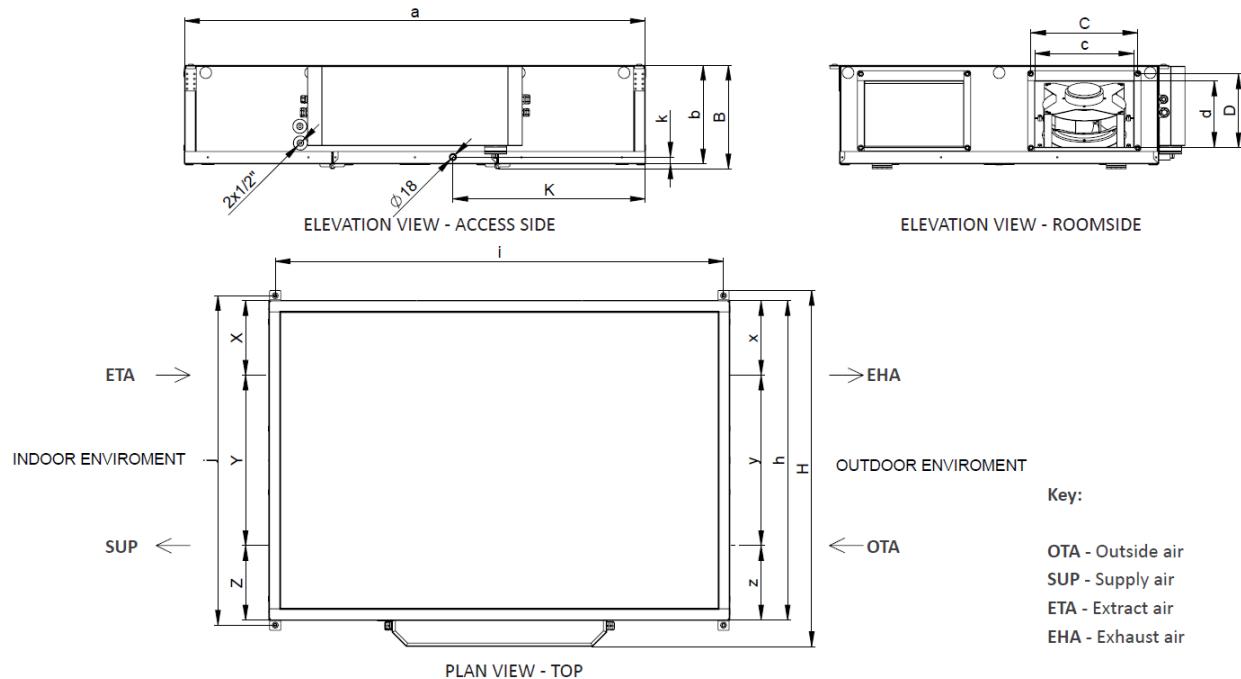


#### PLEASE NOTE

- Heat recovery calculated based on the following conditions:
  - Ambient: 28 °C / 50% RH
  - Room: 24 °C / 50% RH
- Coil capacity calculated based on the following conditions:
  - Air density: 1.2 kg.m<sup>-3</sup>
  - Evaporating: 7 °C, Condensing: 45 °C
- For accurate coil performance data please request a detailed software selection

## 9. DIMENSIONS

### 9.1. UNIT



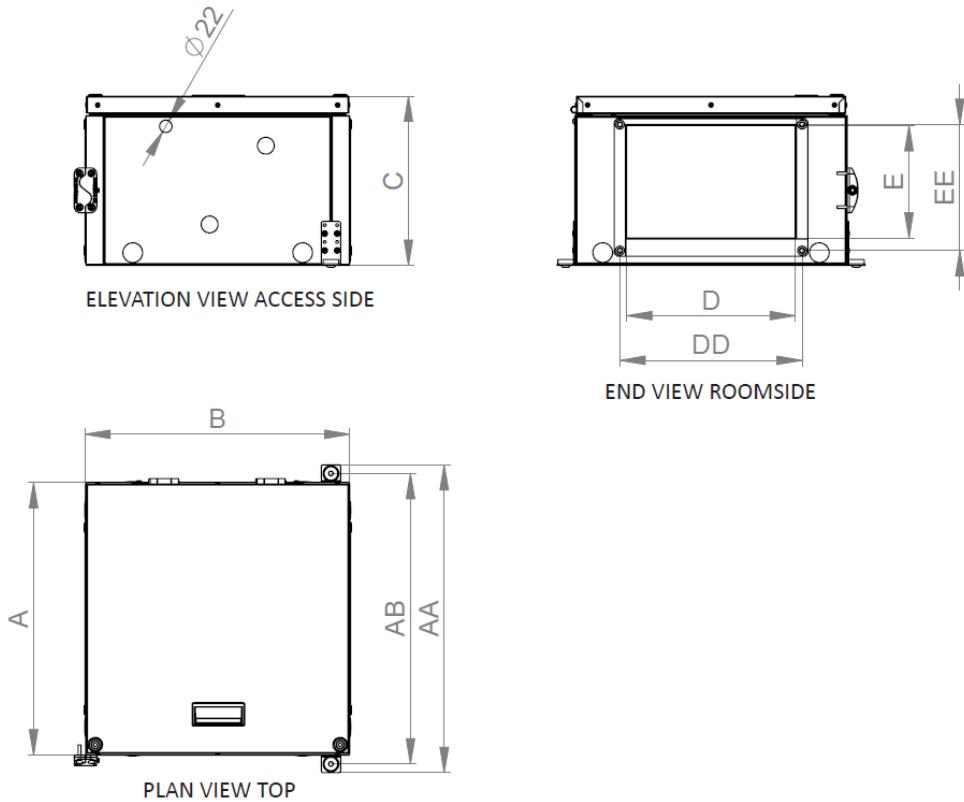
Unit Type	H	h	a	B	b	i	j	K	k	c	d	C	D	X	x	Y	y	Z	z	$\emptyset$ drain con.
HRFL-040	780	670	1190	310	300	1120	700	485	21	250	150	274	174	166	166	332	332	166	166	18
HRFL-070	1080	970	1400	310	300	1330	1000	590	21	300	200	324	224	242	242	517	517	242	242	18
HRFL-150	1385	1270	1700	390	380	1630	1305	720	21	500	250	524	274	323	323	625	625	323	323	18
HRFL-200	1710	1600	2000	470	460	1930	1630	902	21	600	300	624	324	433	433	735	735	433	433	18

Unit Type	LPHW
HRFL-040	$\frac{3}{4}$ " FPT
HRFL-070	$\frac{3}{4}$ " FPT
HRFL-150	$\frac{3}{4}$ " FPT
HRFL-200	$\frac{3}{4}$ " FPT

#### PLEASE NOTE:

- All dimensions are in mm unless otherwise stated
- Please note the standard handing of the unit is as portrayed in the drawing and cannot be changed (for large orders bespoke designs might be available – contact our offices for additional information)
- Detail manufacturing drawings will be provided at the time the equipment is ordered
- WCO (water) and DX (refrigerant) coils are supplied as an external cooling module (see below)

## 9.2. EXTERNAL COOLING MODULE (WCO/DX)



Unit Type	A	B	C	D	E	DD	EE	AB	AA	$\emptyset$ drain con.
HRFL2-040	334	470	295	250	150	274	174	366	397	22
HRFL2-070	484	470	300	300	200	324	224	516	547	22
HRFL2-150	636	470	380	500	250	524	274	668	699	22
HRFL2-200	800	470	460	600	300	624	324	832	863	22

Unit Type	WCO	DX (liquid)	DX (gas)
HRFL-040	3/4" MPT	3/8" <9.5mm>	3/8" <9.5mm>
HRFL-070	3/4" MPT	1/2" <12.7mm>	5/8" <15.9mm>
HRFL-150	3/4" MPT	1/2" <12.7mm>	5/8" <15.9mm>
HRFL-200	3/4" MPT	1/2" <12.7mm>	3/4" <19.1mm>

### PLEASE NOTE:

- All dimensions are in mm
- Please note the dimensions of the external module must be taken in consideration for the total unit dimensions
- External modules are supplied loose for assembly and wiring on site by others
- Detailed manufacturing drawings will be provided at the time the equipment is ordered

## 10. WEIGHTS

Unit Type	Weight of unit [kg]				
	Without coils	With electric post heater	With LPHW post heater	With WCO module	With DX module
	With electric pre-heater				
HRFL2-040	70	75	75	96	94
HRFL2-070	90	95	95	122	120
HRFL2-150	165	170	170	202	200
HRFL2-200	240	245	245	283	280

Unit Type	Weight of external cooling module [kg]	
	WCO module	DX module
HRFL2-040	26	24
HRFL2-070	32	30
HRFL2-150	37	35
HRFL2-200	43	40

## 11. PACKAGED DIMENSIONS AND WEIGHTS

### Units

Unit Type	Height [mm]	Width [mm]	Length [mm]	Weight [kg]	Number of Pallets
HRFL-040	640	1000	1545	+20	1
HRFL-070	640	1380	1810	+30	1
HRFL-150	725	1650	1950	+35	1
HRFL-200	800	1950	2250	+45	1

### External cooling module

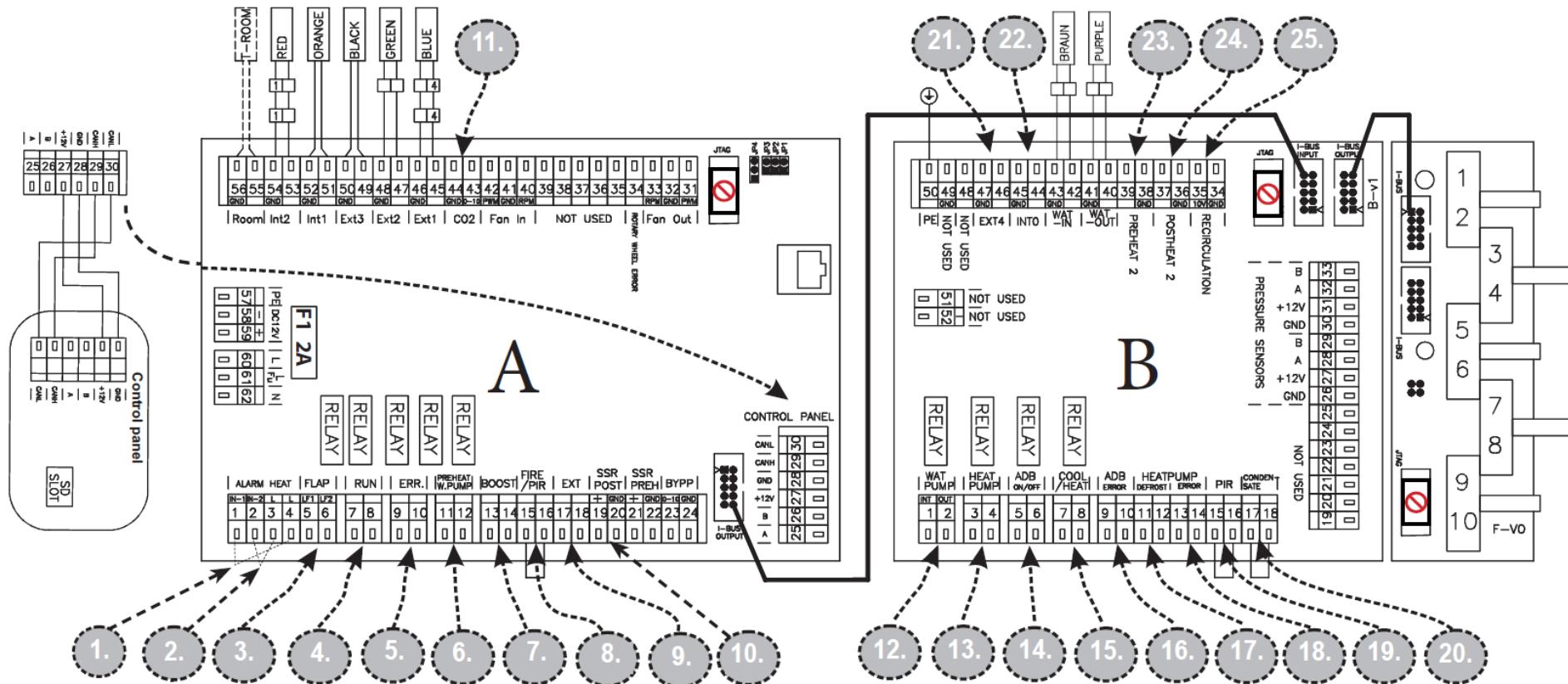
Unit Type	Height [mm]	Width [mm]	Length [mm]	Weight [kg]	Number of Pallets
HRFL-040	688	858	620	+20	1
HRFL-070	688	858	620	+20	1
HRFL-150	688	858	620	+20	1
HRFL-200	688	998	640	+20	1



### PLEASE NOTE:

- All dimensions are in mm unless otherwise stated
- Packaging weight is to be added to the relevant unit or module weight

## 12. GENERIC WIRING DIAGRAM





TERMINAL		DESCRIPTION
3	A (5-6)	LF1 – INLET DAMPER (output L – open, 230V/2A AC) LF2 – OUTLET DAMPER (output L- open, 230V/2A AC)
4	A (7-8)	RUN CONTACT (output - NO/NC (settable), maximum load 230VAC / 2A)
5	A (9-10)	ERROR CONTACT (output NO, maximum load 230VAC / 2A)
7	A (13-14)	BOOST CONTACT (input NO, volt free)
8	A (15-16)	FIRE CONTACT (input NC, volt free)
9	A (17-18)	EXTERNAL CONTROL ON/OFF (input NC, maximum load 230VAC / 2A)
10	A (19,20)	POST-HEATER MODULATION (output 0-10V OR PWM)
11	A (43-44)	AQS SENSOR 0-10V (input 0-10V)

TERMINAL		DESCRIPTION
13	B (3-4)	HEAT PUMP CONTROL (output - ON/OFF, maximum load 230VAC / 2A)
15	B (7-8)	HEAT PUMP COOL / HEAT settable (CO = NC/NO - DX = settable, volt free)
17	B (11-12)	HEAT PUMP DEFROST settable (input NC/NO(settable), volt free)
18	B (13-14)	HEAT PUMP ERROR settable (input NC/NO(settable), volt free)
19	B (15-16)	PIR MOTION SENSOR (input NC, volt free)
20	B (17-18)	CONDENSATE OVERFLOW (input NC, volt free)
21	B (46-47)	EXTERNAL TEMPERATURE SENSOR (external post-heater – input, EXT-4, NTC 10K)
22	B (44-45)	EXTERNAL TEMPERATURE SENSOR (external pre-heater – input, INT-0, NTC 10K)
23	B (38-39)	EXTERNAL PRE-HEATER MODULATION (output 0-10V)
24	B (36-37)	EXTERNAL POST-HEATER MODULATION (output 0-10V)

 PLEASE NOTE:

- This wiring diagram is provided purely as an example, actual wiring diagram will be provided at the time the equipment is ordered

### 13. CODING KEY

HRFL2	Product Type	HRFL2	-	040	H	P	CB	E	75	-	X	S0	S	-	0A3
-	Separator														
040		040													
070		070													
150	Product Size	150													
200		200													
H	Installation	Horizontal/Ceiling Void													
P	Access (1)	Left													
CB	Heat Recovery	Counter flow PHE with Bypass													
E	Fans	EC Fans													
75	Filtration	Supply: F7, Exhaust: M5													
-	Separator														
X	Pre-Heater	None													
E		Electric													
S0		None													
E1	Post Heater	Electric													
V1		LPHW													
S	Controls	Superior													
-	Separator														
0A3	Version														

PLEASE NOTE:

(1) Access side is determined by facing away from the supply airflow. Always confirm unit handing and the positioning of the connections before ordering.

## 14. ACCESSORIES

All Therm-X units are available with a wide range of mechanical and control accessories to facilitate installation and enhance the product functionality.

### 14.1. EXTERNAL DUCT MOUNTED COOLING MODULE

External heating/cooling module for HRFL II units.

Can be fitted with a water changeover (WCO) or direct expansion (DX) coil.

The module includes integral air and water temperature sensors with flying leads for connection to the unit control panel.

Unit Type	Water Changeover Module Order Reference	Direct Expansion Module Order Reference
HRFL2-040	MOFL1-040HX00000-XC3X-0A3	MOFL1-040HX00000-XD3X-0A3
HRFL2-070	MOFL1-040HX00000-XC3X-0A3	MOFL1-040HX00000-XD3X-0A3
HRFL2-150	MOFL1-040HX00000-XC3X-0A3	MOFL1-040HX00000-XD3X-0A3
HRFL2-200	MOFL1-040HX00000-XC3X-0A3	MOFL1-040HX00000-XD3X-0A3

PLEASE NOTE:

- Valve and actuator kits are not included
- This accessory is supplied loose for fitting and wiring on site by others
- This accessory is supplied with all the mechanical and electrical fixings required for its installation
- For additional information please consult the *Therm-X MVHRU Accessories Technical Manual*

### 14.2. DUCT TRANSITIONS

Galvanized transition piece from rectangular to circular ducting. Can be easily installed in the unit through the use of the factory fitted nut inserts on the unit connections.



Unit Type	Transition Order Reference
HRFL2-040	HRB-PR-01
HRFL2-070	HRB-PR-02
HRFL2-150	HRB-PR-03
HRFL2-200	HRB-PR-04

PLEASE NOTE:

- Fittings not included
- For additional information please consult the *Therm-X MVHRU Accessories Technical Manual*

#### 14.3. MOTORIZED RECTANGULAR SHUT-OFF DAMPERS

The **MLKR/S** rectangular damper can be unit or duct mounted to allow automatic shutting of the atmospheric inlet/outlet in order to prevent drafts when the unit is not in operation.

The flanged damper frame is manufactured of galvanized steel. The blades are manufactured of aluminium.

The dampers are provided with an Open/Close, 230V AC, no spring return actuator suitable for internal installation.

The actuator drive comprises of a steel base and a plastic housing.



Unit Type	Rectangular Shut Off Damper Order Reference	Damper Actuator Order Reference
HRFL2-040	MLKR/S-250150	LM230A
HRFL2-070	MLKR/S-300200	
HRFL2-150	MLKR/S-500250	
HRFL2-200	MLKR/S-600300	

**PLEASE NOTE:**

- Power and control for a damper actuator can be provided from the Therm-X unit control panel (230V AC or 24V DC)
- Damper and actuator are supplied loose for fitting and wiring on site by others
- Not suitable for external installation without additional weather protection
- For additional information please consult the **Therm-X MVHCU Accessories Technical Manual**

#### 14.4. MOTORIZED CIRCULAR SHUT-OFF DAMPERS

The **KRTK** circular damper can be duct mounted to allow automatic shutting off the ventilation system and prevent drafts when the unit is not in operation.



The damper housing is manufactured of galvanized steel.

The dampers are provided with an Open/Close, 230V AC, no spring return actuator suitable for internal installation.

The damper may also be operated with the manual control lever.

Unit Type	Circular Shut-Off Damper Order Reference	Damper Actuator Order Reference
HRFL2-040	KRTK-A-200	LM230A
HRFL2-070	KRTK-A-250	
HRFL2-150	KRTK-A-315	
HRFL2-200	KRTK-A-400	

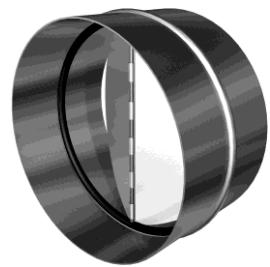
**PLEASE NOTE:**

- Power and control for a damper actuator can be provided from the Therm-X unit control panel (230V AC or 24V DC)
- Damper and actuator are supplied loose for fitting and wiring on site by others
- Not suitable for external installation without additional weather protection
- For additional information please consult the **Therm-X MVHCU Accessories Technical Manual**

#### 14.5. CIRCULAR BACKDRAFT DAMPERS

The **RSKR-Z** damper duct mounted to allow automatic shutting of the atmospheric inlet/outlet in order to prevent drafts when the unit is not in operation.

The damper manufactured of galvanized steel with an internal rubber gasket.



Unit Type	Backdraft Damper Order Reference
<b>HRFL2-040</b>	RSKR-Z200
<b>HRFL2-070</b>	RSKR-Z250
<b>HRFL2-150</b>	RSKR-Z315
<b>HRFL2-200</b>	RSKR-Z400

**PLEASE NOTE:**

- For additional information please consult the *Therm-X MVHRU Accessories Technical Manual*

#### 14.6. CIRCULAR DUCT ATTENUATORS

The **SPTGLX** and **SPTGLP** circular sound attenuator is designed for reducing the noise propagated through the HVAC ducting connected to the unit.

The attenuator comes in 2 standard lengths of 600mm and 900mm respectively and can be fitted with central pods with aerodynamic fairings.



The double skinned housing is manufactured of pre-galvanized steel and is fitted with male spigots with integral seal.

The attenuator and the optional pods contain a sound absorbent infill that is encapsulated with glass cloth and plain/perforated steel.

All attenuators are manufactured in accordance with the DW 144 specification for medium pressure Class B ductwork.

Unit Type	Attenuator Order Reference			
	No pods		With pods	
	0.6m	0.9m	0.6m	0.9m
<b>HRFL2-040</b>	SPTGLX-0,6-200	SPTGLX-0,9-200	NOT AVAILABLE	NOT AVAILABLE
<b>HRFL2-070</b>	SPTGLX-0,6-250	SPTGLX-0,9-250	SPTGLP-0,6-250	SPTGLP-0,9-250
<b>HRFL2-150</b>	SPTGLX-0,6-315	SPTGLX-0,9-315	SPTGLP-0,6-315	SPTGLP-0,9-315
<b>HRFL2-200</b>	SPTGLX-0,6-400	SPTGLX-0,9-400	SPTGLP-0,6-400	SPTGLP-0,9-400



#### PLEASE NOTE:

- Attenuators supplied loose for installation on site by others
- Bespoke sizes available on request
- Attenuators suitable for external ducted installation
- For additional information please consult the **Therm-X MVH RU Accessories Technical Manual**

#### 14.7. RECTANGULAR DUCT ATTENUATORS

The **SPTREC**, **SPTBRL** and **SPTBUD** rectangular straight or bend sound attenuator is designed for reducing the noise propagated through the HVAC ducting connected to the unit. The attenuator comes in 3 standard lengths of 900mm, 1200mm and 1500mm respectively.

The 25mm deep double skinned housing is manufactured of pre-galvanized steel with stiffened internals and proprietary flanges.

The splitters and side linings contain a sound absorbent infill that is encapsulated with glass cloth and plain/perforated steel. The splitters have an aerodynamic fairing at each end.

All attenuators are manufactured in accordance with the DW 144 specification for medium pressure Class B ductwork.

##### Straight

Unit Type	Attenuator Order Reference		
	0.9m	1.2m	1.5m
<b>HRFL2-040</b>	SPTREC-250x150x900	SPTREC-250x150x1200	SPTREC-250x150x1500
<b>HRFL2-070</b>	SPTREC-300x200x900	SPTREC-300x200x1200	SPTREC-300x200x1500
<b>HRFL2-150</b>	SPTREC-500x250x900	SPTREC-500x250x1200	SPTREC-500x250x1500
<b>HRFL2-200</b>	SPTREC-600x300x900	SPTREC-600x300x1200	SPTREC-600x300x1500

##### Bend Right-Left

Unit Type	Attenuator Order Reference		
	0.9m	1.2m	1.5m
<b>HRFL2-040</b>	SPTBLR-250x150x900	SPTBLR-250x150x1200	SPTBLR-250x150x1500
<b>HRFL2-070</b>	SPTBLR-300x200x900	SPTBLR-300x200x1200	SPTBLR-300x200x1500
<b>HRFL2-150</b>	SPTBLR-500x250x900	SPTBLR-500x250x1200	SPTBLR-500x250x1500
<b>HRFL2-200</b>	SPTBLR-600x300x900	SPTBLR-600x300x1200	SPTBLR-600x300x1500

##### Bend Up-Down

Unit Type	Attenuator Order Reference		
	0.9m	1.2m	1.5m
<b>HRFL2-040</b>	SPTBUD-250x150x900	SPTBUD-250x150x1200	SPTBUD-250x150x1500
<b>HRFL2-070</b>	SPTBUD-300x200x900	SPTBUD-300x200x1200	SPTBUD-300x200x1500
<b>HRFL2-150</b>	SPTBUD-500x250x900	SPTBUD-500x250x1200	SPTBUD-500x250x1500
<b>HRFL2-200</b>	SPTBUD-600x300x900	SPTBUD-600x300x1200	SPTBUD-600x300x1500

##### PLEASE NOTE:

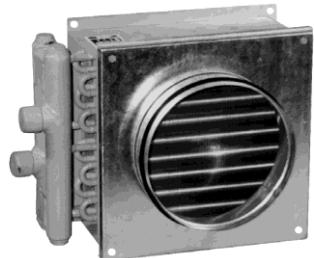
- Attenuators supplied loose for installation on site by others
- Bespoke sizes available on request
- Attenuators suitable for external ducted installation
- For additional information please consult the **Therm-X MVHGU Accessories Technical Manual**

#### 14.8. LPHW DUCT HEATERS

The **VOK-01** water heater is designed for heating or re-heating the supply air in HVAC systems.

It can be used for pre-heating or re-heating air from the Therm-X unit's heat recovery device when the optional in-built heater capacity is not sufficient to achieve the required temperature or when closer temperature control of the room is required.

The heater frame is made of galvanized steel with copper tubes and aluminium fins.



To detect the temperature of the air a temperature sensor for duct installation is provided with the heater.

Unit Type	Heater Order Reference
ALL	BESPOKE



##### PLEASE NOTE:

- The water coil is designed for the maximum operating water temperature of +100°C and maximum operating pressure of 16bar
- The heater is supplied loose for fitting on site by others
- The heater is supplied as a standalone product and requires a valve and actuator as well as an external control system to operate it
- Valve and actuator kits are not included
- The duct temperature sensor supplied with the heater must be installed downstream by others to allow the Therm-X unit or other controller to modulate the heater
- It is possible to control the coil valve through the Therm-X control panel in certain scenarios, contact our office for more information
- For additional information please consult the *Therm-X MVHRU Accessories Technical Manual*

#### 14.9. ELECTRIC DUCT HEATERS

The **EOKO2** electric duct mounted heater is designed for heating or re-heating the supply air in HVAC systems.

It can be used for pre-heating or re-heating air from the Therm-X unit's heat recovery device when the optional in-built heater capacity is not sufficient to achieve the required temperature or when closer temperature control of the room is required.



The heater is manufactured of galvanized steel and open coil electric heating elements. The electric IP rating of the cabling housing of the heater is IP 20.

The heater is supplied with fully integral control panel with 7 digit display to adjust the desired set temperature.

To detect the temperature of the air a temperature sensor for duct installation is provided with the heater.

Unit Type	Heater Order Reference
<b>HRFL2-040</b>	EOKO2-200-3,6-3-D
<b>HRFL2-070</b>	EOKO2-250-4,5-3-D
<b>HRFL2-150</b>	EOKO2-315-6,0-3-D
<b>HRFL2-200</b>	EOKO2-400-9,0-3-D



 PLEASE NOTE:

- The heater is supplied as a standalone product
- Heater supplied loose for fitting and wiring on site by others
- Power and control to the heater must be provided by an external source
- The Therm-X integral control panel is capable of modulating the heater output and guarantees that it only operates when airflow is present. It also ensures the heater is cooled down when the unit is turned off. All other emergency and safety functions (minimum airflow, high temp limit, etc...) must be ensured by an external control system.
- A duct temperature sensor supplied with the heater must be installed downstream by others to allow the Therm-X unit or other controller to modulate the heater
- It is possible to control the heater from the Therm-X unit controller in certain scenarios, contact our office for more information
- Heater not suitable for external installation
- For additional information please consult the *Therm-X MVHRU Accessories Technical Manual*

#### 14.10. CONDENSATE TRAP

Condensate trap with integral foul air infiltration prevention system for installation recessed or flush mounted on the wall.

The trap cover is transparent for easy monitoring of the water level.



Unit Type	Trap Order Reference
ALL	SK-HL138

**PLEASE NOTE:**

- Use of a condensate trap is only recommended where gravity assisted condensate collection is achievable
- Accessory is supplied loose for fitting on site by others
- Pipework not included
- For additional information please consult the *Therm-X MVHRU Accessories Technical Manual*

#### 14.11. CONDENSATE PUMP

Condensate pump kit for connection with the Therm-X units.

Includes pump body, reservoir with floating sensor, support bracket for installation on the unit and rubber bend for condensate outlet connection.



Unit Type	Pump Order Reference
ALL	CERP-MAXI-ORANGE

**PLEASE NOTE:**

- Use of a condensate pump is recommended where gravity assisted condensate collection is not achievable
- Accessory supplied loose for fitting and wiring on site by others
- Pipework from pump to discharge not included
- Power can be provided by the Therm-X unit control panel (230V AC)
- Pump not suitable for external installation without additional weather protection
- For additional information please consult the *Therm-X MVHRU Accessories Technical Manual*

## 14.12. AIR QUALITY SENSORS

The 0-10V output signal of these sensors can be connected to the Therm-X unit controller for modulation in the DCV mode.

### Room CO<sub>2</sub> sensor

Room sensor for measurement of the CO<sub>2</sub> concentration on ventilated spaces.



### Duct CO<sub>2</sub> sensor

Duct CO<sub>2</sub> sensor for measurement of the CO<sub>2</sub> concentration on the return ductwork.

The elegant, compact housing enables easy installation directly at the ventilation duct using a mounting flange.



### Room relative humidity sensor

Room sensor for measurement of humidity on ventilated spaces.



### Duct relative humidity sensor

Duct relative humidity sensor for measurement of humidity on the return ductwork.

The sensor has an analogue voltage output 0-10V, corresponding to the range of relative air humidity 0-100%.



Unit Type	Sensor Order Reference			
	Room CO2	Duct CO2	Room RH	Duct RH
ALL	22RTM-19-1	22DC-11	22RTH-19-1	22DTH-11M



### PLEASE NOTE:

- Sensors are supplied loose for fitting and wiring on site by others
- Cabling not included, use of shielded cable for wiring is recommended
- All sensors suitable for 24V DC power supply
- Power can provided by the Therm-X unit control panel (24V DC)
- The Therm-X unit is able to operate based on the input from a single air quality sensor (multiple sensors not supported)
- Additional sensors can be connected with the use of an external system, contact our offices for details
- Sensors not suitable for external installation without additional weather protection
- For additional information please consult the **Therm-X MVHCU Accessories Technical Manual**

#### 14.13. MOTION SENSOR

Room passive infrared motion sensor for occupancy detection. When something enters into the controlled space, this sensor detects heat emission from bodies and switches the contacts on or off.

The sensor can be connected to the Therm-X unit controller turning the unit on or off accordingly.

The sensor has a detection range of 12 meters at an 90° angle and can be mounted on walls or installed in corners. It's possible to switch the light emission diodes (LED) on/off.



Lower boundary of mass sensing is 25 kilos.

Unit Type	Sensor Order Reference
ALL	CI-PS 1003

PLEASE NOTE:

- Sensor supplied loose for wiring and fitting on site
- Cabling not included, use of shielded cable for wiring is recommended
- All sensors suitable for 24V DC power supply
- Power can provided by the Therm-X unit control panel (24V DC)
- Sensors not suitable for external installation without additional weather protection
- For additional information please consult the *Therm-X MVHRU Accessories Technical Manual*

#### 14.14. SPARE FILTERS

Spare filters of the same manufacture as those installed on the unit.

Unit Type	Filter Order Reference		
	Filter class M5 (ePM <sub>10</sub> 70%)	Filter class F7 (ePM <sub>2.5</sub> 65%)	Filter class F9 (ePM <sub>2.5</sub> 80%)
HRFL2-040	FILTR-HRFL2-040 M5	FILTR-HRFL2-040 F7	FILTR-HRFL2-040 F9
HRFL2-070	FILTR-HRFL2-070 M5	FILTR-HRFL2-070 F7	FILTR-HRFL2-070 F9
HRFL2-150	FILTR-HRFL2-150 M5	FILTR-HRFL2-150 F7	FILTR-HRFL2-150 F9
HRFL2-200	FILTR-HRFL2-200 M5	FILTR-HRFL2-200 F7	FILTR-HRFL2-200 F9

PLEASE NOTE:

- Filters supplied loose for installation on site by others

## 14.15. VALVES AND ACTUATORS

A range of 2-way, 3-way and PIC valves for internal and external installation is available. Please contact our offices for additional information.



### Chilled or Hot Water Coil

Unit Type	Order Reference			
	CCV 2 Way 2 Port Valve & Actuator Kit (Internal)	CCV 3 Way 3 Port Valve & Actuator Kit (Internal)	CCV 2 Way 2 Port Valve & Actuator Kit (External)	CCV 3 Way 3 Port Valve & Actuator Kit (External)
HRFL2-040	VALVEKIT22-3/4-I	VALVEKIT33-3/4-I	VALVEKIT22-3/4-E	VALVEKIT33-3/4-E
HRFL2-070	VALVEKIT22-3/4-I	VALVEKIT33-3/4-I	VALVEKIT22-3/4-E	VALVEKIT33-3/4-E
HRFL2-150	VALVEKIT22-3/4-I	VALVEKIT33-3/4-I	VALVEKIT22-3/4-E	VALVEKIT33-3/4-E
HRFL2-200	VALVEKIT22-3/4-I	VALVEKIT33-3/4-I	VALVEKIT22-3/4-E	VALVEKIT33-3/4-E

Unit Type	Order Reference	
	EPIV Kit (Internal)	EPIV Kit (Internal)
HRFL2-040	VALVEKITEPIV-3/4-I	VALVEKITEPIV-3/4-E
HRFL2-070	VALVEKITEPIV-3/4-I	VALVEKITEPIV-3/4-E
HRFL2-150	VALVEKITEPIV-3/4-I	VALVEKITEPIV-3/4-E
HRFL2-200	VALVEKITEPIV-3/4-I	VALVEKITEPIV-3/4-E

## 14.16. MATCHED DX SYSTEMS

A range of outdoor heat pump units is available. Please consult the *Therm-X MVHRU Accessories Technical Manual* and contact our offices for additional information.



## 15. SPECIFICATION

### Therm-X HRFL II MVHR Unit Specification

#### 1. Construction

- 1.1. The unit shall generally comprise of an accessible enclosure, high efficient counter flow plate heat exchanger equipped with face & bypass dampers, condensate tray, supply & extract fans, supply & extract filters, optional integral electric pre heating coil and/or electric or water post heating coil and integral plug & play controls.
- 1.2. The unit shall be supplied as a single piece assembly.
- 1.3. The casing shall be erected from a self-supporting frameless construction, built from double skinned, nominal 30mm deep galvanized sandwich panels manufactured from 0.8mm thick uncoated hot dip galvanized steel. The bottom panels shall be finished with a powder coat paint in RAL 9010.
- 1.4. The panels shall form a rigid enclosure with smooth, crevice free surfaces, reinforced internally to achieve an outstanding casing rigidity and mechanical strength.
- 1.5. The panels shall be packed with high density Rockwool ( $88\text{kg.m}^{-3}$ ) with excellent thermal and acoustic performance ( $\lambda_D=0.041 \text{ W.m}^{-1}\text{K}^{-1}$ ) and fire resistance class A1 to 13501-1 + A1: 2009 - non-combustible.
- 1.6. To avoid external air leakage both fixed and access panels shall be sealed with high tightness, VDI6022 compliant, EPDM closed cell gasket

#### 2. Installation

- 2.1. The units shall be suitable for internal installation by suspension on the false ceiling in a dry indoor environment at an ambient temperature ranging from +5 to +40°C for ventilation of air that is free of heavy dust, grease, hazardous chemicals or other abrasive pollutants with temperature ranging from -15°C (-20°C with electric pre heating coil) up to +60°C and a maximum relative humidity up to 90%.
- 2.2. The unit shall be supplied, as standard, with factory mounted support brackets equipped with anti-vibration mounts to allow quick and reliable installation.

### 3. Access and maintenance

- 3.1. Access to all the unit compartments shall be available through the bottom tool operated access panels as standard.
- 3.2. All the access panels shall be fully removable allowing access to the fan, filter and ancillary coil sections and providing access for periodic inspection.
- 3.3. Handles shall be provided on all access panels to facilitate handling during maintenance operations.
- 3.4. The control panel shall be mounted on an externally accessible sealed box on the external surface of the unit casing.

### 4. Fans

- 4.1. The unit shall be supplied with high performance supply and extract, single inlet plug fans.
- 4.2. The impellers shall be manufactured with continuously welded backward curved aluminium blades.
- 4.3. The fans shall be directly driven by low energy consumption IE4 electronically commutated (EC) motors.
- 4.4. The assembly shall be statically and dynamically balanced as per DIN / ISO 1940 to balancing grade G 6.3.
- 4.5. The fan assembly is installed on a highly rigid galvanized support structure and fitted with an aerodynamically optimized galvanized inlet.
- 4.6. The fan shall comply with the efficiency requirements of regulation 327/211 of the Eco-design directive for fans.
- 4.7. The motor insulation shall be Class 'B', rated IP 54 (acc. to EN 60529) and meet all relevant EMC directives and requirements.

### 5. Filters

- 5.1. Filtration shall be provided by means of compact, low pressure drop, synthetic media filters mounted in a plastic frame.
- 5.2. Grade of filtration according to BS EN779:2012 shall be class F7 (ePM<sub>2.5</sub> 65%) on supply and M5 (ePM<sub>10</sub> 70%) on extract.
- 5.3. An F9 (ePM<sub>2.5</sub> 80%) grade filter of the same characteristics shall be optionally available.
- 5.4. The filters shall be mounted on slides for easy removal and tightly sealed against the rails to ensure reduced filter bypass leakage.

## 6. Counter flow plate heat exchanger

- 6.1. The unit shall be equipped with highly efficient counter flow air to air plate heat exchanger, exceeding the 2018 requirements of regulation 1253/2014 of the Eco-design directive for ventilation units.
- 6.2. The heat exchanger finned area and casing shall be manufactured from high thermal transmittance and corrosion resistant aluminium.
- 6.3. The exchanger shall be Eurovent certified and fully tested to EN308:1997 with low internal leakage (<0,5% @ 250 Pa).
- 6.4. The heat exchanger shall be provided with fully modulating face and by-pass dampers.
- 6.5. The heat recovery section shall also be equipped with fully removable, epoxy coated, galvanized condensate tray fitted with a 18mm OD drain connection for condensate collection and disposal.
- 6.6. The condensate tray shall be equipped with a liquid level sensing mechanism to avoid overflow of the condensate tray.
- 6.7. A pumped drainage system shall be offered, as an option, with all units.
- 6.8. To minimize noise and prolong working life the condensate pump shall be equipped with a liquid sensing mechanism so it operates only when there is condensate to pump and an alarm system unit stops operation in the event of a pump failure or condensate overflow risk.
- 6.9. Where the depth of ceiling void allows, an alternative gravity assisted condensate drainage system shall be available as an option.

## 7. Optional features

- 7.1. The unit shall be optionally available with integral electrical pre-heating coil or post-heating coil.
  - 7.1.1. The electric heaters shall be manufactured with open coil heating elements and galvanized casing.
  - 7.1.2. The heater shall be complete with fully modulating SCR control (0-10V) to regulate the heat output from 0 to 100% and 2 stages of overheat protection (automatic and manual reset), integral to the unit's control logic.
- 7.2. The units shall be optionally available with integral LPHW post-heating coil.
  - 7.2.1. LPHW coils shall be manufactured with aluminium fins, copper tubes and assembled on a corrosion resistant galvanized casing.
  - 7.2.2. The maximum operating pressure of the LPHW coils shall be 16bar and the maximum operating temperature 130°C.
  - 7.2.3. The heating output shall be automatically modulated by use of the in-built temperature sensors and the integral unit controls.

**7.3.** The unit shall be optionally available with water changeover coil (WCO) or reverse cycle direct expansion (DX) coils to allow cooling and/or heating operation. A plastic droplet eliminator shall be installed in the coil and the coil section shall be equipped with a fully removable, epoxy coated, galvanized condensate tray fitted with a 22mm OD drain connection for condensate collection and disposal.

**7.3.1.** Water changeover coils shall be manufactured of aluminium fins with hydrophilic treatment, copper tubes and assembled on a corrosion resistant galvanized casing.

**7.3.2.** The maximum operating pressure of the water changeover coils shall be 16bar and the maximum operating temperature 130°C.

**7.3.3.** Direct expansion coils shall be manufactured of aluminium fins with hydrophilic treatment, copper tubes and assembled on a corrosion resistant galvanized casing.

**7.3.4.** The test pressure of the direct expansion coils shall be 46bar.

**7.4.** The heating and cooling output shall be automatically modulated by the in-built temperature sensors and the integral unit controls. The changeover between heating and cooling mode shall be automatically managed by the unit controls.

## **8. Testing and compliance**

**8.1.** Performance shall be tested to ISO 5801:2007 Industrial fans -- Performance testing using standardized airways.

**8.2.** Casing radiated noise acoustically tested to BS EN 3744 - Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for an essentially free field over a reflecting plane.

Published figures shall be for a non-punctiform source and spherical propagation as described in ISO 3744.

**8.3.** In duct noise shall be acoustically tested to BS EN ISO 5136 - Acoustics - Determination of sound power radiated into a duct by fans and other air-moving devices - In-duct method.

**8.4.** Heat recovery efficiency shall be tested to EN 308 - Heat exchangers - Test procedures for establishing performance of air to air and flue gases heat recovery devices.

**8.5.** The units shall be compliant with Part L of the Building Regulations 2010 and the requirements of the Eco-design directive for 2018.

**8.6.** Testing tolerances in accordance with COMMISSION REGULATION (EU) No 1253/2014 are as follows:

- SFPint – Declared value x 1.07
- Thermal Efficiency – Declared value x 0.93
- Sound power levels – Declared value + 5 dB

## 9. Controls

- 9.1.** The units shall be equipped with a factory fitted, fully integral intelligent control package to provide control of the ventilation output, supply and room temperature and indoor air quality.
- 9.2.** The factory fitted controls shall include temperature sensors (fresh, supply and return air), antifreeze sensor (extract air), digital pressure sensors for the filters, fans and supply duct, water/refrigerant temperature sensors (only versions with water or direct expansion coils) and all the required electrics and electronic parts including the mains switch isolator. A condensate level sensor shall be fitted in every condensate drain tray.
- 9.3.** The unit shall be supplied, as standard, with a wired handheld controller with full RGB touchscreen to allow easy commissioning and operation and a room temperature sensor for installation in the conditioned space. The unit controls shall allow for up to 2 controllers to be connected simultaneously.
- 9.4.** The handheld controller shall provide basic functionality for the end user and enhanced functionality for commissioning and service. The controller shall have a bootloader functionality to provide easy replacement of the controller firmware and copying settings across similar units.
- 9.5.** The unit controls shall allow continuous flow rate modulation of the airflow range of the unit from 0 to 100% in 10% steps.
- 9.6.** The unit shall be able to operate as standard in CAV (Constant Air Volume) mode supplying a constant volume of air independently of internal or external pressure changes.
- 9.7.** The unit shall be capable to operate as standard in VAV (Variable Air Volume) mode supplying a variable airflow volume according to the pressure changes on the supply ductwork.
- 9.8.** The unit shall be capable to operate in DCV (Demand Controlled Ventilation) mode supplying a variable airflow volume provided the installation of an external IAQ sensor connected to the unit. The unit shall be able to optionally turn OFF to save energy when the IAQ requirements are satisfied, turning back ON regularly to check the concentration of pollutants and resume the DCV operation.
- 9.9.** The unit shall be capable to adjust the ratio of the supply and extract airflows providing balanced or unbalanced ventilation to the conditioned space.
- 9.10.** The unit shall be able to operate in FIRE emergency mode activated via interlock with the BMS fire emergency system.
- 9.11.** The unit shall be able to operate in TRICKLE MODE, provided installation of a motion PIR (Passive Infrared Sensor) connected to the unit. In this mode the unit shall be able to provide background ventilation when no occupancy is detected on the room.

**9.12.** The unit shall be able to operate in BOOST MODE overriding the unit operating settings via the handheld controller or an external contact. This mode shall also be available when the unit is on standby.

**9.13.** The unit shall be able to operate in a TIME SCHEDULING mode on a weekly and yearly regime. The user shall be able to define up to 6 time blocks per day and/or 6 date blocks per year with specific settings for each time block.

**9.14.** The unit shall be able to control the conditioned space temperature based on a set-point temperature strategy by use of the integral temperature sensors (supply or return air) or an external room temperature sensor. The output of the heat recovery and integral heaters or coolers (if installed) shall be continuously modulated to match the set-point temperature on the handheld controller.

**9.15.** The unit shall automatically control the recuperative exchanger efficiency by regulating the face and bypass dampers position.

**9.16.** When the conditions for free cooling are favourable (e.g. summer night ventilation) the unit fully open the bypass damper in order to utilise the colder outside air and save on space cooling – this strategy shall also be available when the unit is in standby.

**9.17.** The unit shall provide a frost protection logic for the plate heat exchanger – this shall be achieved by maintaining the exhaust air temperature above freeze point by either modulating the electric pre-heating coil if installed or reducing the PHE supply airflow (by using bypass).

**9.18.** When an electric post heating coil is installed the output of the heater shall be continuously controlled to match the pre-set temperature on the controller.

**9.19.** The unit shall provide an overheat protection logic for the electric heaters – this shall be achieved by the integral automatic and manual re-sets installed on the control panel. The unit shall provide indication of the overheating error on the handheld controller.

**9.20.** When a LPHW or water changeover post heating coil is installed the unit shall output a 0-10 V signal for analogue valve actuation to control the water flow across the coil.

**9.21.** When a water changeover coil is installed the unit shall be able to automatically detect the heating or cooling requirement by measuring the temperature of the inlet water into the coil.

**9.22.** The unit shall be able to maintain the supply air temperature between the minimum and maximum defined on the handheld controller to prevent supply of overheated or overcooled air to the conditioned space.

**9.23.** The unit shall include a water coil frost protection logic – this shall be achieved by maintaining the air inlet temperature to the coil above freezing point by modulating the electric pre heating coil if installed or by stopping the unit operation in the event of freeze risk.

**9.24.** The unit shall provide condensate overflow protection via the condensate level sensor. The operation of the unit shall be stopped if there is risk of the condensate tray overflowing.

- 9.25.** The controls shall include alarm signalisation whenever a failure of fan, filter or sensor occurs. Emergency overheating alarms shall also be available for the electric heaters if installed. The alarms shall be displayed on the handheld controller and provide information about the cause of the error.
- 9.26.** The unit controls shall allow individual testing of each component to facilitate isolation of faults.
- 9.27.** The unit shall provide an external enable/disable, error and run signalisation relay contacts.
- 9.28.** The unit shall provide automatic calibration of the fans and filters in order to facilitate commissioning.
- 9.29.** The unit shall provide continuous monitoring of the filters dirtiness and inform the user when the filter requires replacement.
- 9.30.** The unit shall provide BMS integration via Modbus RTU RS485, Modbus TCP/IP and BACNET TCP/IP protocol allowing full control and monitoring of the unit.
- 9.31.** The unit shall provide soft start-up and memory of the last operating status in the event of a power failure.
- 9.32.** The unit shall provide end user access protection with PIN access code. Different levels of protection shall be available.
- 9.33.** The unit shall provide automatic Winter/Summer time switch.
- 9.34.** The unit shall be able to control external fresh and exhaust air shut-off dampers. The dampers shall be normally open when the unit is operating and closed when the unit is not in operation to avoid outside air drafts into the conditioned space.
- 9.35.** The unit shall be able to control a second external pre heating coil – either electric or water – via a 0-10V signal.
- 9.36.** The unit shall be able to control a second external pre heating coil – either electric, water or direct expansion – via a 0-10V signal.
- 9.37.** The unit shall be able to control an heat pump either through ON/OFF or 0-10V operation and provide an enable, error and defrost inputs/outputs.

## 10. Ancillaries

- 10.1.** The units shall be compatible with a range of ancillaries for facilitated installation and control.
- 10.2.** The specification for each ancillary shall be provided by the MVHR manufacturer.



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