



# Lindab Residential Heat Recovery Counterflow - **RHR-CF**

Technical guide

# Lindab Inside

Residential ventilation by Lindab



# Contents

|  |  |                       |
|--|--|-----------------------|
|  | General features   | 2                     |
|  | The range  | 7                     |
|  | Fast unit selection  | 8                     |
| VERTICAL VERSION   | Dimensions and weight  | 10                    |
|  | Wall installation  | 12                    |
|  | Floor installation   | 13                    |
|  | RHR-CF-V PRO version with automatic air flow control             | 14                    |
|  | RHR-CF-V Standard version with programmed timing profile control | 15                    |
|  | Construction features of the main components                     | 16                    |
|  | Modes  | 18                    |
|  | Thermal performance  | 19                    |
|  | Efficiency curves  | 20                    |
|  | HORIZONTAL VERSION   | Dimensions and weight |
| Installation   |  | 28                    |
| RHR-CF-H PRO version with automatic air flow control           |  | 29                    |
| Construction features of the main components                   |  | 30                    |
| Modes  |  | 32                    |
| Thermal performance  |  | 34                    |
| Efficiency curves  |  | 35                    |
| Selection procedure  |  | 36                    |
| Free-cooling and Free-heating management                       |  | 39                    |
| Control panel  |  | 40                    |
| Centralised control  |  | 42                    |
| Versions with integrated electric heaters                      |  | 43                    |
| Accessories  |  | 44                    |
| Table of compliance with Regulations EU 1253/14 and EU 1254/14 |  | 47                    |

## GENERAL FEATURES



RHR-CF-V Unit

**The Residential Heat Recovery Counterflow units RHR-CF are high efficiency ventilation units with heat recovery and are designed for residential ambiances.**

The units replace the exhaust air of indoor environments with filtered air coming from the outside thanks to a special high efficiency F7 class filter<sup>1</sup>.

The hexagonal counterflow heat recovery unit prevents any winter heat drops due to the introduction of fresh air, thereby recovering up to 92.5%<sup>2</sup> of the extracted heat and conveying it to the clean air introduced in the occupied environment.

Each unit is also equipped with an average efficiency filter <sup>3</sup> (M5) installed on the inlet of the extraction section to prevent any dust from getting into the equipment.

**All Residential Heat Recovery Counterflow units RHR-CF comply with the 2018 efficiency limits imposed by Regulation 1253/14.**

As well as the type of installation, the range can also be classified according to the type of control:

- **PRO unit** with automatic centralised control via humidity probe:  
RHR-CF-V PRO (vertical)  
RHR-CF-H PRO (horizontal)
- **Standard unit** with time programming control:  
RHR-CF-V (vertical)

RHR-CF-V PRO and RHR-CF-V units are designed for vertical wall installation or, with the addition of feet, floor installation. Instead, RHR-CF-H PRO units are ideal for both horizontal ceiling installation and vertical wall installation.

The width of the RHR-CF-V PRO and RHR-CF-V units is such as to ensure easy insertion into modular kitchen components, since the width is less than 600 mm.

<sup>1</sup> F7 filtering efficiency compliant with Standard EN 779/2012  
<sup>2</sup> Thermal efficiency compliant with Regulation EU 1253/2014  
<sup>3</sup> M5 filtering efficiency compliant with Standard EN 779/2012

**The PRO Versions are available in class A + while the Standard versions are in Class A. Both are equipped with high efficiency backward-curved blades and EC motors**, driven by the integrated inverter control board for variable speed control.

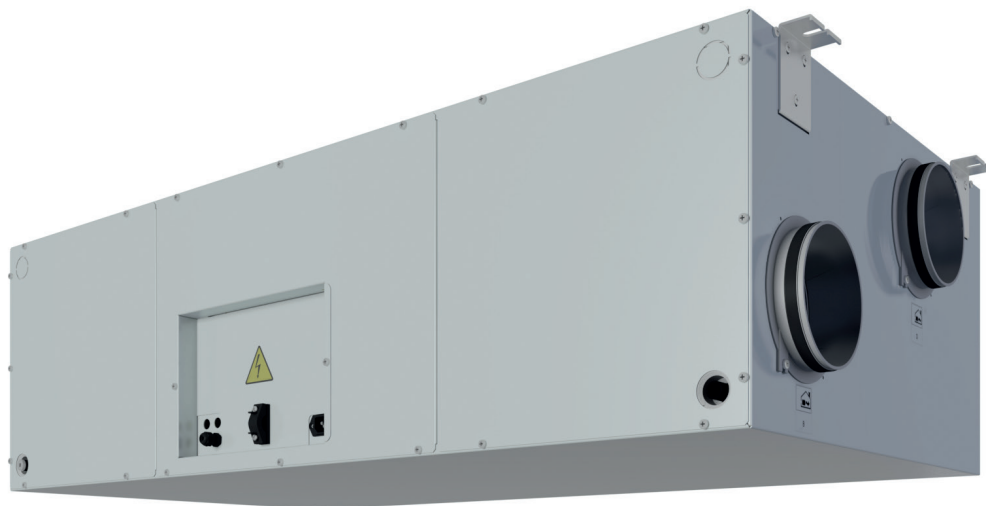
All units have a remote control user interface (T-EP control), which can be wall-mounted for RHR-CF-H PRO units, integrated in the inspection cover of RHR-CF-V PRO and RHR-CF-V units; for the latter, it is also possible to disconnect the interface from the inspection cover and place it on the wall using a special cable.

**The PRO versions are equipped with an automatic centralised air flow control system operated by an integrated humidity sensor** located in the extracted air duct. If the humidity of the indoor environment exceeds the reference parameters, to prevent the proliferation of mould and pathogenic bacteria, the fresh air flow is increased with the aim of restoring a healthy humidity level. The control also prevents from dropping below excessively low humidity levels, thus preventing excessively dry conditions inside the environments and, as a result, any health hazards.

The units are NOT able, by themselves, to lower the level of internal humidity to a value below that of the outdoor humidity.

The centralised automatic control can also work in response to CO<sub>2</sub> measurements; in this case, it is recommended to connect a 0-10V CO<sub>2</sub> sensor to the main control board.

For more details about the centralised control, please refer to the chapter on p. 40.



RHR-CF-H 170 PRO Units

## GENERAL FEATURES

The units with automatic control via humidity or CO<sub>2</sub> sensor can enable the “AUTO” mode. In this mode, the fan speed is controlled by an automatic control cycle relating to internal instantaneous humidity and CO<sub>2</sub> variations. In variable-flow automatic control mode, the user can still intervene at any time by changing the fan speed manually as required.

The automatic mode will be restored at the next significant variation of ambient humidity or concentration of CO<sub>2</sub>.

In the event that the user does not require automatic control but just simply time programming or even manual control, standard units are ideal. There is a choice of 8 weekly programs for these units: 4 preset programs and 4 free programs that can be modified as required.

Nominal flow rate or minimum flow rate (Holiday) operation can be selected in various intervals of the day. At any time, the user may force the programming manually, which will resume at the beginning of the next time interval.

In manual mode, in addition to the nominal speed, **there are 3 default speeds equal to 70%, 45%, and 25% of the project flow rate.** The timed intensive ventilation modes can be activated via the user interface (“Party” mode) or via a remote switch located in a particular room (“Booster” mode).

**The T-EP** control also has many advanced features, which are accessible from specific technical menus.

It is also possible to connect the main board to certain external switches with the following characteristics:

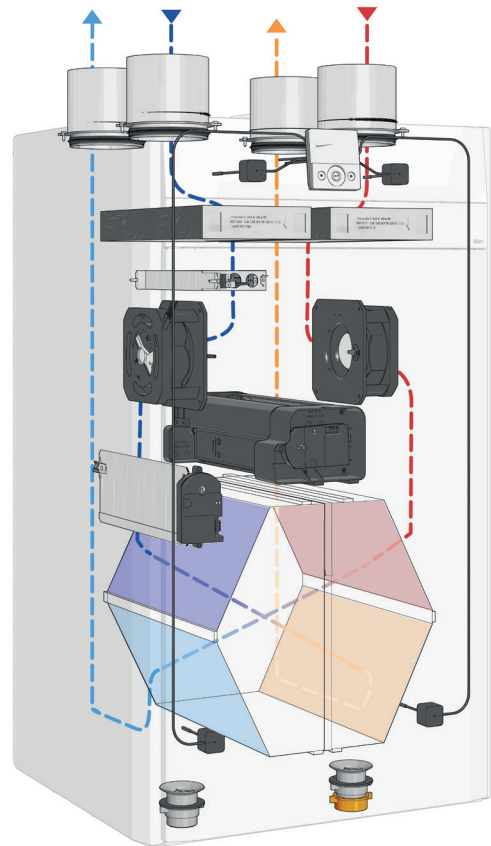
- remote ON/OFF function
- “Booster” mode remote activation
- connection to a differential negative pressure switch in the event of simultaneous operation between the ventilation unit and an atmospheric fireplace or a manual timer switch in the event that the unit must support the start-up of an atmospheric boiler



**All the units are equipped with an automatic bypass system** that totally disables use of the heat recovery unit to permit 100% **free-cooling** (or **free-heating**). The system is controlled by logic subject to the feedback of the embedded temperature sensors.

Also, the units have the following integrated control logic:

- The mass supply flow defined by the user is kept constant in all outdoor climatic conditions.
- The extraction flow is kept at a constant balancing percentage compared to the air supply flow, in order to preserve the desired overpressure or negative pressure for all operating conditions.



When installing the units in homes located in regions

with particularly harsh climatic conditions<sup>4</sup>, we recommend installing the units with integrated filament electric resistances (E versions), where the thermal power is continuously modulated to maintain exhaust air at the desired temperature, preventing freezing.

For all models, it is possible to use an external antifreeze coil, with continuous modulation or ON/OFF, as an accessory.

To prevent excessive efficiency drops due to filter clogging, it is recommended to replace the filters at the end of the recommended period (usually every 6 months). The increase in filter dirt in fact leads to increased fan rotation resistance, causing a significant drop in flow rates. With regard to RHR-CF-V units, the automatic constant flow control system, which prevents any drops in flow rates due to filter clogging, is available as an accessory. In this case, filter clogging may result in a significant increase in power consumption of the fans.

**If the flows need to be inverted, all units are reversible during installation.**

For each model, a complete set of accessories is also available to meet any installation need.

<sup>4</sup> Minimum outdoor temperature below -10°C





## THE RANGE

### Vertical version with integrated/wall mounted T-EP control

#### PRO Version

| Version                        | Model               | Max flow at 100 Pa (m <sup>3</sup> /h) | Energy class | Width (mm) | Humidity sensor | Automatic flow rate control |
|--------------------------------|---------------------|--|--------------|------------|-----------------|-----------------------------|
| PRO                            | RHR-CF-V 180 PRO    | 180                                    | A+           | 600        | ✓               | ✓                           |
|                                | RHR-CF-V 280 PRO    | 280                                    | A+           | 600        | ✓               | ✓                           |
|                                | RHR-CF-V 370 PRO    | 370                                    | A+           | 660        | ✓               | ✓                           |
|                                | RHR-CF-V 460 PRO    | 460                                    | A            | 660        | ✓               | ✓                           |
| PRO with left electric heater  | RHR-CF-V 180 PRO EL | 180                                    | A+           | 600        | ✓               | ✓                           |
|                                | RHR-CF-V 280 PRO EL | 280                                    | A+           | 600        | ✓               | ✓                           |
|                                | RHR-CF-V 370 PRO EL | 370                                    | A+           | 660        | ✓               | ✓                           |
|                                | RHR-CF-V 460 PRO EL | 460                                    | A            | 660        | ✓               | ✓                           |
| PRO with right electric heater | RHR-CF-V 180 PRO ER | 180                                    | A+           | 600        | ✓               | ✓                           |
|                                | RHR-CF-V 280 PRO ER | 280                                    | A+           | 600        | ✓               | ✓                           |
|                                | RHR-CF-V 370 PRO ER | 370                                    | A+           | 660        | ✓               | ✓                           |
|                                | RHR-CF-V 460 PRO ER | 460                                    | A            | 660        | ✓               | ✓                           |

#### Standard version

| Version                             | Model           | Max flow at 100 Pa (m <sup>3</sup> /h) | Energy class | Width (mm) | Humidity sensor | Automatic flow rate control |
|-------------------------------------|-----------------|--|--------------|------------|-----------------|-----------------------------|
| Standard                            | RHR-CF-V 170    | 170                                    | A            | 550        | (*)             | (**)                        |
|                                     | RHR-CF-V 270    | 270                                    | A            | 550        | (*)             | (**)                        |
|                                     | RHR-CF-V 360    | 360                                    | A            | 550        | (*)             | (**)                        |
|                                     | RHR-CF-V 460    | 460                                    | A            | 660        | (*)             | (**)                        |
| Standard with left electric heater  | RHR-CF-V 170 EL | 170                                    | A            | 550        | (*)             | (**)                        |
|                                     | RHR-CF-V 270 EL | 270                                    | A            | 550        | (*)             | (**)                        |
|                                     | RHR-CF-V 360 EL | 360                                    | A            | 550        | (*)             | (**)                        |
|                                     | RHR-CF-V 460 EL | 460                                    | A            | 660        | (*)             | (**)                        |
| Standard with right electric heater | RHR-CF-V 170 ER | 170                                    | A            | 550        | (*)             | (**)                        |
|                                     | RHR-CF-V 270 ER | 270                                    | A            | 550        | (*)             | (**)                        |
|                                     | RHR-CF-V 360 ER | 360                                    | A            | 550        | (*)             | (**)                        |
|                                     | RHR-CF-V 460 ER | 460                                    | A            | 660        | (*)             | (**)                        |

### Horizontal and vertical version with wall-mounted T-EP control

| Version                        | Model               | Max flow at 100 Pa (m <sup>3</sup> /h) | Energy class | Height (mm) | Humidity sensor | Automatic flow rate control |
|--------------------------------|---------------------|--|--------------|-------------|-----------------|-----------------------------|
| PRO                            | RHR-CF-H 170 PRO    | 170                                    | A+           | 330         | ✓               | Not available               |
| PRO with left electric heater  | RHR-CF-H 170 PRO EL | 170                                    | A+           | 330         | ✓               | Not available               |
| PRO with right electric heater | RHR-CF-H 170 PRO ER | 170                                    | A+           | 330         | ✓               | Not available               |

(\*) The humidity sensor is available as an accessory.

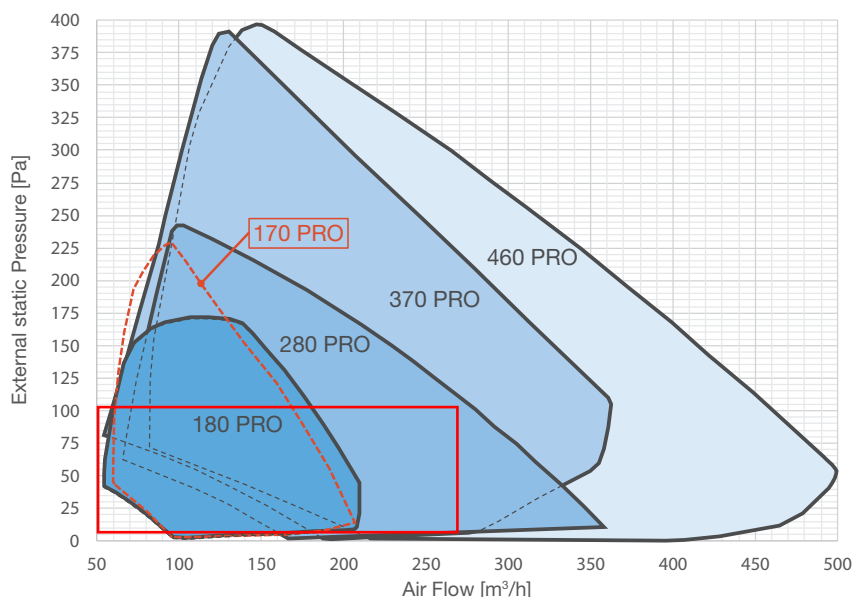
(\*\*) The pressure transducer for automatic flow rate control is available as an accessory.

## FAST UNIT SELECTION

Residential Heat Recovery CounterFlow units RHR-CF are suitable for operation in balanced or slightly unbalanced flow and return conditions. They ensure residential air exchange, recovering the heat from the extracted air and conveying it to the clean air.

The chart below shows the recommended operating ranges in terms of volumetric supply air flow rate at standard conditions and available external static pressure.

### RHR-CF-V PRO and RHR-CF-H PRO version



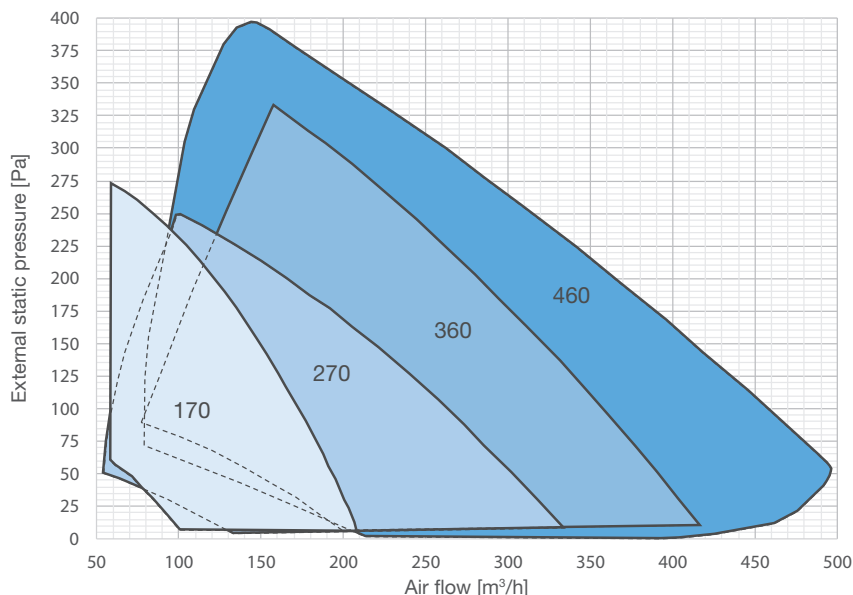
|                      | RHR-CF-V 180 PRO | RHR-CF-V 280 PRO | RHR-CF-V 370 PRO | RHR-CF-V 460 PRO | RHR-CF-H 170 PRO |
|----------------------|------------------|------------------|------------------|------------------|------------------|
| $Q_{max}$ [m³/h]     | 180              | 280              | 370              | 460              | 170              |
| $Q_{ref}$ [m³/h]     | 130              | 200              | 260              | 320              | 120              |
| $P_{el}$ [W]         | 23               | 35               | 47               | 76               | 23               |
| $\eta_{t_{rvu}}$ [%] | 91.5%            | 91.4%            | 92.5%            | 88.6%            | 92.1%            |
| SPI [W/m³/h]         | 0.174            | 0.174            | 0.179            | 0.237            | 0.193            |
| CTRL                 | 0.85             | 0.85             | 0.85             | 0.85             | 0.85             |
| SEC [kWh/m²a]        | -42.32           | -42.29           | -42.47           | -40.10           | -42.05           |
| Energy class         | A+               | A+               | A+               | A                | A+               |
| Filter efficiency    | F7 / M5          | F7 / M5          | F7 / M5          | F7 / M5          | F7 / M5          |
| $L_{WA}$ [dBa]       | 38.9             | 43.1             | 46.3             | 47.9             | 44.9             |
| $LK_I$ [%]           | 1.2%             | 0.7%             | 0.5%             | 0.3%             | 0.5%             |
| $LK_E$ [%]           | 1.7%             | 1.0%             | 0.8%             | 0.7%             | 2.3%             |
| HEP [W]              | 500              | 900              | 1250             | 1600             | 600              |

**LEGEND** | all terms must be considered in compliance with Standard EU 1253/2014

|                  |  |            |  |
|------------------|--|------------|--|
| $Q_{max}$        | Maximum flow rate, at max motor speed and external static pressure of 100 Pa | <b>SEC</b> | Specific energy consumption                      |
| $Q_{ref}$        | Reference flow rate - 70% of $Q_{max}$                                       | $L_{WA}$   | Sound power level emitted by structure           |
| $P_{el}$         | Power supply at $Q_{ref}$ and external static pressure of 50Pa               | $LK_I$     | Internal leakage at 100 Pa compared to $Q_{ref}$ |
| $\eta_{t_{rvu}}$ | Thermal efficiency at $Q_{ref}$  | $LK_E$     | External leakage at 250 Pa compared to $Q_{ref}$ |
| SPI              | Specific power input   | <b>HEP</b> | Pre-heater power (only mod. EL and ER)           |
| CTRL             | Control factor - Centralised automatic control                               |            |  |

## FAST UNIT SELECTION

### RHR-CF-V Standard version



|                   |           | RHR-CF-V 170 | RHR-CF-V 270 | RHR-CF-V 360 | RHR-CF-V 460 |
|-------------------|-----------|--------------|--------------|--------------|--------------|
| $Q_{max}$         | [m³/h]    | 170          | 270          | 360          | 460          |
| $Q_{ref}$         | [m³/h]    | 120          | 190          | 250          | 320          |
| $P_{el}$          | [W]       | 22           | 35           | 53           | 76           |
| $\eta_{t\_rvu}$   | [%]       | 87.0%        | 86.5%        | 90.1%        | 88.6%        |
| SPI               | [W/m³/h]  | 0.183        | 0.184        | 0.209        | 0.237        |
| CTRL              | -         | 0.95         | 0.95         | 0.95         | 0.95         |
| SEC               | [kWh/m²a] | -39.4        | -39.3        | -39.6        | -38.4        |
| Energy class      |           | A            | A            | A            | A            |
| Filter efficiency |           | F7 / M5      | F7 / M5      | F7 / M5      | F7 / M5      |
| $L_{WA}$          | [dBa]     | 40.6         | 46.6         | 49.0         | 47.9         |
| $LK_i$            | [%]       | 0.4%         | 0.4%         | 0.7%         | 0.3%         |
| $LK_E$            | [%]       | 1.8%         | 1.4%         | 2.7%         | 0.7%         |
| HEP               | [W]       | 500          | 900          | 1250         | 1600         |

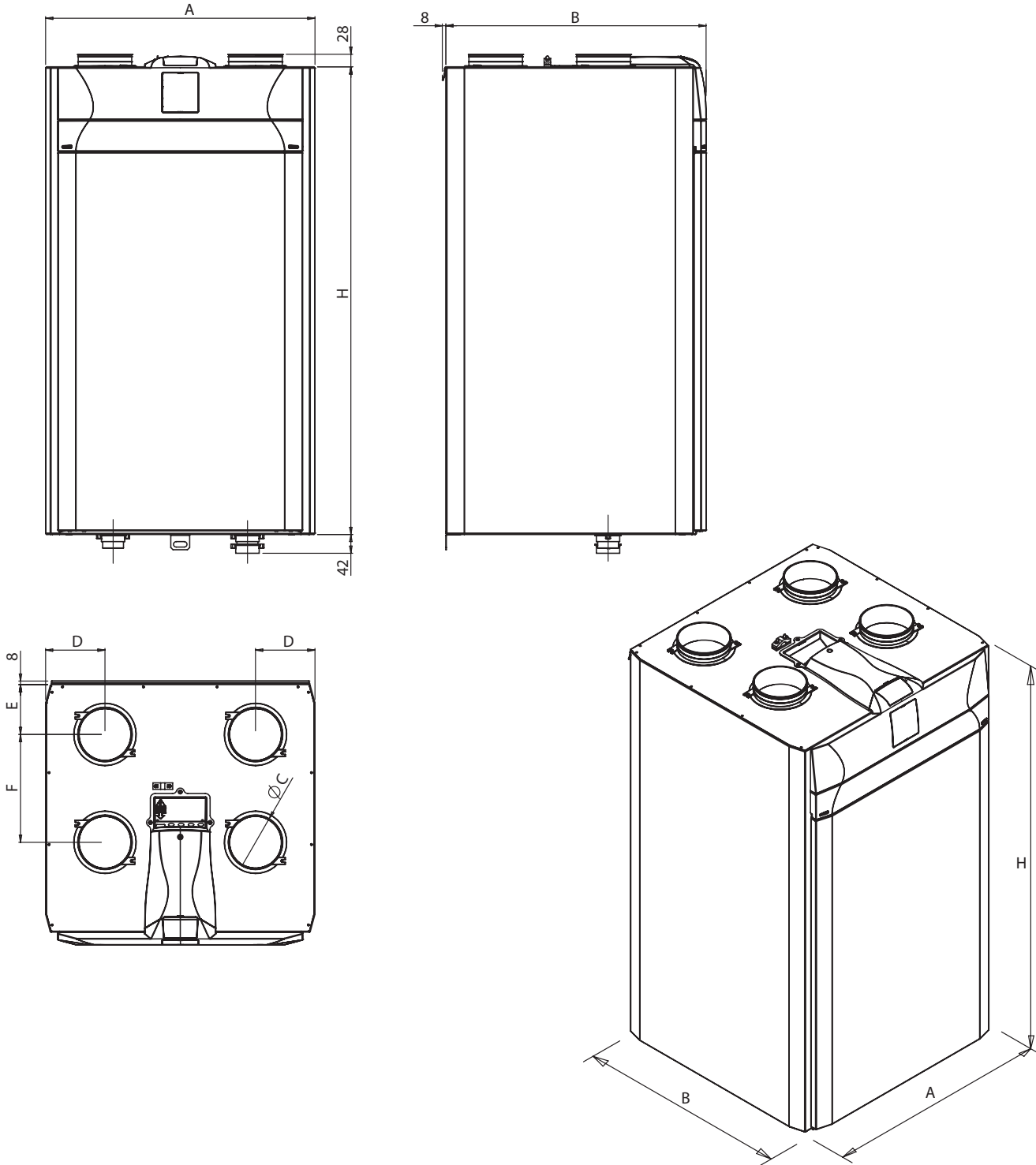
**LEGEND** | all terms must be considered in compliance with Standard EU 1253/2014

|                                   |  |                            |  |
|-----------------------------------|--|----------------------------|--|
| <b><math>Q_{max}</math></b>       | Maximum flow rate, at max motor speed and external static pressure of 100 Pa | <b>SEC</b>                 | Specific energy consumption                      |
| <b><math>Q_{ref}</math></b>       | Reference flow rate - 70% of $Q_{max}$                                       | <b><math>L_{WA}</math></b> | Sound power level emitted by structure           |
| <b><math>P_{el}</math></b>        | Power supply at $Q_{ref}$ and external static pressure of 50Pa               | <b><math>LK_i</math></b>   | Internal leakage at 100 Pa compared to $Q_{ref}$ |
| <b><math>\eta_{t\_rvu}</math></b> | Thermal efficiency at $Q_{ref}$  | <b><math>LK_E</math></b>   | External leakage at 250 Pa compared to $Q_{ref}$ |
| <b>SPI</b>                        | Specific power input   | <b>HEP</b>                 | Pre-heater power (only mod. EL and ER)           |
| <b>CTRL</b>                       | Control factor - Centralised automatic control                               |                            |  |

## DIMENSIONS AND WEIGHT

### RHR-CF-V PRO version

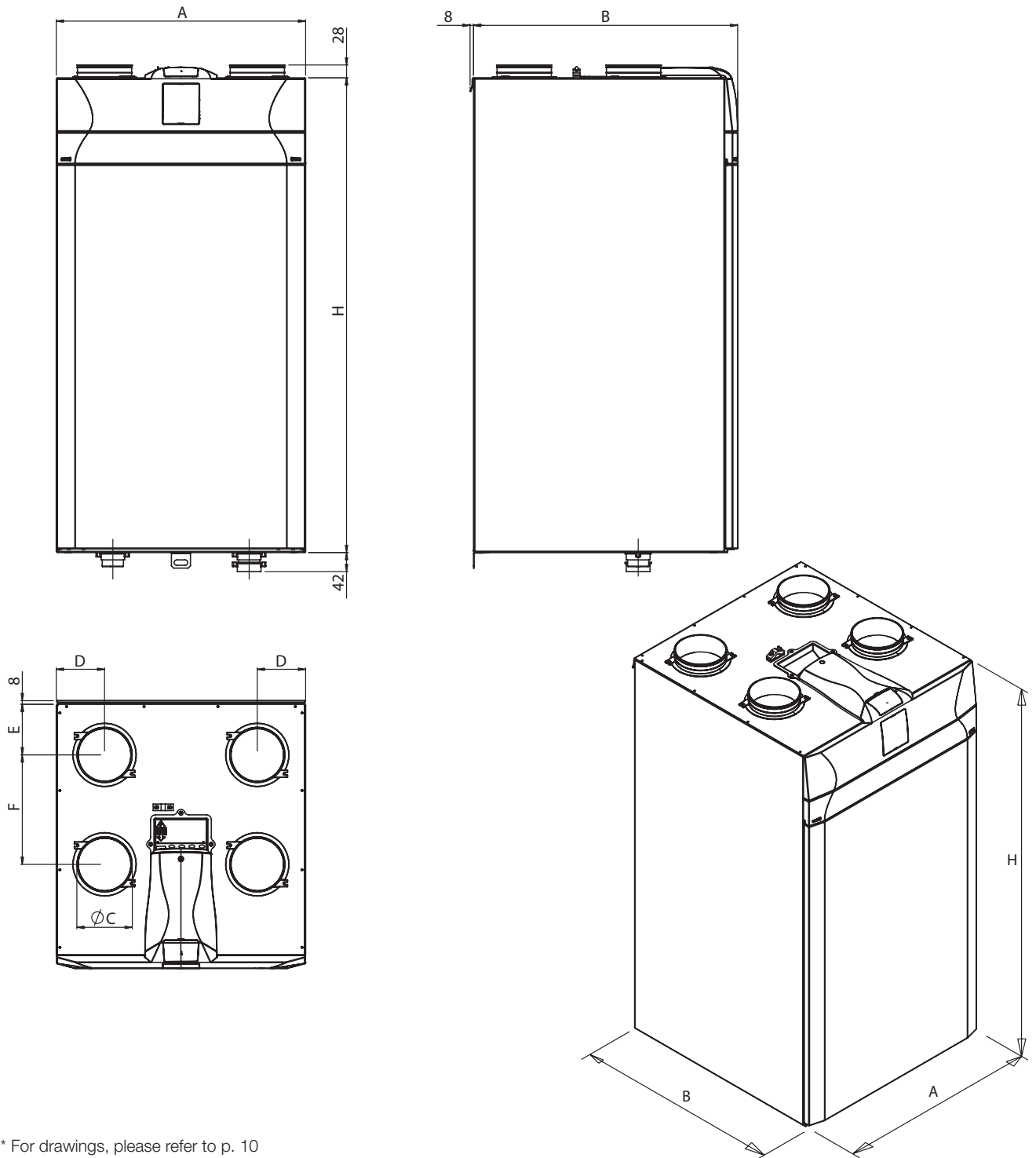
All PRO Versions are equipped with a humidity sensor and automatic flow rate calibration system; the units are also equipped with panels with insulating features that ensure a reduction in sound emissions in the environment.



| Model            | A   | B   | Ø C | H    | D   | E   | F   | Weight with packaging | Weight without packaging |
|------------------|-----|-----|-----|------|-----|-----|-----|-----------------------|--------------------------|
| RHR-CF-V 180 PRO | 600 | 580 | 125 | 1041 | 132 | 111 | 240 | 63 kg                 | 47 kg                    |
| RHR-CF-V 280 PRO | 600 | 630 | 160 | 1041 | 132 | 111 | 290 | 67 kg                 | 51 kg                    |
| RHR-CF-V 370 PRO | 660 | 680 | 160 | 980  | 147 | 126 | 305 | 75 kg                 | 56 kg                    |
| RHR-CF-V 460 PRO | 660 | 680 | 180 | 980  | 147 | 126 | 305 | 75 kg                 | 59 kg                    |

## DIMENSIONS AND WEIGHT

### RHR-CF-V Standard version



\* For drawings, please refer to p. 10

| Model         | A   | B   | Ø C | H    | D   | E    | F     | Weight with packaging | Weight without packaging |
|---------------|-----|-----|-----|------|-----|------|-------|-----------------------|--------------------------|
| RHR-CF-V 170  | 547 | 505 | 125 | 1041 | 106 | 93.5 | 212.5 | 56 kg                 | 40 kg                    |
| RHR-CF-V 270  | 547 | 580 | 160 | 1041 | 106 | 111  | 240   | 64 kg                 | 48 kg                    |
| RHR-CF-V 360  | 547 | 630 | 160 | 1041 | 106 | 111  | 290   | 66 kg                 | 50 kg                    |
| RHR-CF-V 460* | 660 | 680 | 180 | 980  | 147 | 126  | 305   | 75 kg                 | 59 kg                    |

## WALL INSTALLATION

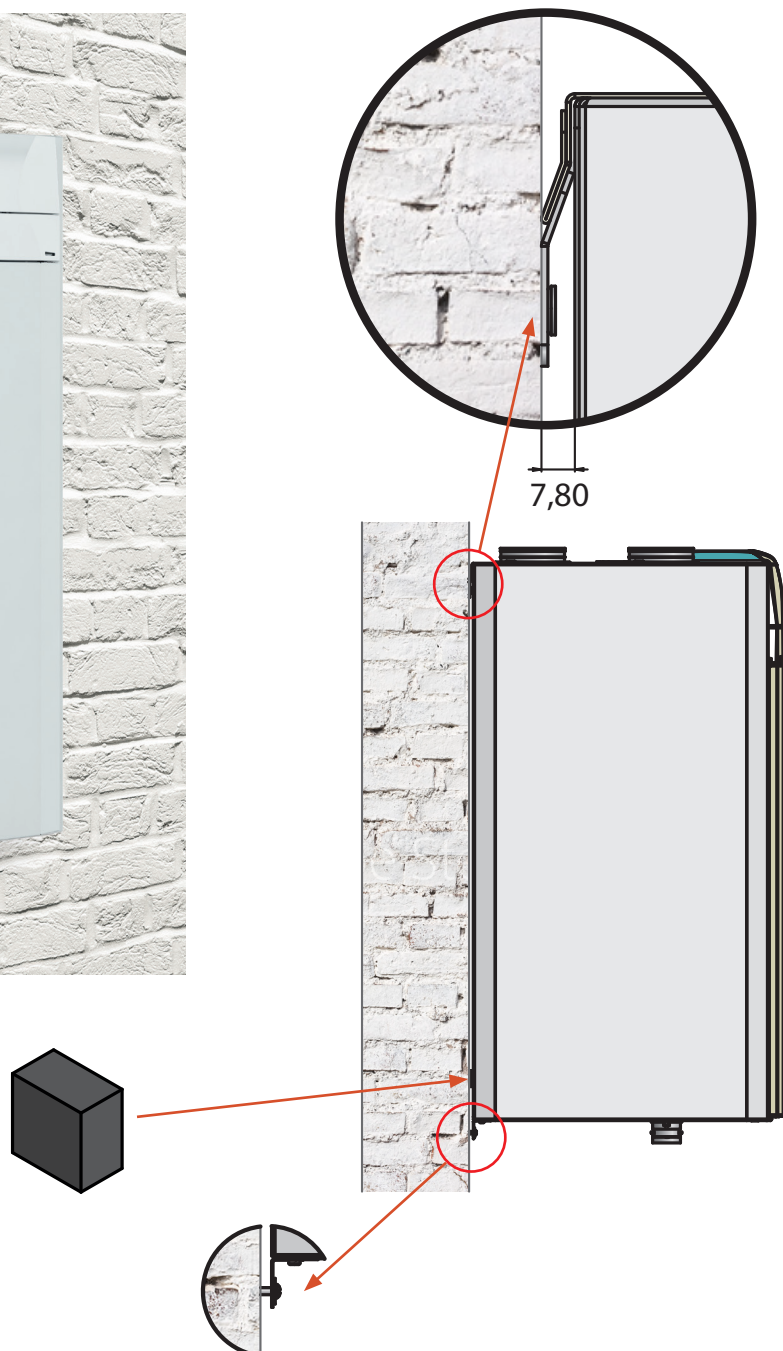
RHR-CF-V and RHR-CF-V PRO units can be easily installed on walls with the suspension brackets included in the unit. Along with the suspension brackets, an additional bracket is provided, to be placed at the bottom to further secure the unit.

The back of the unit is provided with a rubber shim to prevent impacts that could damage the system.

### General wall installation

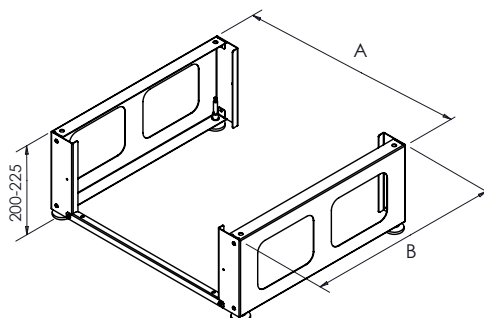
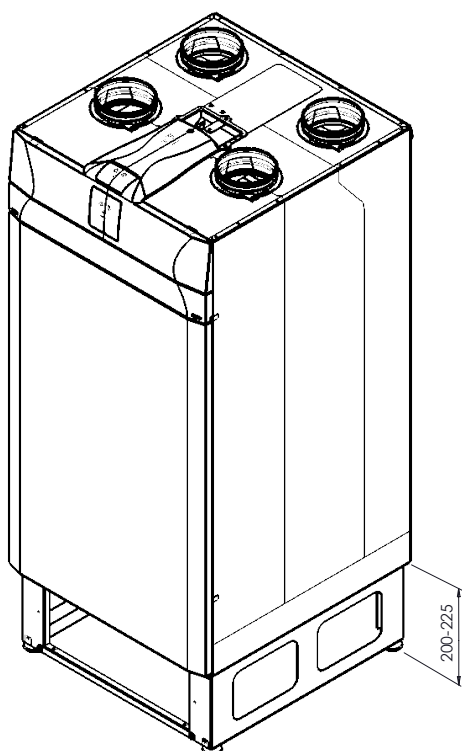
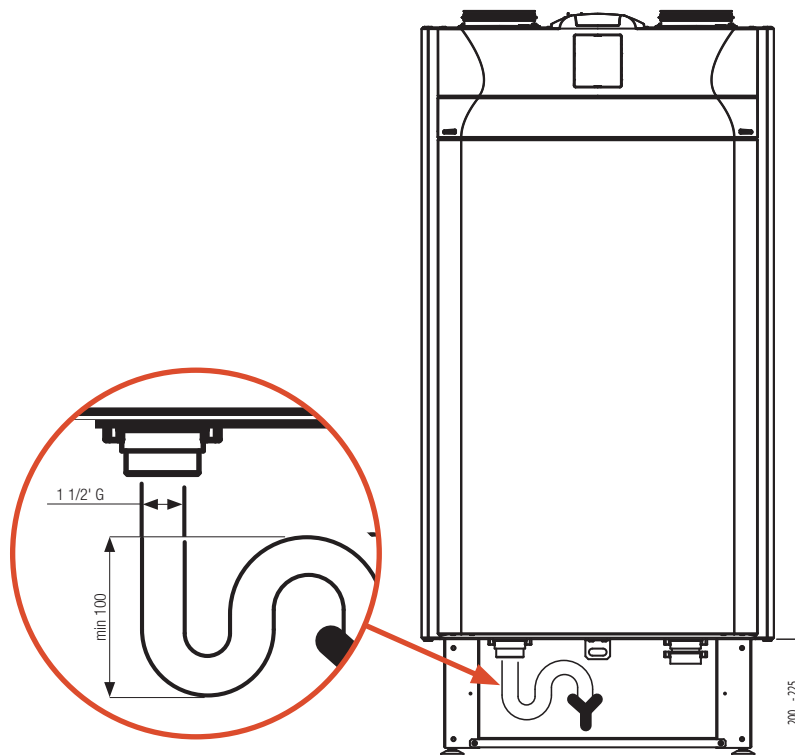


### Suspension brackets details



## FLOOR INSTALLATION

RHR-CF-V and RHR-CF-V PRO units can also be installed on the floor using the special feet, available as an accessory. It is recommended to use these feet to prevent any damage to the underside of the machine (the unit cannot be placed directly on the floor) and to install the drainage siphon. Using the feet raises the unit by about 20-23 cm from the floor. The siphon is mandatory but is not provided by Lindab.



**RHR-CF-V PRO and RHR-CF-V vertical version**

| Model            | A   | B   |
|------------------|-----|-----|
| RHR-CF-V 180 PRO | 523 | 534 |
| RHR-CF-V 280 PRO | 523 | 584 |
| RHR-CF-V 370 PRO | 583 | 634 |
| RHR-CF-V 460 PRO | 583 | 634 |
| RHR-CF-V 170     | 523 | 549 |
| RHR-CF-V 270     | 523 | 534 |
| RHR-CF-V 360     | 523 | 584 |
| RHR-CF-V 460     | 583 | 634 |

## RHR-CF-V PRO VERSION WITH ADVANCED AIR FLOW CONTROL

| Model  |                   | RHR-CF-V 180 PRO   | RHR-CF-V 280 PRO | RHR-CF-V 370 PRO  | RHR-CF-V 460 PRO |
|--|-------------------|--|------------------|---|------------------|
| Depth  | mm                | 580  | 630              | 680   | 680              |
| Width  | mm                | 600  | 600              | 660   | 660              |
| Height   | mm                | 1041   | 1041             | 980   | 980              |
| Duct connection                                      | -                 | DN125  | DN160            | DN160   | DN180            |
| Weight <sup>1</sup>                                  | kg                | 47   | 51               | 56  | 59               |
| Maximum flow rate                                    | m <sup>3</sup> /h | 180  | 280              | 370   | 460              |
| External static pressure at maximum flow rate        | Pa                | 100  | 100              | 100   | 100              |
| Reference flow rate                                  | m <sup>3</sup> /h | 130  | 200              | 260   | 320              |
| External static pressure at reference flow rate      | Pa                | 50   | 50               | 50  | 50               |
| Minimum flow rate                                    | m <sup>3</sup> /h | 50   | 70               | 50  | 90               |
| Maximum external static pressure                     | Pa                | 160  | 240              | 390   | 400              |
| Thermal efficiency at reference flow rate EN 13141-7 | %                 | 91%  | 91%              | 92%   | 89%              |
| Filtering efficiency EN779                           | -                 | F7 supply - M5 extraction  |                  |   |                  |
| Fan type   | -                 | Centrifugal with EC brushless motor and backward-curved blades   |                  |   |                  |
| Maximum power absorbed by controls and fans          | W                 | 50   | 70               | 120   | 215              |
| Maximum current absorbed by controls and fans        | A                 | 0.6  | 1.0              | 1.0   | 2.0              |
| Electric input                                       | -                 | Single phase -230 V – 50 Hz via 1.5m cable with Schuko CEE 7/7 connection  |                  |   |                  |
| Standby power  |                   | < 1 W  |                  |   |                  |
| Safety features                                      |                   | • IP protection rating: IP21   |                  | • CE <sup>2</sup> compliance  |                  |
| Components and general materials                     | -                 | <ul style="list-style-type: none"> <li>• T-EP capacitive touch pad integrated control</li> <li>• Main power board with Modbus interface</li> <li>• Main structure: Polystyrene</li> <li>• External covering: Painted galvanized steel plate</li> <li>• Plastic components: ABS</li> <li>• Acoustic insulation: Polyester fibre</li> <li>• Recovery unit: Counterflow plate heat recovery unit - PET</li> </ul> |                  | <ul style="list-style-type: none"> <li>• Fan blades and housings: PA6 in plastic, reinforced fibreglass</li> <li>• Filters: Micro-pleated type - Synthetic</li> <li>• Motorised bypass dampers:                             <ol style="list-style-type: none"> <li>1) ON/OFF - ABS</li> <li>2) ON/OFF - Steel plate</li> </ol> </li> <li>• Temperature sensors PT1000</li> <li>• Humidity Sensor Central Demand Control for Extract Air</li> <li>• Condensate Drainage 1"½ gas thread Male</li> </ul> |                  |
| Accessories  | -                 | <ul style="list-style-type: none"> <li>• Internal hot filament Defrost Electric Pre-Heater with reinforced metal lining, controlled by PWM signal</li> <li>• Feet</li> </ul>   |                  | <ul style="list-style-type: none"> <li>• External Electric Heater</li> </ul>  |                  |
| Maximum Defrost Pre-Heater power                     | W                 | 500  | 900              | 1250  | 1600             |
| Maximum electric resistance current                  | A                 | 3  | 5                | 7   | 9                |

<sup>1</sup> Without packaging

<sup>2</sup> EN 60335-1, EN 60335-2-80, EN 62233, EN 55014-1, EN 55014-2, EN 61000-3-2, EN 61000-3-3, EN 50581, Reg. 1253/14, Reg. 1254/14 (EU Directives: 2014/35/EU, 2014/30/EU, 2006/42/EC, 2011/65/EC)



## RHR-CF-V STANDARD VERSION WITH PROGRAMMED TIMING PROFILE CONTROL

| Model  |                   | RHR-CF-V 170  | RHR-CF-V 270 | RHR-CF-V 360  | RHR-CF-V 460 |
|--|-------------------|---|--------------|---|--------------|
| Depth  | mm                | 505   | 580          | 630   | 680          |
| Width  | mm                | 547   | 547          | 547   | 660          |
| Height   | mm                | 1041  | 1041         | 1041  | 980          |
| Duct connection                                      | -                 | DN125   | DN160        | DN160   | DN180        |
| Weight <sup>1</sup>                                  | kg                | 40  | 48           | 50  | 59           |
| Maximum flow rate                                    | m <sup>3</sup> /h | 170   | 270          | 360   | 460          |
| External static pressure at maximum flow rate        | Pa                | 100   | 100          | 100   | 100          |
| Reference flow rate                                  | m <sup>3</sup> /h | 120   | 190          | 250   | 320          |
| External static pressure at reference flow rate      | Pa                | 50  | 50           | 50  | 50           |
| Minimum flow rate                                    | m <sup>3</sup> /h | 60  | 70           | 90  | 90           |
| Maximum external static pressure                     | Pa                | 250   | 250          | 350   | 400          |
| Thermal efficiency at reference flow rate EN 13141-7 | %                 | 87%   | 87%          | 90%   | 89%          |
| Filtering efficiency EN779                           | -                 | F7 supply - M5 extraction   |              |   |              |
| Fan type   | -                 | Centrifugal with EC brushless motor and backward-curved blades  |              |   |              |
| Maximum power absorbed by controls and fans          | W                 | 50  | 80           | 125   | 215          |
| Maximum current absorbed by controls and fans        | A                 | 0.6   | 1.1          | 1.5   | 2.0          |
| Electric input                                       | -                 | Single phase -230 V – 50 Hz via 1.5m cable with Schuko CEE 7/7 connection   |              |   |              |
| Standby power  |                   | < 1 W   |              |   |              |
| Safety features                                      |                   | • IP protection rating: IP21  |              | • CE <sup>2</sup> compliance  |              |
| Components and general materials                     | -                 | <ul style="list-style-type: none"> <li>• T-EP capacitive touch pad integrated control</li> <li>• Main unit control board with Modbus interface</li> <li>• Main structure: Polystyrene</li> <li>• External covering and linings: Painted galvanized steel plate</li> <li>• Plastic components: ABS</li> <li>• Recovery unit: Counterflow plate heat recovery unit - PET</li> </ul> |              | <ul style="list-style-type: none"> <li>• Fan blades and housings: PA6 in plastic, reinforced fibreglass</li> <li>• Filters: Micro-pleated type - Synthetic</li> <li>• Motorised bypass dampers: <ul style="list-style-type: none"> <li>1) ON/OFF - ABS</li> <li>2) ON/OFF - Steel plate</li> </ul> </li> <li>• Temperature sensors PT1000</li> <li>• Condensate Drainage 1"½ gas thread Male</li> </ul> |              |
| Accessories  | -                 | <ul style="list-style-type: none"> <li>• Internal hot filament electric desfriesting pre-heater with reinforced metal lining, controlled by PWM signal</li> <li>• Differential pressure sensor for automatic flow rate control</li> </ul>   |              | <ul style="list-style-type: none"> <li>• External Electric Heater</li> <li>• Feet</li> <li>• Humidity sensor</li> </ul>   |              |
| Maximum Defrost Pre-Heater power                     | W                 | 500   | 900          | 1250  | 1600         |
| Maximum electric resistance current                  | A                 | 3   | 5            | 7   | 9            |

<sup>1</sup> Without packaging

<sup>2</sup> EN 60335-1, EN 60335-2-80, EN 62233, EN 55014-1, EN 55014-2, EN 61000-3-2, EN 61000-3-3, EN 50581, Reg. 1253/14, Reg. 1254/14 (EU Directives: 2014/35/EU, 2014/30/EU, 2006/42/EC, 2011/65/EC)

## CONSTRUCTION FEATURES OF THE MAIN COMPONENTS

### 1 RHR-CF-V PRO version external structure

made of hot-dip galvanised steel sheet panels painted in RAL 9003 and satin finish obtained with epoxy paint dried in oven at 180°C; the side panels are insulated with a 25 mm thick padding, while the inspection cover is completely removable and is insulated with a 30 mm thick padding.

### RHR-CF-V standard version external structure

made of hot-dip galvanised steel sheet panels painted in RAL 9003 and satin finish obtained with epoxy paint dried in oven at 180°C; the inspection cover is completely removable and is insulated with a 30 mm thick padding.

### 2 EPDM fan access closure

### 3 EPDM filter access closure

### 4 Electric defrosting pre-heater

Hot filament resistance with reinforced metal lining, controlled by PWM signal (only versions with integrated resistance).

### 5 High efficiency filters compliant with Standard EN779:2012;

The filters have the following features:

- class F7 for the supply air
- class M5 for the extracted air

### 6 ABS shanks for inlet/outlet flow connection

### 7/11 Extract air (7) and air supply (11) electric fan

consisting of:

- **Permanent single-phase** synchronous EC motor with protection against overtemperature of the motor and electronic components
- **High efficiency ABS fans** with backward-curved blades
- **ABS Motor/fan** housing

### 8 High efficiency static heat recovery unit

with PET counterflow exchange plates. The reachable efficiency obtainable may be higher than 90% because they ensure counterflow heat transfer between two air flows at different inlet temperatures. The static heat recovery units do not feature moving parts and guarantee high reliability and safe operation.

In order to increase the efficiency of the heat exchanger, the plate surfaces feature special swirlers.

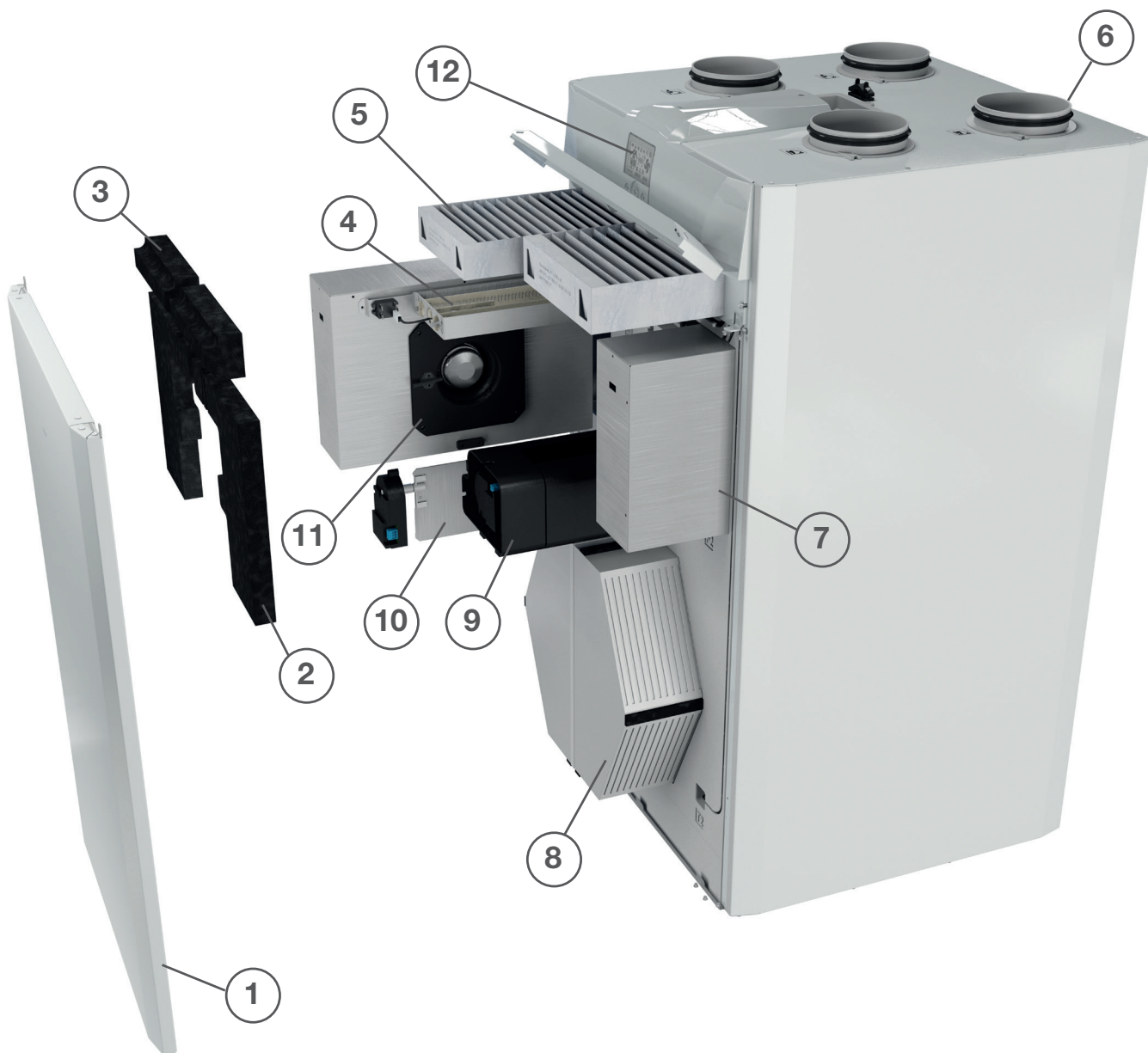
### 9 Main by-pass damper

made entirely of ABS and motorised with a Valemo actuator

### 10 Secondary by-pass damper

consisting of a steel blade and motorised with a Valemo actuator

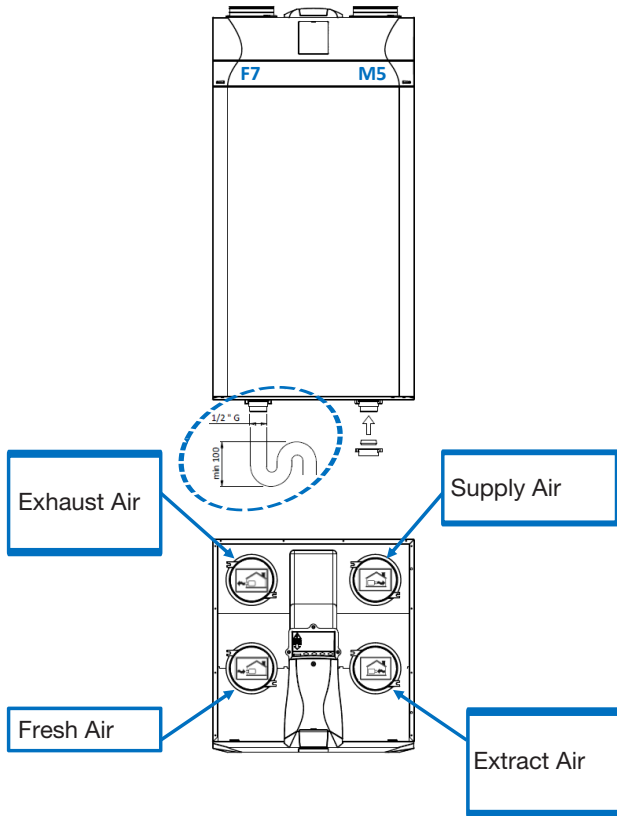
### 12 T-EP control



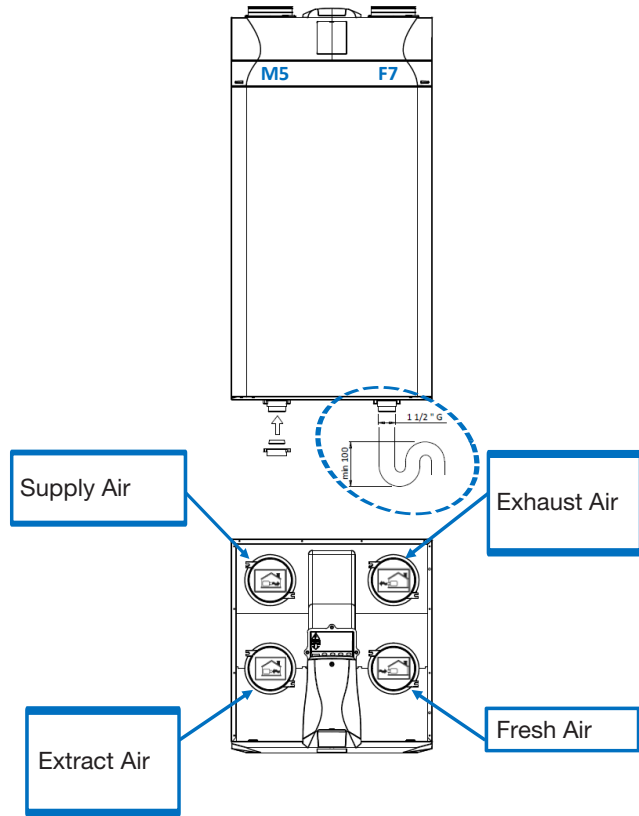
## MODES

The units are configured with the fresh air fan on the front left side and that of the extracted air on the right side. If necessary, it is possible to invert the flows by inverting the position of the filters, the position of the condensate drain, the position of the humidity probe (RHR-CF-V PRO versions only) and paying attention to the proper connection of the ducts to the machine; below is the standard configuration and the inverted flow configuration

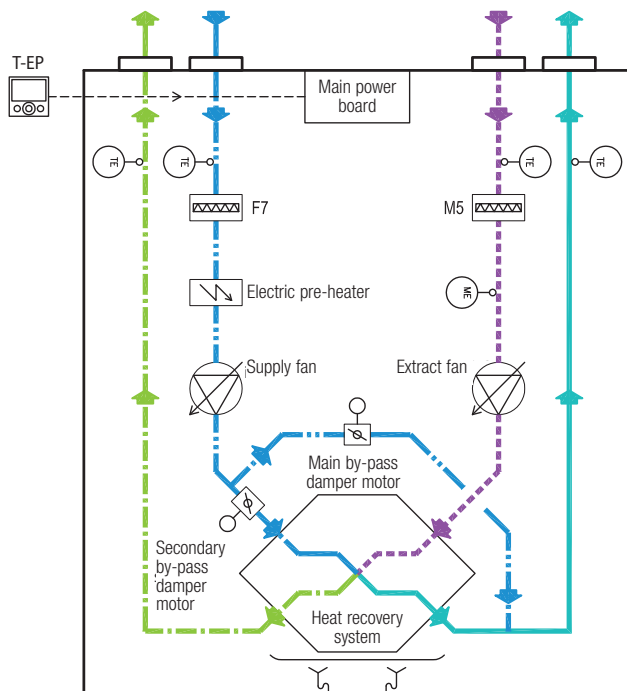
**LEFT SIDE CONFIGURATION  
DEFAULT**



**RIGHT SIDE CONFIGURATION  
OPTIONAL**



### DIAGRAM



#### LEGEND

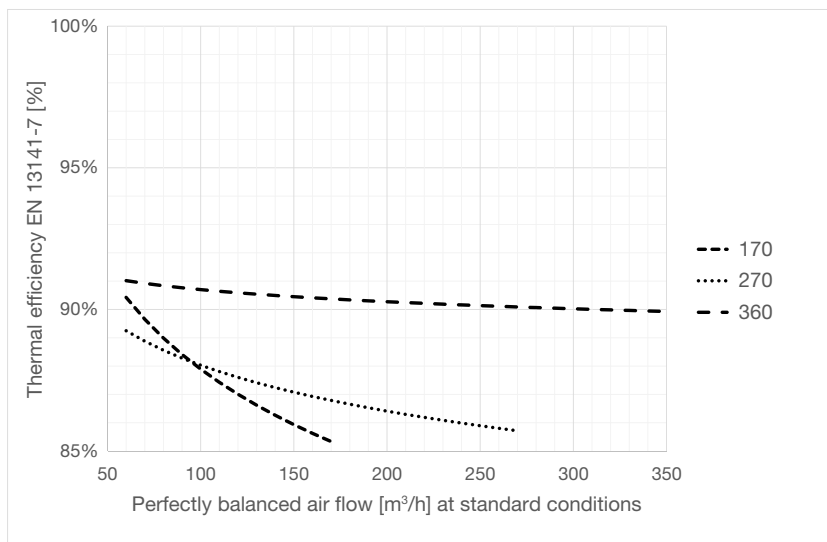
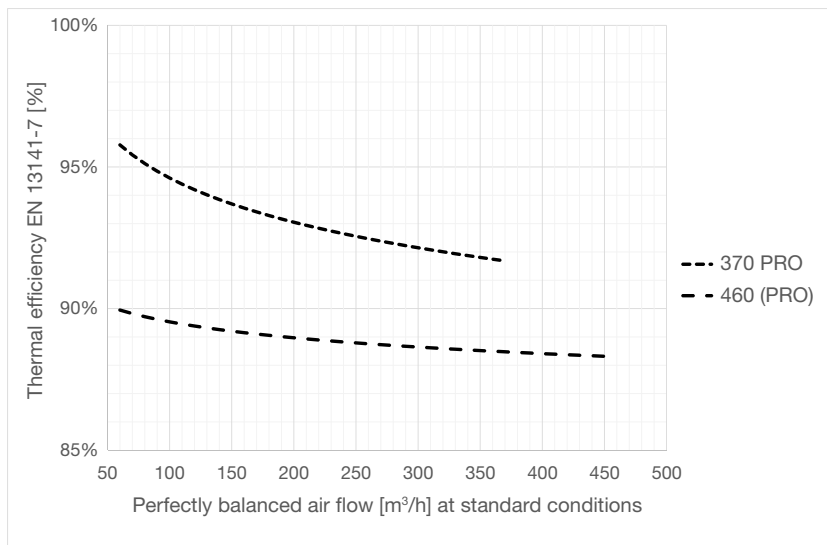
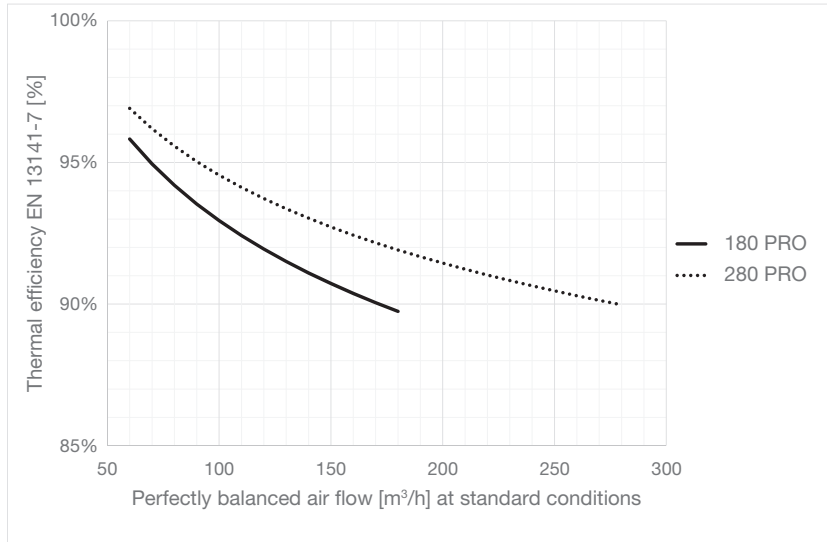
|  |  |
|--|--|
|  | Fresh air  |
|  | Supply air   |
|  | Extract air  |
|  | Exhaust air  |
|  | Micro pleat filter   |
|  | Remote or on board control                                   |
|  | Electric pre-heater optional only required for cold climates |
|  | Temperature sensor   |
|  | Humidity Sensor Central Demand Control                       |
|  | Condensate Drainage  |

## THERMAL PERFORMANCE

The thermal performance shown below was measured in compliance with Standard EN 13141-7, recommended by the European Commission documents enclosed in EU Regulation 1253-14.

The conditions relating to the performance are the following:

- fresh air temperature = 7°C
- indoor air temperature = 20°C
- internal relative humidity = 45%



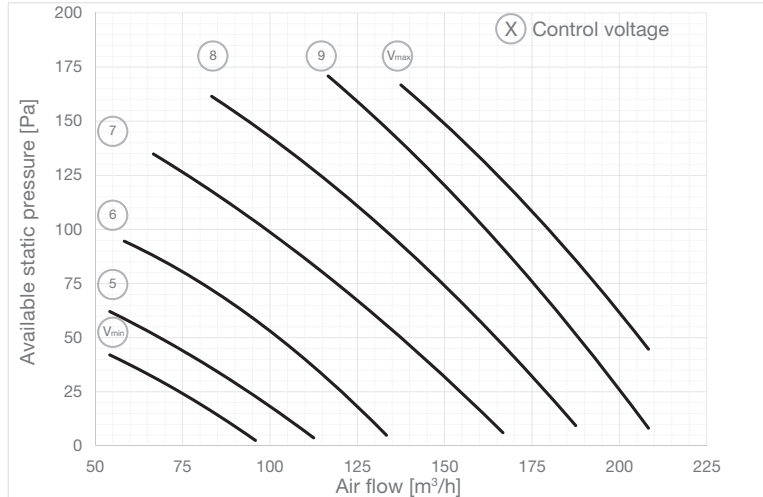
## EFFICIENCY CURVES

### RHR-CF-V 180 PRO

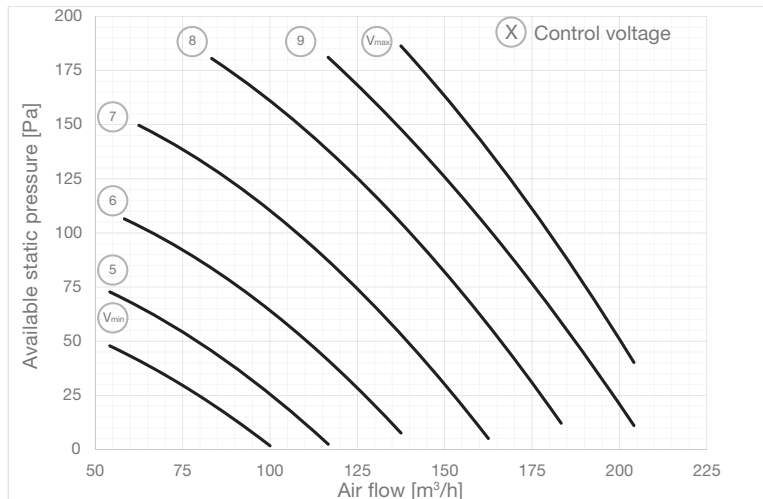
All mechanical efficiency curves are measured in standard air conditions (1 atm, 20°C)

- Control voltage range  $V_{max} = 9.6\text{ V}$  ;  $V_{min} = 4.2\text{ V}$
- Maximum current input  $I_{max} = 0.6\text{ A}$  at 10 V

#### Supply air

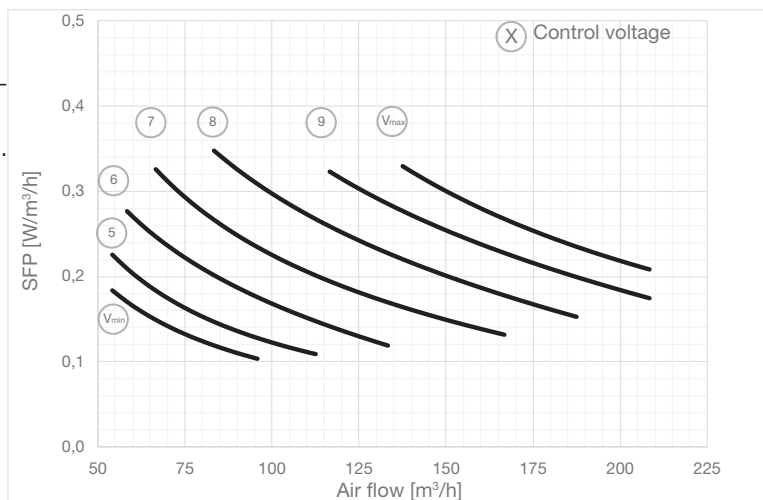


#### Extract air



#### Specific fan power - SFP

SFP includes the consumption of the fans and controls.  
The curves apply in the event of balanced flow rates.



The minimum voltage indicated only refers to a minimum value that can be configured during the nominal flow rate calibration procedure. In fact, during normal operation the motors can operate at lower voltages.

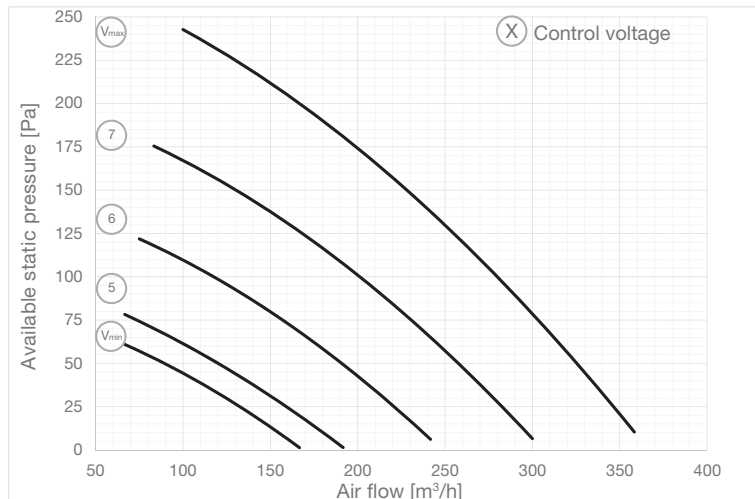
## EFFICIENCY CURVES

### RHR-CF-V 280 PRO

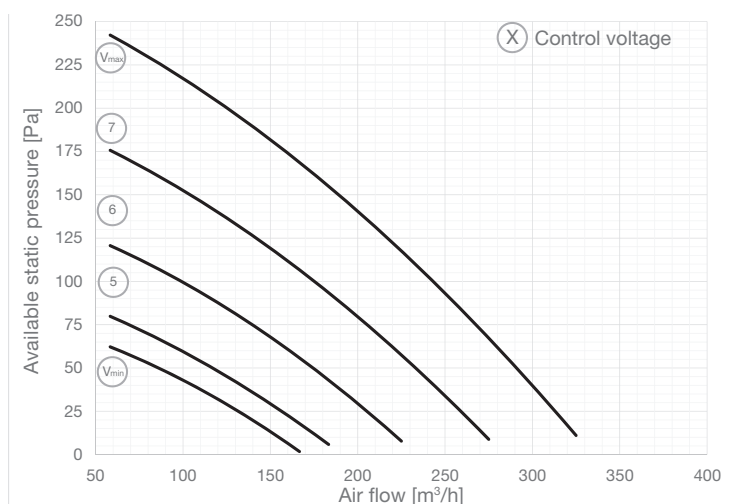
All mechanical efficiency curves are measured in standard air conditions (1 atm, 20°C)

- Control voltage range  $V_{max} = 8.0\text{ V}$  ;  $V_{min} = 4.5\text{ V}$
- Maximum current input  $I_{max} = 1.0\text{ A}$  at 10 V

#### Supply air

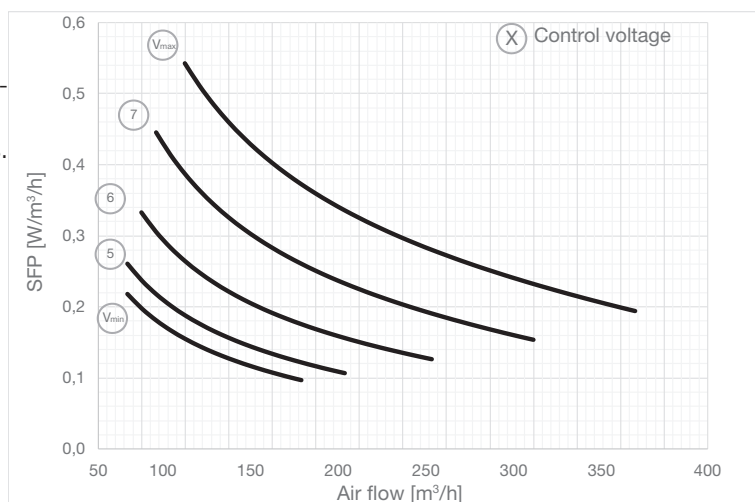


#### Extract air



#### Specific fan power - SFP

SFP includes the consumption of the fans and controls.  
The curves apply in the event of balanced flow rates.



The minimum voltage indicated only refers to a minimum value that can be configured during the nominal flow rate calibration procedure. In fact, during normal operation the motors can operate at lower voltages.

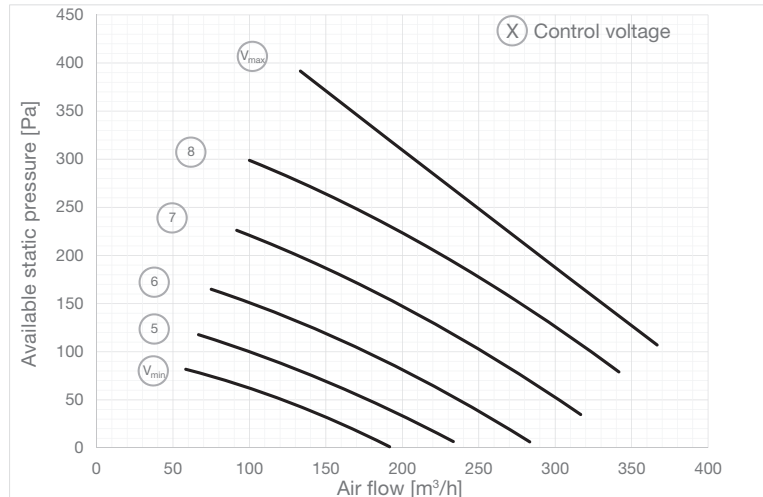
## EFFICIENCY CURVES

### RHR-CF-V 370 PRO

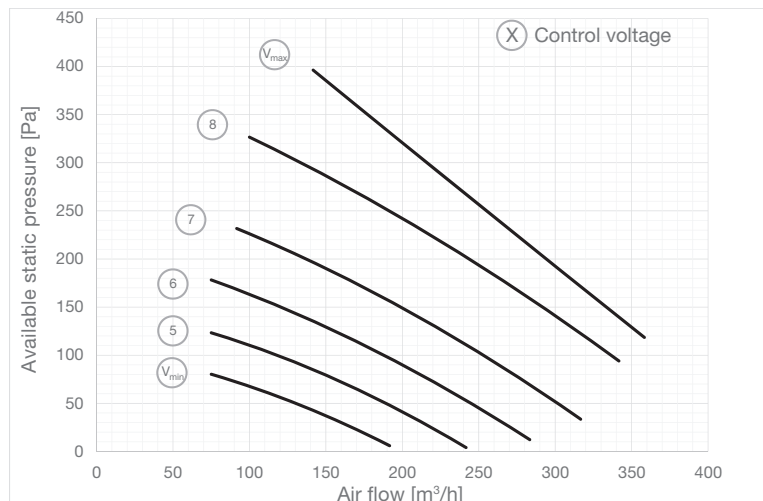
All mechanical efficiency curves are measured in standard air conditions (1 atm, 20°C)

- Control voltage range  $V_{max} = 10.0\text{ V}$  ;  $V_{min} = 4.0\text{ V}$
- Maximum current input  $I_{max} = 1.0\text{ A}$  at 10 V

#### Supply air

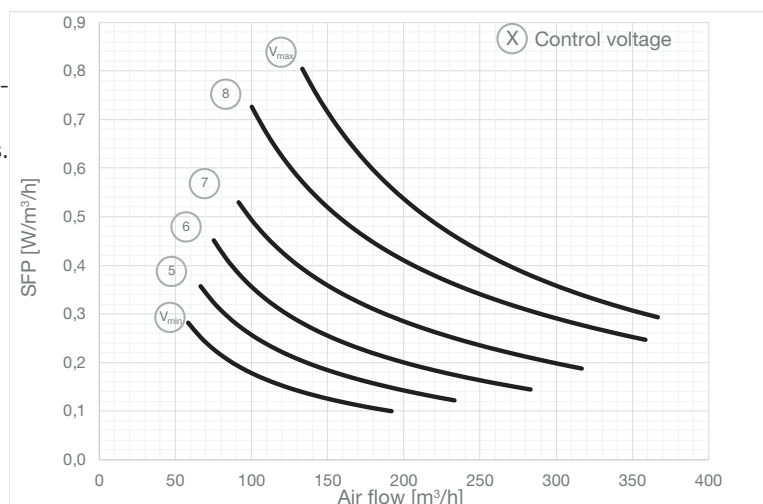


#### Extract air



#### Specific fan power - SFP

SFP includes the consumption of the fans and controls.  
The curves apply in the event of balanced flow rates.



The minimum voltage indicated only refers to a minimum value that can be configured during the nominal flow rate calibration procedure. In fact, during normal operation the motors can operate at lower voltages.



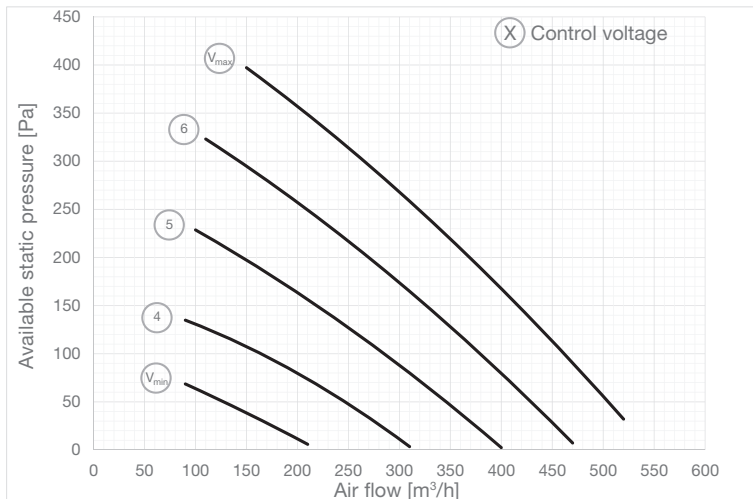
## EFFICIENCY CURVES

### RHR-CF-V 460 PRO

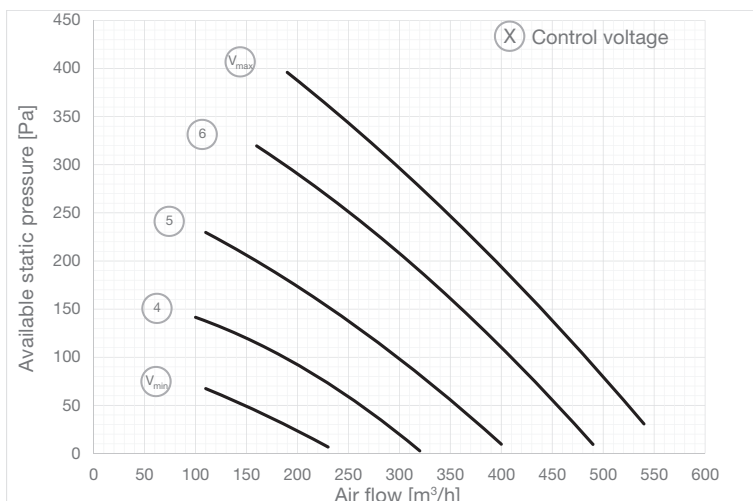
All mechanical efficiency curves are measured in standard air conditions (1 atm, 20°C)

- Control voltage range  $V_{max} = 7.0\text{ V}$  ;  $V_{min} = 3.2\text{ V}$
- Maximum current input  $I_{max} = 2.0\text{ A}$  at  $10\text{ V}$

#### Supply air

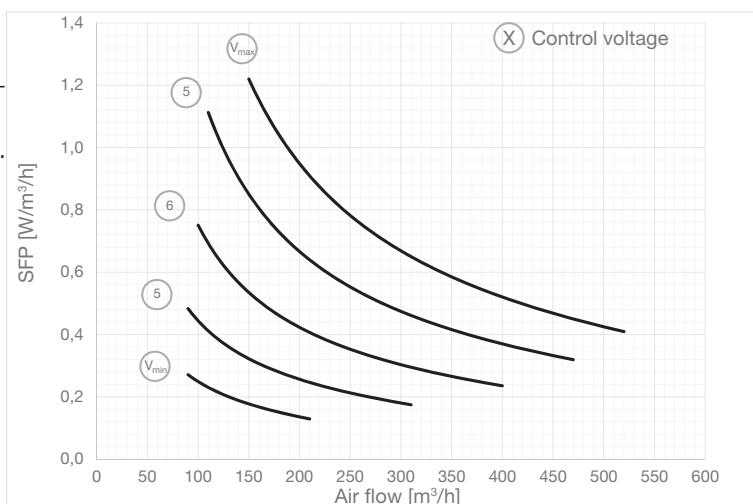


#### Extract air



#### Specific fan power - SFP

SFP includes the consumption of the fans and controls. The curves apply in the event of balanced flow rates.



The minimum voltage indicated only refers to a minimum value that can be configured during the nominal flow rate calibration procedure. In fact, during normal operation the motors can operate at lower voltages.

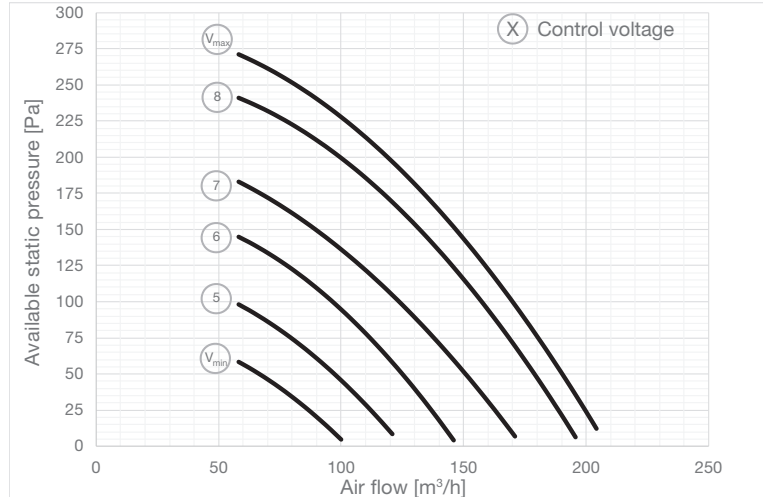
## EFFICIENCY CURVES

### RHR-CF-V 170

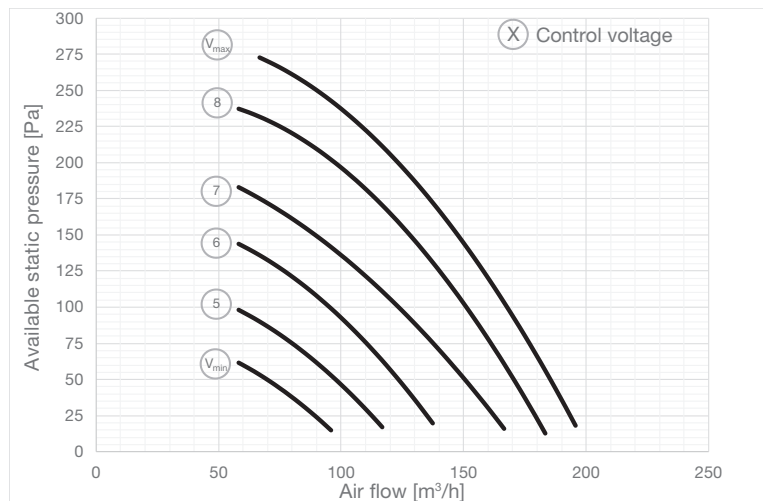
All mechanical efficiency curves are measured in standard air conditions (1 atm, 20°C)

- Control voltage range  $V_{max} = 9.0\text{ V}$  ;  $V_{min} = 4.0\text{ V}$
- Maximum current input  $I_{max} = 0.6\text{ A}$  at 10 V

#### Supply air

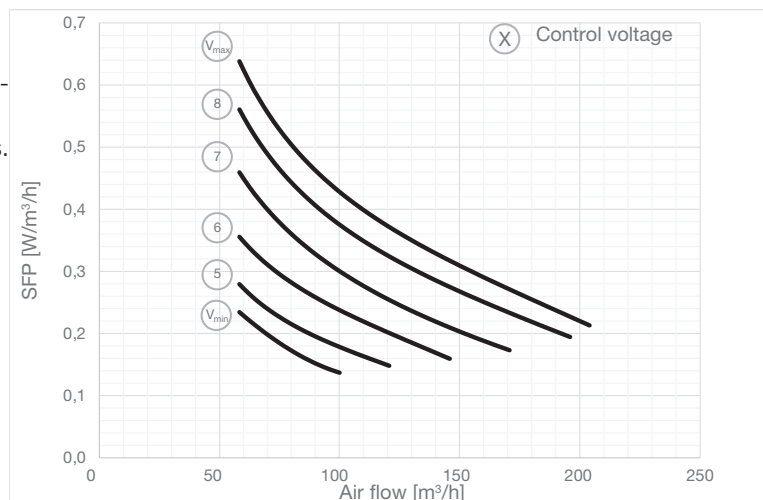


#### Extract air



#### Specific fan power - SFP

SFP includes the consumption of the fans and controls.  
The curves apply in the event of balanced flow rates.



The minimum voltage indicated only refers to a minimum value that can be configured during the nominal flow rate calibration procedure. In fact, during normal operation the motors can operate at lower voltages.

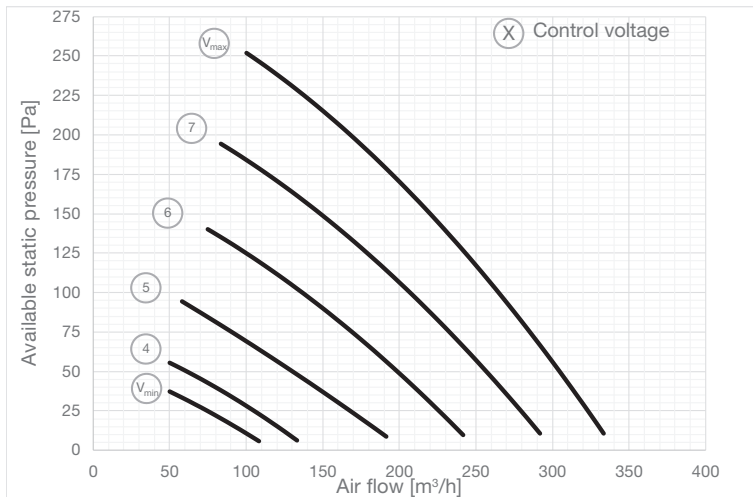
## EFFICIENCY CURVES

### RHR-CF-V 270

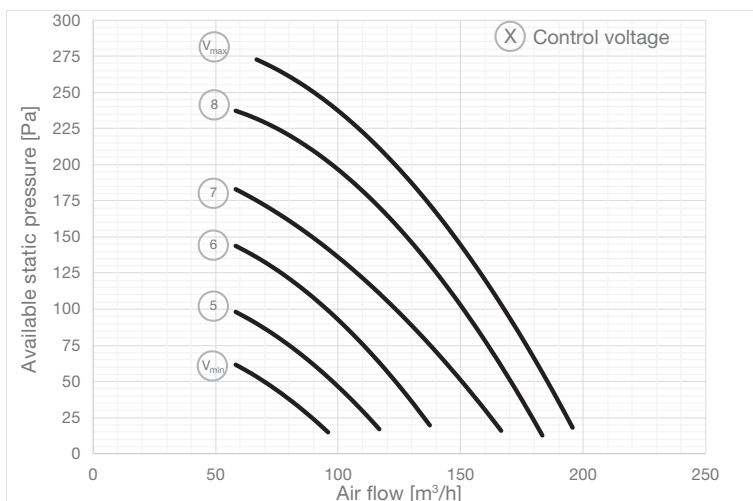
All mechanical efficiency curves are measured in standard air conditions (1 atm, 20°C)

- Control voltage range  $V_{max} = 8.0\text{ V}$  ;  $V_{min} = 3.5\text{ V}$
- Maximum current input  $I_{max} = 1.0\text{ A}$  at 10 V

#### Supply air

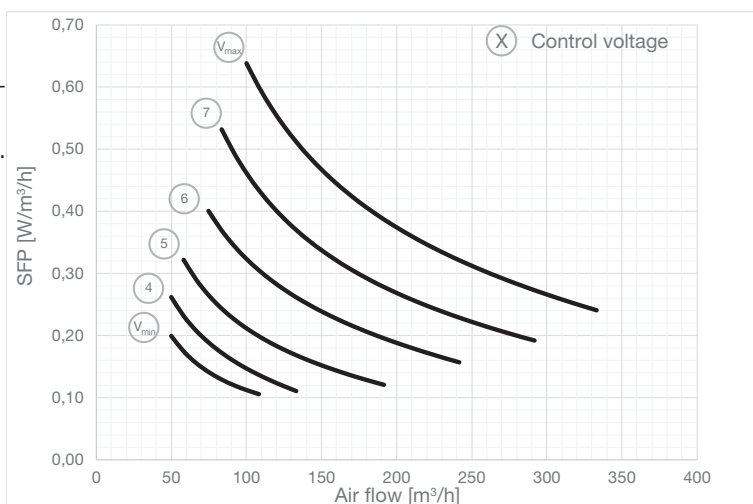


#### Extract air



#### Specific fan power - SFP

SFP includes the consumption of the fans and controls.  
The curves apply in the event of balanced flow rates.



The minimum voltage indicated only refers to a minimum value that can be configured during the nominal flow rate calibration procedure. In fact, during normal operation the motors can operate at lower voltages.

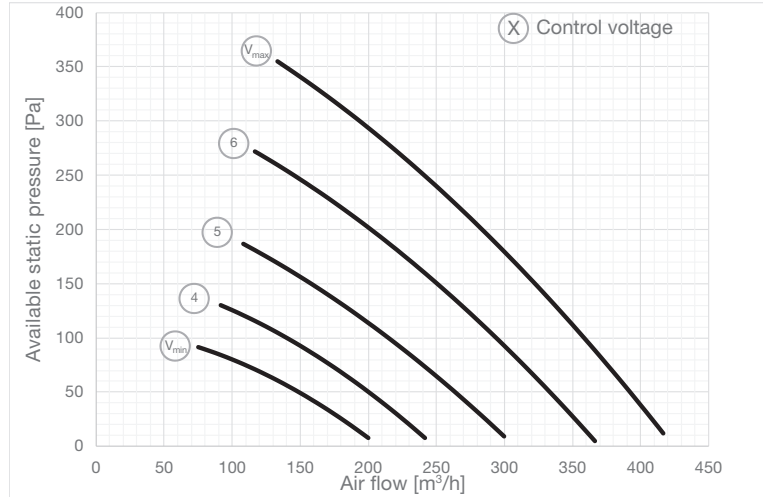
## EFFICIENCY CURVES

### RHR-CF-V 360

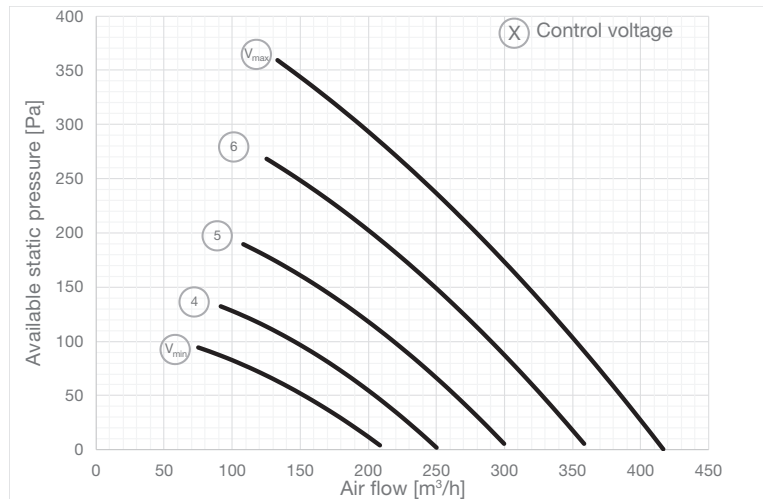
All mechanical efficiency curves are measured in standard air conditions (1 atm, 20°C)

- Control voltage range  $V_{max} = 7.0\text{ V}$  ;  $V_{min} = 3.0\text{ V}$
- Maximum current input  $I_{max} = 1.4\text{ A}$  at 10 V

#### Supply air

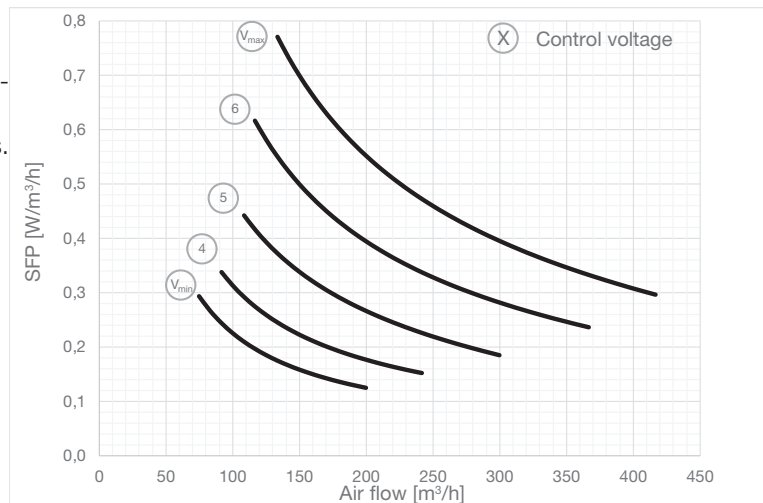


#### Extract air



#### Specific fan power - SFP

SFP includes the consumption of the fans and controls.  
The curves apply in the event of balanced flow rates.



The minimum voltage indicated only refers to a minimum value that can be configured during the nominal flow rate calibration procedure. In fact, during normal operation the motors can operate at lower voltages.

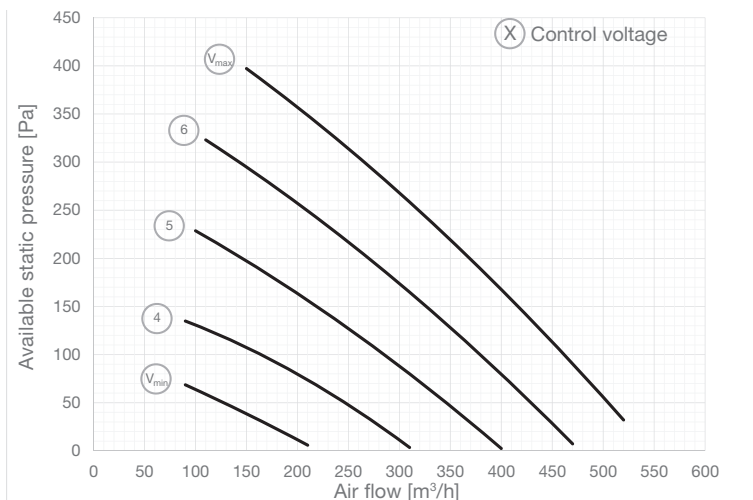
## EFFICIENCY CURVES

### RHR-CF-V 460

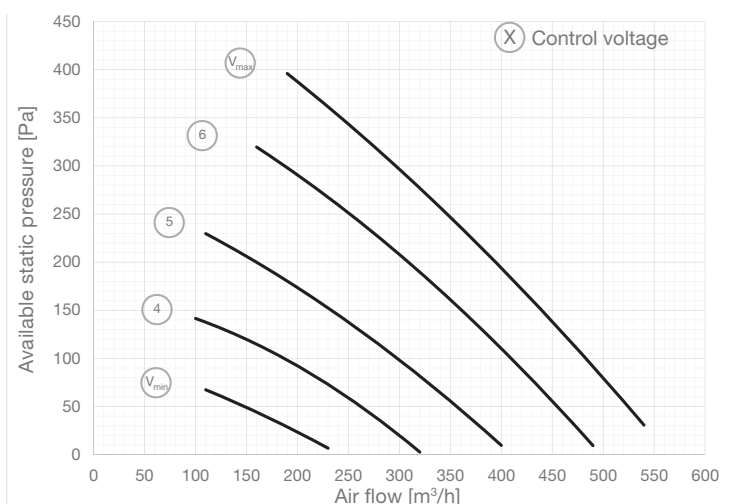
All mechanical efficiency curves are measured in standard air conditions (1 atm, 20°C)

- Control voltage range  $V_{max} = 7.0\text{ V}$  ;  $V_{min} = 3.2\text{ V}$
- Maximum current input  $I_{max} = 2.0\text{ A}$  at 10 V

#### Supply air

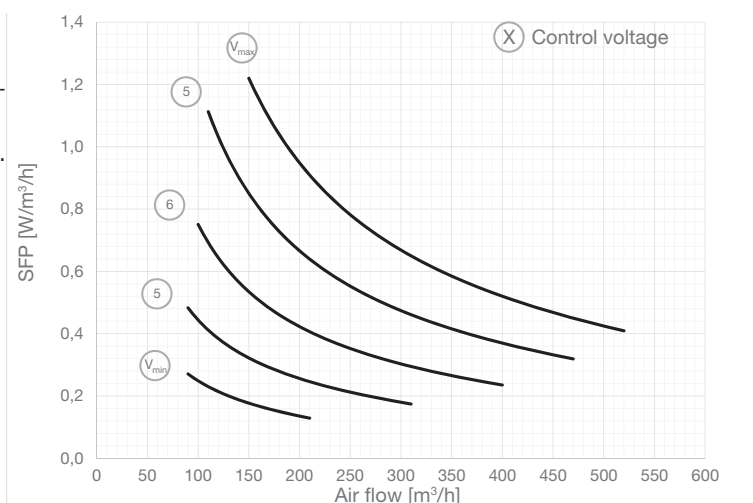


#### Extract air



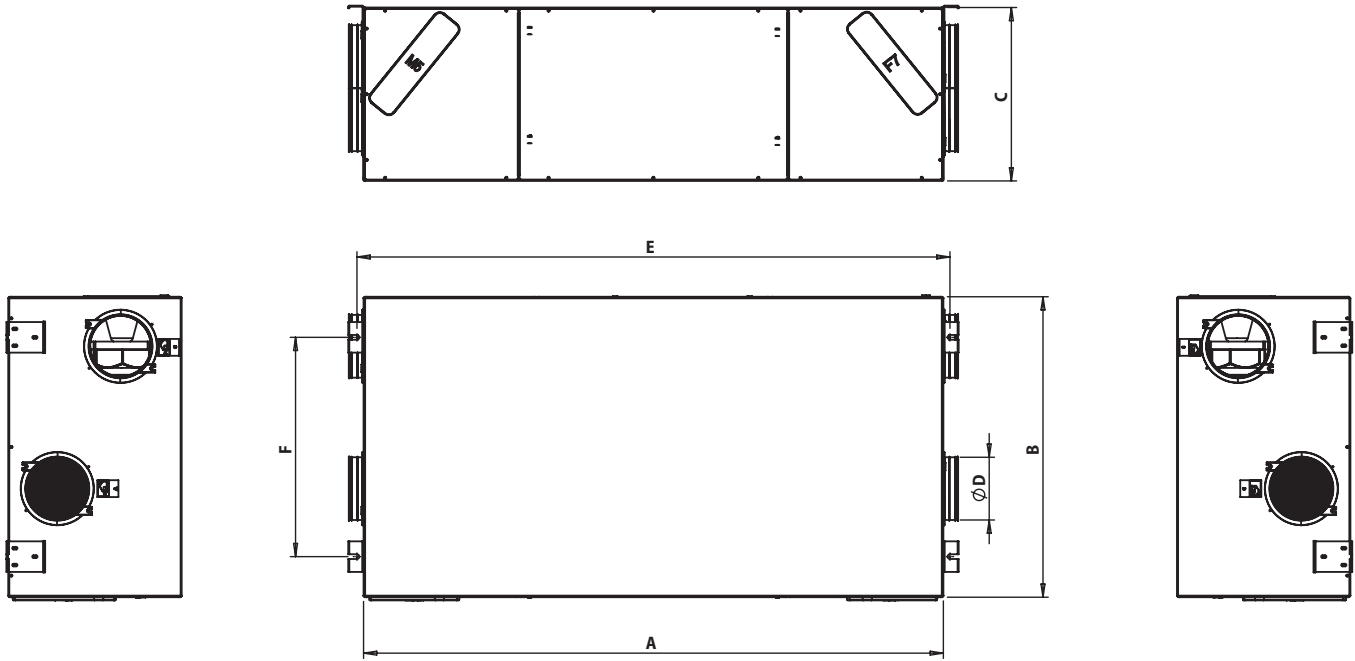
#### Specific fan power - SFP

SFP includes the consumption of the fans and controls. The curves apply in the event of balanced flow rates.



The minimum voltage indicated only refers to a minimum value that can be configured during the nominal flow rate calibration procedure. In fact, during normal operation the motors can operate at lower voltages.

## DIMENSIONS AND WEIGHT



|              | A    | B   | C   | Ø D | E    | F   | Weight with packaging | Weight without packaging |
|--------------|------|-----|-----|-----|------|-----|-----------------------|--------------------------|
| RHR-CF-H 170 | 1100 | 570 | 329 | 125 | 1125 | 416 | 35 kg                 | 31 kg                    |

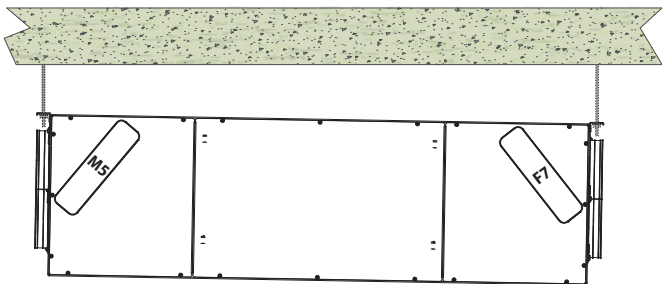
## INSTALLATION

The RHR-CF-H 170 PRO unit can easily be installed both horizontally and vertically. Special support brackets are provided to install the unit horizontally on the ceiling and to install the unit vertically (especially in gaps between plasterboard walls and load-bearing walls).

### Horizontal installation

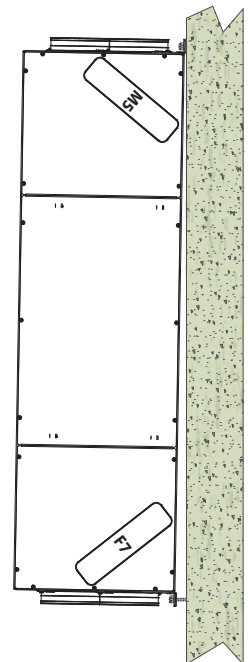
Spacer bars can be used to adjust the distance from the ceiling.

It is recommended to install the unit tilted towards the side where the F7 filter is placed, in order to facilitate condensate drainage.



### Vertical installation

Place the F7 side at the bottom of the unit.



The instruction manual indicates the appropriate maintenance clearance for each type of installation.

**RHR-CF-H PRO VERSION WITH ADVANCED AIR FLOW CONTROL**

| Model  |                   | RHR-CF-H 170 PRO   |
|--|-------------------|--|
| Depth  | mm                | 1098   |
| Width  | mm                | 568  |
| Height   | mm                | 327  |
| Duct connection                                      | -                 | DN125  |
| Weight <sup>1</sup>                                  | kg                | 35   |
| Maximum flow rate                                    | m <sup>3</sup> /h | 170  |
| External static pressure at maximum flow rate        | Pa                | 100  |
| Reference flow rate                                  | m <sup>3</sup> /h | 120  |
| External static pressure at reference flow rate      | Pa                | 50   |
| Minimum flow rate                                    | m <sup>3</sup> /h | 60   |
| Maximum external static pressure                     | Pa                | 230  |
| Thermal efficiency at reference flow rate EN 13141-7 | %                 | 92%  |
| Filtering efficiency EN779                           | -                 | F7 supply - M5 extraction  |
| Fan type   | -                 | Centrifugal with EC brushless motor and backward-curved blades   |
| Maximum power absorbed by controls and fans          | W                 | 50   |
| Maximum current absorbed by controls and fans        | A                 | 0.6  |
| Electric input                                       | -                 | Single phase -230 V – 50 Hz via 1.5m cable with Schuko CEE 7/7 connection  |
| Standby power  |                   | < 1 W  |
| Safety features                                      |                   | <ul style="list-style-type: none"> <li>• IP protection rating: IP21</li> <li>• CE<sup>2</sup> compliance</li> </ul>  |
| Components and general materials                     | -                 | <ul style="list-style-type: none"> <li>• T-EP capacitive touch pad remote control</li> <li>• Main power board with Modbus interface</li> <li>• Electric defrosting pre-heater: hot filament electric heater with reinforced metal lining, controlled by PWM signal (optional)</li> <li>• Main structure: Polystyrene</li> <li>• External covering and components: Painted galvanized steel plate</li> <li>• Recovery unit: Counterflow plate heat recovery unit - PET</li> <li>• Fan blades and housings: PA6 in plastic, reinforced fibreglass</li> <li>• Filters: Micro-pleated type – Synthetic Bypass damper with two POM and steel fins</li> <li>• Temperature sensor PT 1000</li> <li>• Humidity Sensor Central Demand Control for extract air</li> <li>• DN 15 Condensate Drainage</li> </ul> |
| Accessories  | -                 | <ul style="list-style-type: none"> <li>• Internal hot filament electric desfrosting pre-heater with reinforced metal lining, controlled by PWM signal</li> <li>• External Electric Heater</li> </ul>   |
| Maximum Defrost Pre-Heater power                     | W                 | 600  |
| Maximum electric resistance current                  | A                 | 3  |

<sup>1</sup> Without packaging

<sup>2</sup> EN 60335-1, EN 60335-2-80, EN 62233, EN 55014-1, EN 55014-2, EN 61000-3-2, EN 61000-3-3, EN 50581, Reg. 1253/14, Reg. 1254/14 (EU Directives: 2014/35/EU, 2014/30/EU, 2006/42/EC, 2011/65/EC)

## CONSTRUCTION FEATURES OF THE MAIN COMPONENTS

### 1 RHR-CF-H PRO version external structure

made of hot-dip galvanised steel sheet panels painted in RAL 9003 and satin finish obtained with epoxy paint dried in oven at 180°C

### 2 EPDM heat recovery unit access closure

### 3 EPDM filter access closure

### 4 Electric defrosting pre-heater

Hot filament resistance with reinforced metal lining, controlled by PWM signal (only versions with integrated resistance).

### 5 High efficiency filters compliant with Standard EN779:2012;

The filters have the following features:

- class F7 for the supply air
- class M5 for the extracted air

### 6 ABS shanks for inlet/outlet flow connection

### 7/11 Extracted air (7) and air supply (11) electric fan

consisting of:

- **Permanent single-phase** synchronous EC motor with protection against overtemperature of the motor and electronic components
- **High efficiency ABS fans** with backward-curved blades
- **ABS Motor/fan** housing

### 8 High efficiency static heat recovery unit

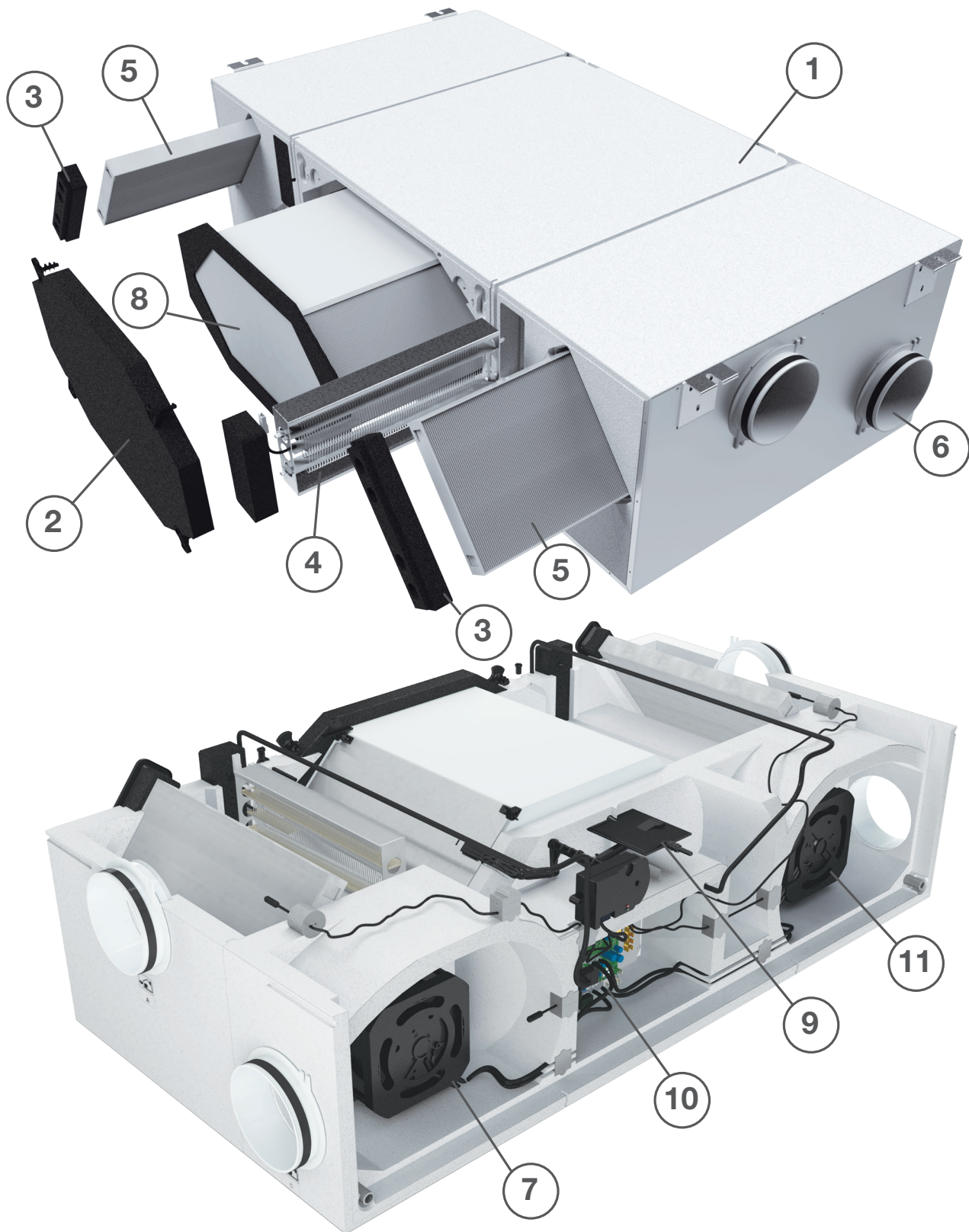
with PET counterflow exchange plates. The efficiency obtainable may be higher than 90% because they ensure counterflow heat transfer between two air flows at different inlet temperatures. The static heat recovery units do not feature moving parts and guarantee high reliability and safe operation.

In order to increase the efficiency of the heat exchanger, the plate surfaces feature special swirlers.

### 9 By-pass damper with 2 fins driven by the same motor

### 10 Main power board





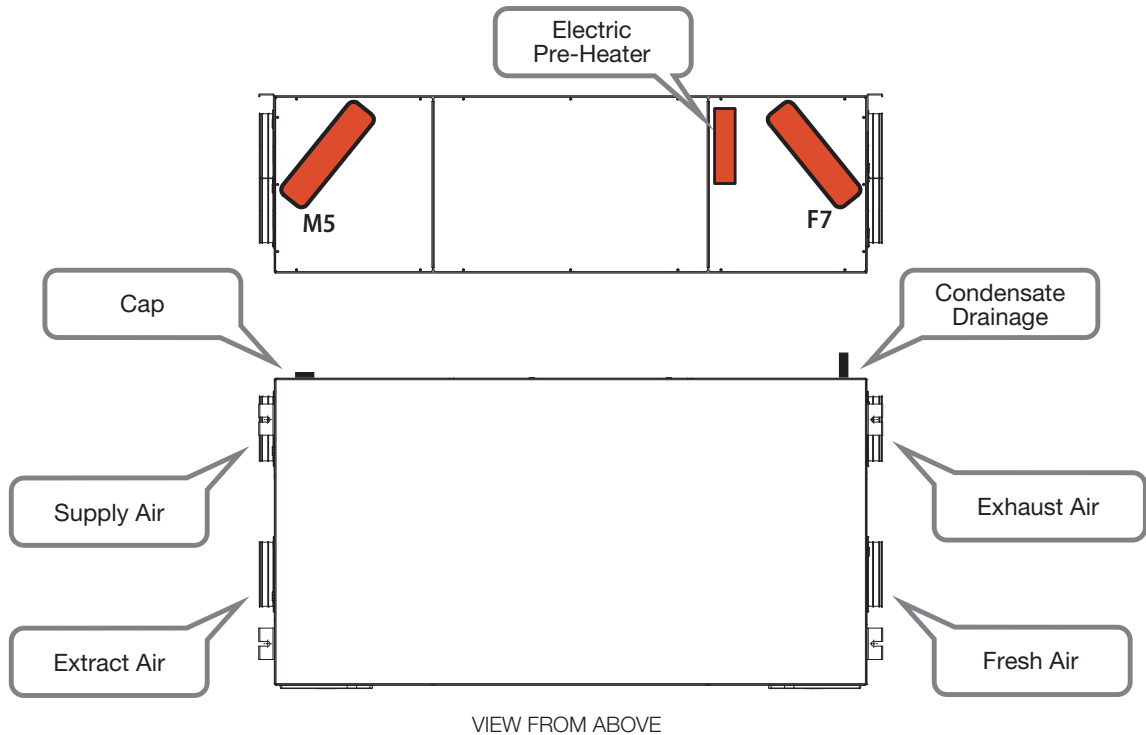
## MODES

### Ceiling version

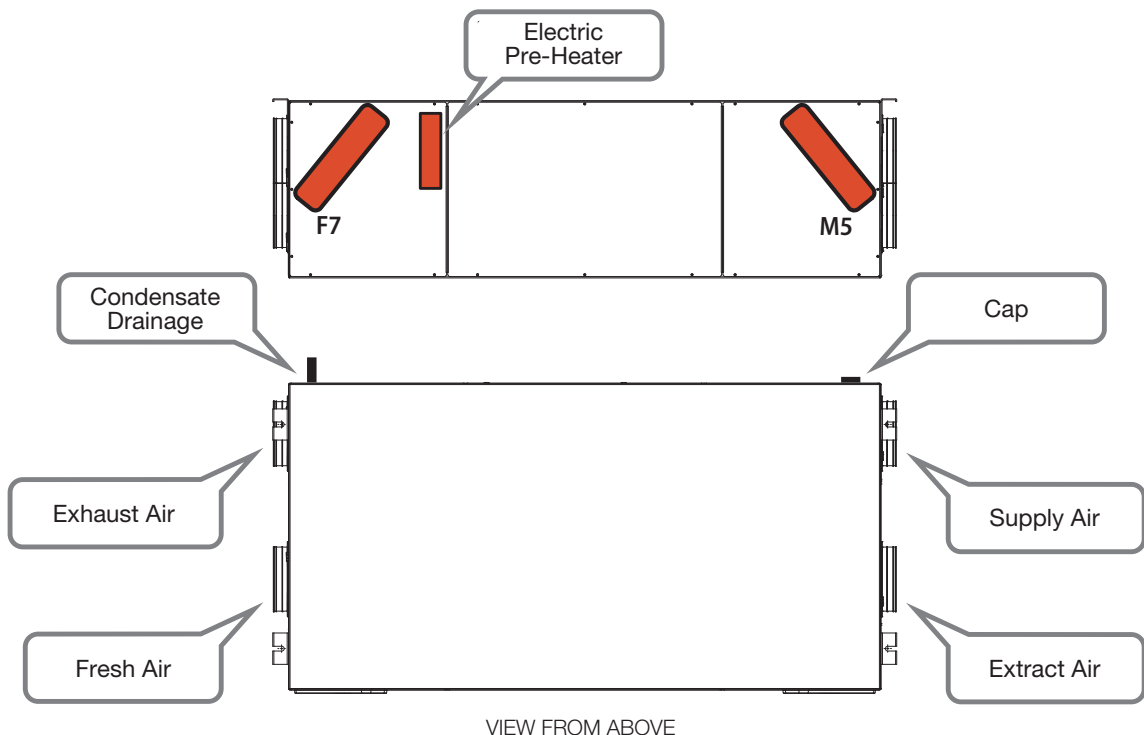
The standard units are configured with the supply fan on the front left side and the F7 filter to the right, whereas the extracted air flow connection is located on the right side with the M5 filter to the left.

If necessary, it is possible to invert the flows by inverting the position of the filters, the position of the condensate drain, the position of the humidity probe and paying attention to the proper connection of the ducts to the machine; below is the standard configuration and the inverted flow configuration

### Default right side configuration



### Optional left side configuration



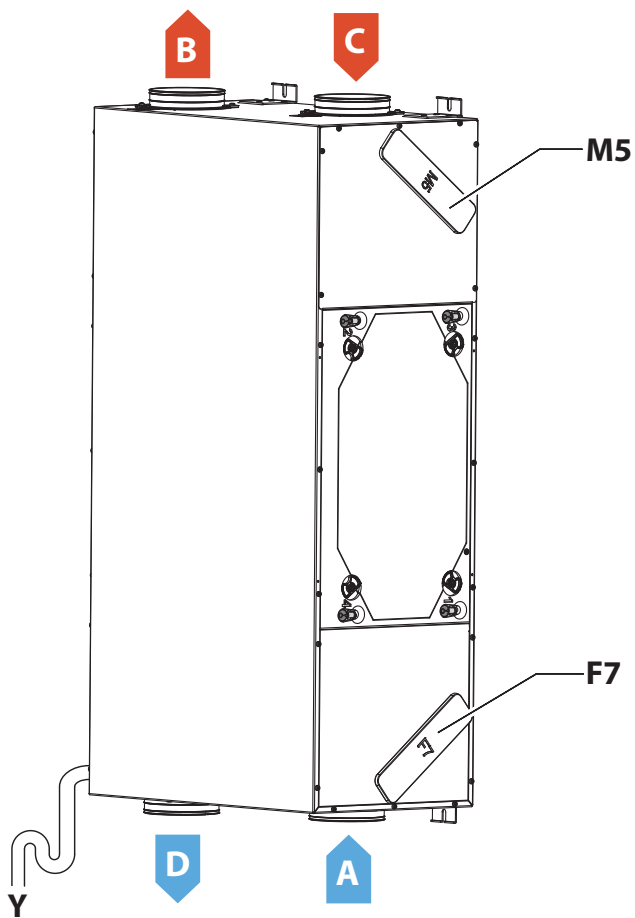
## MODES

### Wall version

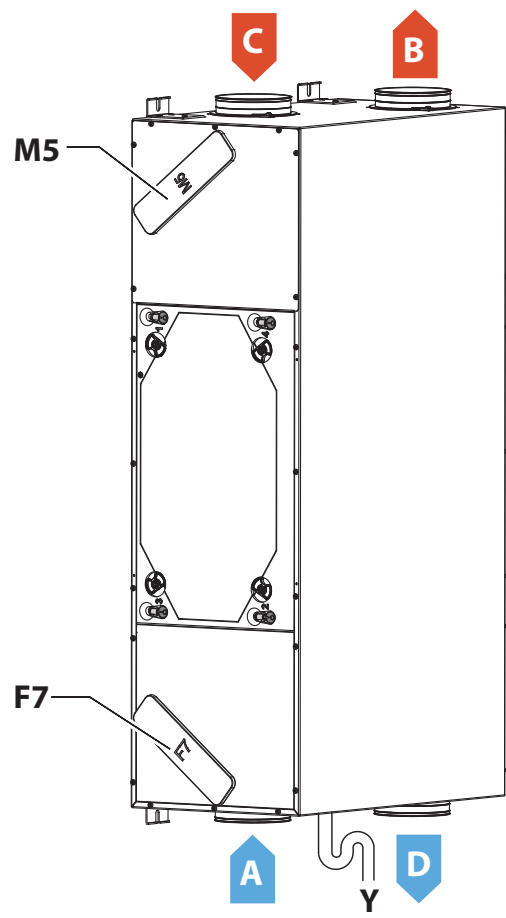
By default, the units are configured in order to position the supply fan at the top, with the F7 filter at the bottom, while the extraction flow connection is located at the bottom with the M5 filter at the top.

The flows can be inverted if necessary; below there is the standard configuration and the inverted flow configuration.

#### Standard initial configuration



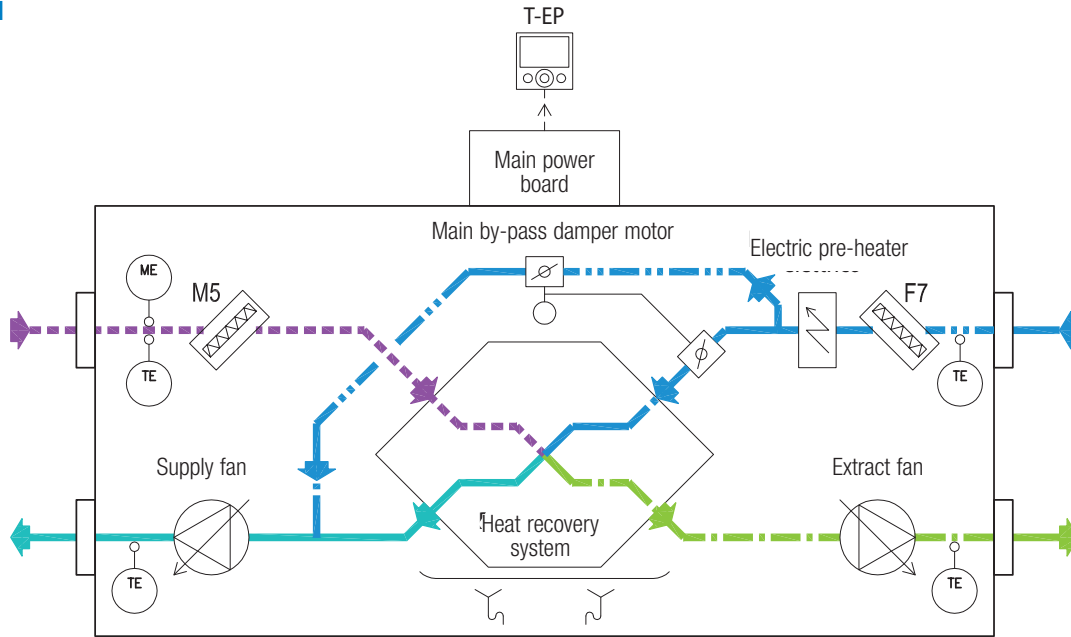
#### Final inverted configuration



- A = Fresh air
- B = Supply air
- C = Extract air
- D = Exhaust air

## MODES

### DIAGRAM



#### LEGEND

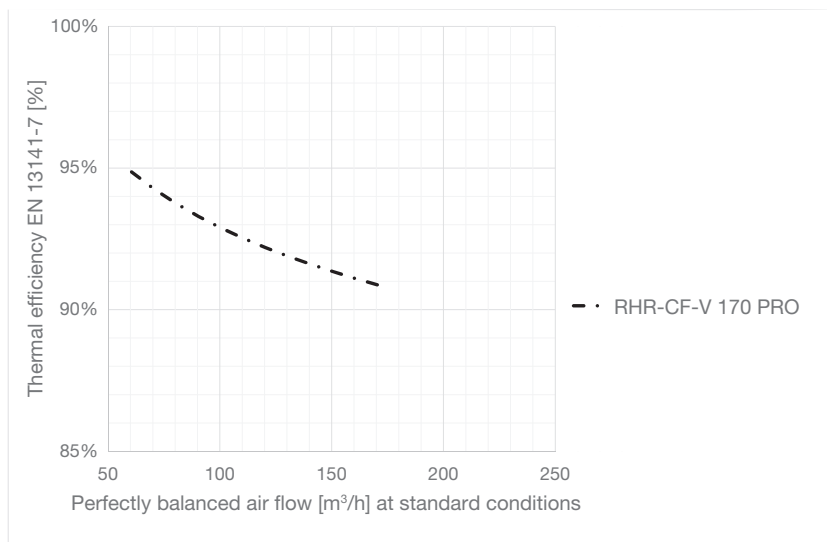
|  |                    |  |  |
|--|--------------------|--|--|
|  | fresh air          |  | remote or on board control                                   |
|  | supply air         |  | electric pre-heater optional only required for cold climates |
|  | extract air        |  | temperature sensor   |
|  | exhaust air        |  | humidity sensor central demand control                       |
|  | micro pleat filter |  | condensate drainage  |

## Thermal performance

The thermal performance was measured in compliance with Standard EN 13141-7, recommended by the European Commission documents enclosed in EU Regulation 1253-14.

The conditions relating to the charts are the following:

- fresh air temperature = 7°C
- indoor air temperature = 20°C
- internal relative humidity = 45%



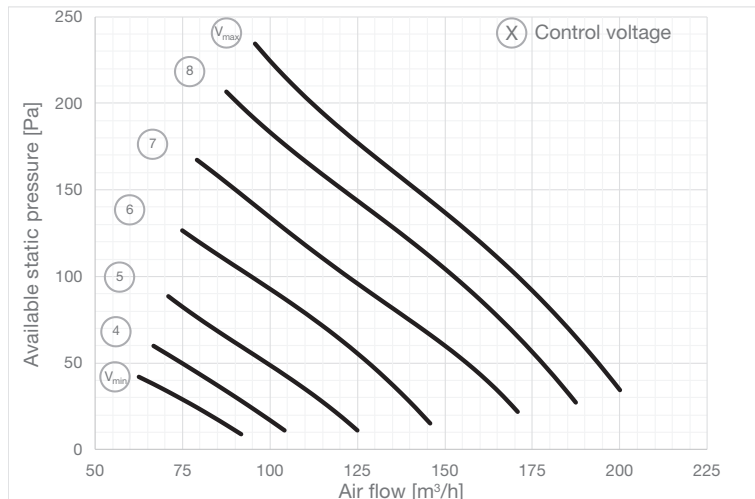
## EFFICIENCY CURVES

### RHR-CF-H 170 PRO

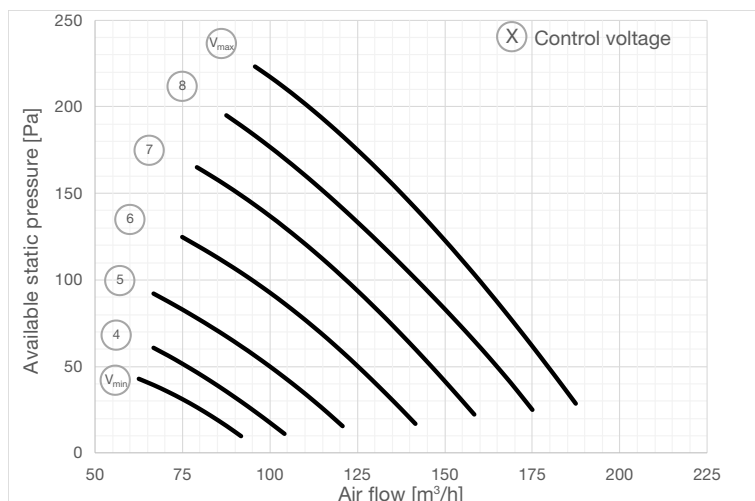
All mechanical efficiency curves are measured in standard air conditions (1 atm, 20°C)

- Control voltage range  $V_{max} = 8.9\text{ V}$  ;  $V_{min} = 3.0\text{ V}$
- Maximum current input  $I_{max} = 0.6\text{ A}$  at 10 V

#### Supply Air

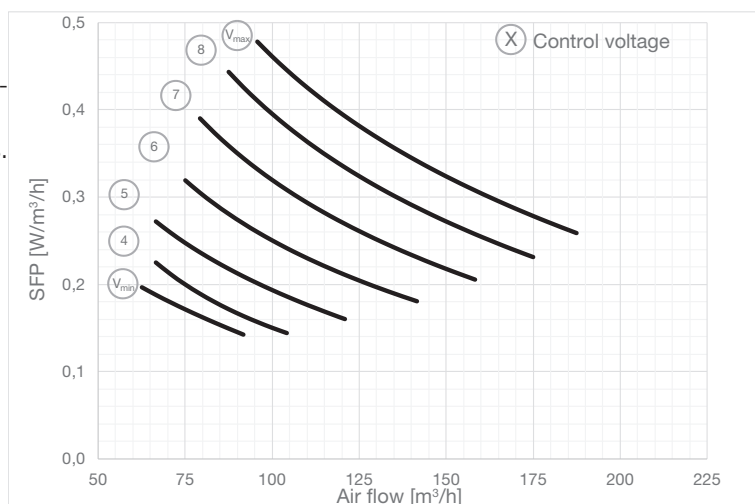


#### Extract Air



#### Specific fan power - SFP

SFP includes the consumption of the fans and controls.  
The curves apply in the event of balanced flow rates.



The minimum voltage indicated only refers to a minimum value that can be configured during the nominal flow rate calibration procedure. In fact, during normal operation the motors can operate at lower voltages.

## SELECTION PROCEDURE

Residential Heat Recovery Counterflow units RHR-CF are designed for controlled air exchange in residential ambiances and minimise heat dissipation due to ventilation.

As a result, the units must be sized according to the project air exchange flow rate (nominal flow rate  $Q_{SN}$ ), based on the calculation rule applicable in the country where the unit is installed.

The calculation rule usually applied in Europe is Standard **DIN 1946-6**, therefore the nominal flow rates recommended are specified according to the area of the building heated directly or indirectly (table 5 of the standard). At the same time, the intake flow rate should not be less than the general extraction flow rate required (table 7 of the standard), while the **air exchange per person should be greater than or equal to 30 m<sup>3</sup>/h or, in the event of a particularly high density, greater than or equal to 20 m<sup>3</sup>/h.**

However, it is possible to use alternative calculation rules, in accordance with the national legislation in force or with the designer's policy.

After calculating  $Q_{SN}$ , it is the responsibility of the designer to assess the need of balancing the extraction flow ( $Q_{EN}$  = nominal extraction flow rate)\*, as well as the value of the project static pressure, which must be indicated for each flow in order to counteract the pressure drops of the air ducts and distribution components ( $\Delta p_{SN}$ ,  $\Delta p_{EN}$ ).

Once the nominal flow rate/static pressure values have been defined, it is possible to use the pressure-flow rate diagrams to identify the most suitable model.

**The model must be selected in order to enable the “Booster”/“Party” modes, which increase the nominal flow rate by 30%, resulting in an increase of the required static pressure.**

### Selection procedure:

1. The **maximum supply** and **maximum extraction flow rates** are defined as follows:

- a.  $Q_{SN\_max} = 1.3 Q_{SN}$
- b.  $Q_{EN\_max} = 1.3 Q_{EN}$

2. Quick selection procedure, through “fast selection table and diagrams”

Identify the model whose declared maximum flow rate is just above the maximum value between  $Q_{SN\_max}$  and  $Q_{EN\_max}$ .

3. Check that the following maximum supply and extraction points are within the operating ranges of the fans of the selected unit:

- a.  $(Q_{SN\_max} ; \Delta p_{SN\_max})$ , where  $\Delta p_{SN\_max} = 1.7 \Delta p_{SN}$
- b.  $(Q_{EN\_max} ; \Delta p_{EN\_max})$ , where  $\Delta p_{EN\_max} = 1.7 \Delta p_{EN}$

4. In the event of a negative result, choose the larger model.

\* An imbalance of  $\pm 10\%$  between the supply flow and the extraction flow is usually accepted.

## SELECTION PROCEDURE

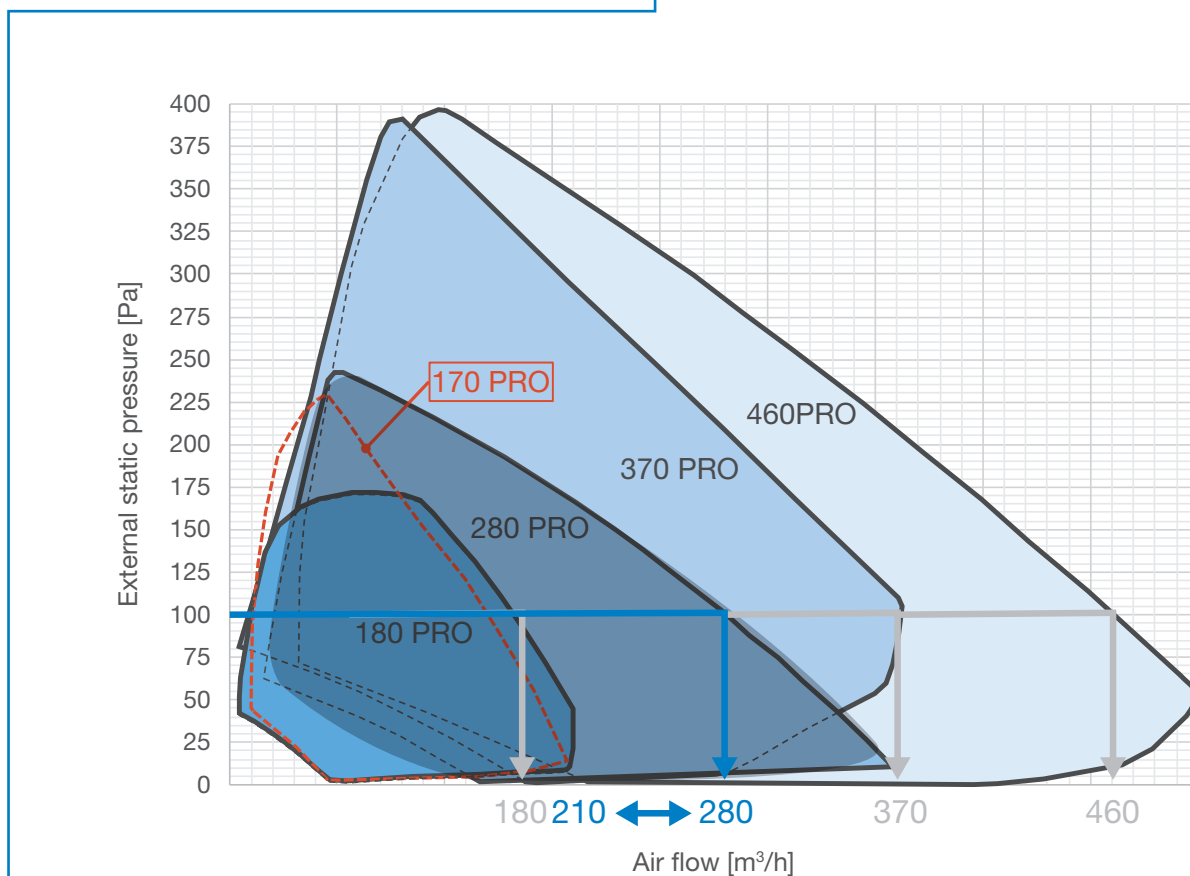
### Example of model selection

Let's suppose a designer is interested in a vertical RHR-CF-V PRO unit to be installed in a newly built flat.

Let's suppose that the designer calculates the following data, with the resulting identification of the maximum flows:

| Supply flow   | Extraction flow  |
|---|--|
| $Q_{SN} = 160 \text{ m}^3/\text{h}$   | $Q_{EN} = 140 \text{ m}^3/\text{h}$                        |
| $\Delta p_{SN} = 90 \text{ Pa}$   | $\Delta p_{EN} = 80 \text{ Pa}$                            |
| $Q_{SN\_MAX} = 1.3 (160) \approx 210 \text{ m}^3/\text{h}$                              | $Q_{EN\_MAX} = 1.3 (140) \approx 180 \text{ m}^3/\text{h}$ |
| Quick selection flow rate $Q_{QS} = \max(210; 180) = \mathbf{210 \text{ m}^3/\text{h}}$ |  |

|           |                     | RHR-CF-V 180 PRO | RHR-CF-V 280 PRO | RHR-CF-V 370 PRO | RHR-CF-V 460 PRO |
|-----------|---------------------|------------------|------------------|------------------|------------------|
| $Q_{max}$ | [m <sup>3</sup> /h] | 180              | 280              | 370              | 460              |
| $Q_{ref}$ | [m <sup>3</sup> /h] | 130              | 200              | 260              | 320              |

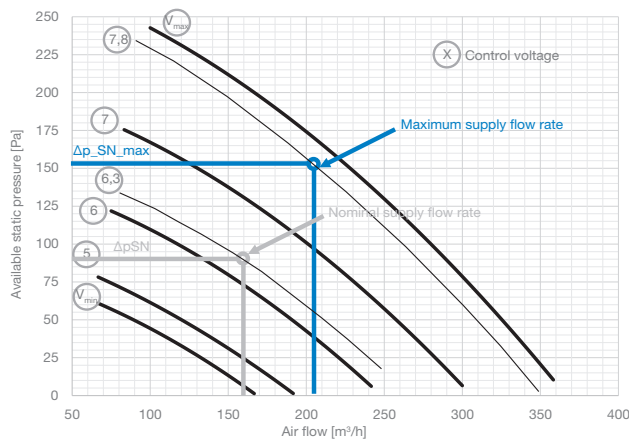


**Model RHR-CF-V 280 PRO**  
is selected as the most suitable unit.

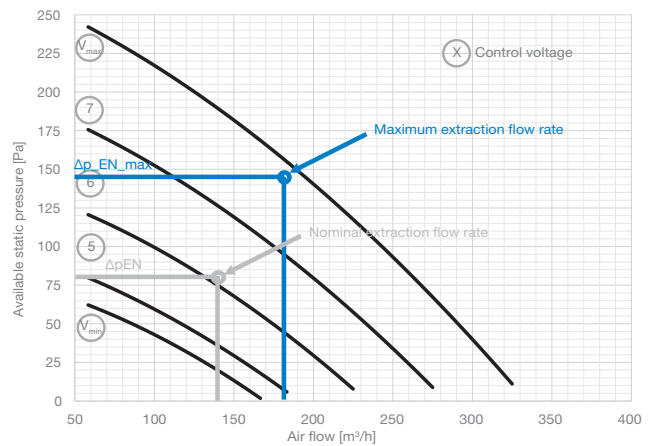
## SELECTION PROCEDURE

The following checks must in any case be performed in order to calculate the maximum power consumption of the unit:

### Operating supply points control

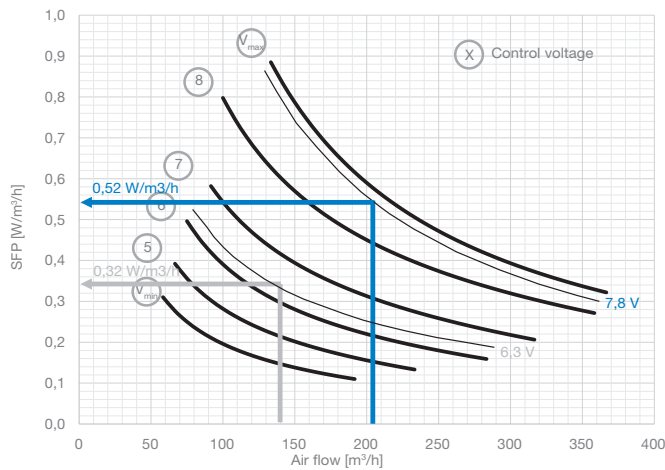


### Operating extraction points control



The maximum supply and extraction capacity can be processed by the selected unit RHR-CF-V 280 PRO. In this case, the supply flow may be considered the main one because it is the one that involves the highest consumption between the two flows.

### Power consumption



Hypothesis:

Unit without electric resistance and set in the conservative case of flows balanced to the flow rate and available static pressure of the main flow.

$$P_{max} = 110 \text{ W}$$

$$P_{nom} = 45 \text{ W}$$

#### LEGEND of the selection procedure

|                      |  |
|----------------------|--|
| $Q_{SN}$             | Nominal supply flow rate   |
| $\Delta p_{SN}$      | Nominal supply external static pressure  |
| $Q_{SN\_max}$        | Maximum supply flow rate   |
| $\Delta p_{SN\_max}$ | Maximum supply external static pressure  |
| $P_{max}$            | Maximum electric power generated by the fans and controls in maximum flow and balanced flow conditions |

|                      |  |
|----------------------|--|
| $Q_{EN}$             | Nominal extraction flow rate   |
| $\Delta p_{EN}$      | Nominal extraction external static pressure  |
| $Q_{SN\_max}$        | Maximum extraction flow rate   |
| $\Delta p_{EN\_max}$ | Maximum extraction external static pressure  |
| $P_{nom}$            | Electric power generated by the fans and controls in nominal flow and balanced flow conditions |



## FREE-COOLING AND FREE-HEATING MANAGEMENT

All Residential Heat Recovery Counterflow units RHR-CF are equipped with a heat recovery by-pass function, when it is beneficial to use the fresh air free-cooling (or free-heating) function.

The following setpoint temperatures must be set:

### Internal heating system setpoint

- $t_{\text{heating}}$ , usually set at 20°C

### Internal cooling system setpoint

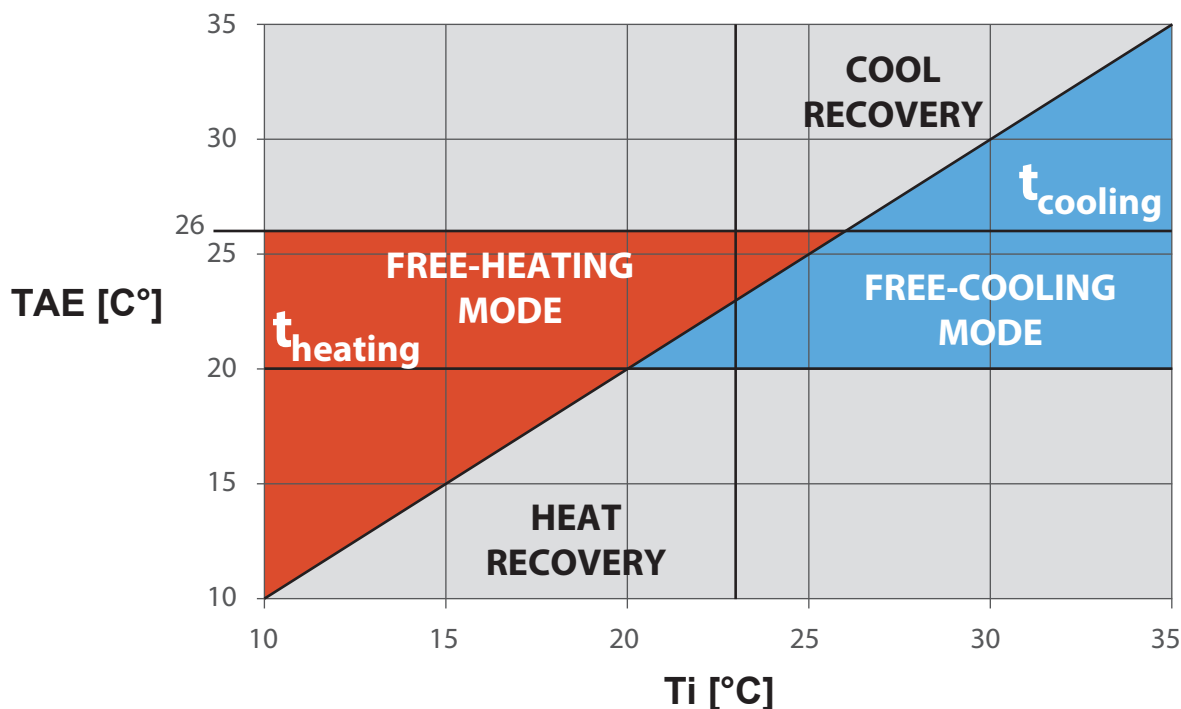
- $t_{\text{cooling}}$ , usually set at 26°C

The temperatures entered must be determined by the installer in accordance with the Heating/Cooling system provided in the unit installation room.

Other temperatures are also defined:

- $T_i$ , i.e. the internal temperature
- $T_{AE}$ , i.e. the external temperature

The following operating modes of the bypass damper are available:



If a geothermal water resource is available, a Dip Switch configuration can be used to control an on-off valve of a geothermal water coil, supplied by a third party and installed in a fresh air pre-treatment position. The geothermal water coil can be used in summer for pre-cooling fresh air, thus enhancing the standard free-cooling mode.

In fact, thanks to the pre-treatment, the cooled fresh air can be used in free-cooling mode even in warmer outdoor conditions than those normally used to operate by-pass dampers.

In winter, the geothermal coil can be used as a hydronic antifreeze system, which ensures considerable energy savings compared to electrical systems.

## CONTROL PANEL

### T-EP control

Residential Heat Recovery Counterflow units RHR-CF are equipped as standard with a T-EP control panel.


The use of the interface is very intuitive and thanks to the icons on the screen, the two keys and the touchpad, it is possible to display and change the operating status of the unit, display the values read by the temperature sensors and humidity sensor (if any), and display any alarm.

The use of the interface is simplified by the presence of two sub-menus:


- **User Settings Menu** where the user can select the operating mode and set the clock
- **Technical Settings Menu** where the installer can calibrate the flow rates, change the unit operating parameters and monitor the operating status.


The **user settings menu** is used to select the following unit operating modes:

- **Manual Mode:** customised selection of desired air flow rate in manual mode:
  - 100% - Nominal ventilation (standard)
  - 70% - Reduced ventilation (nighttime)
  - 45% - humidity control for high humidity rate environments
  - 25% - humidity control for low humidity rate environments

When this function is active on the main screen, the corresponding icon  will also be active

FIR

- **Party Mode:** timed function, active for 3 hours after activation, in which the nominal speed is increased by 30%. When this function is active on the main screen, the icon  will also be active

- **Holiday Mode:** anti-mould function with the fans at minimum speed. When this function is active on the main screen, the icon  will also be active


- **Automatic Mode:** speed controlled by means of an automatic control cycle relating to ambient instantaneous humidity and CO2 variations. This mode is only available for the Pro version or for units equipped with an air quality sensor (humidity or CO2).

When this function is active on the main screen, the icon  will also be active

The user menu is also used to set the clock and perform weekly programming.

The **technical settings menu** is used to:


- Confirm or edit the operating parameters
- Monitor the operating conditions
- Set the nominal calibration speed of the fans
- Enter and select the weekly program available to the user

The Residential Heat Recovery Counterflow units RHR-CF not equipped with electric antifreeze resistance, come with an **antifreeze function**, which, with a preventive logic, automatically sets the supply fan at minimum for 10 minutes every hour when the fresh air drops below  $-5^{\circ}\text{C}$ . Also, if the temperature drops below  $-10^{\circ}\text{C}$ , the unit stops automatically and a **"FROST"** alarm appears on the display. When the alarm is active, the unit switches off and restarts automatically when the critical climatic condition disappears. The "Frost" alert remains until the unit is switched off and back on. For units with electric resistance, both integrated and installed as an external accessory, the activation of the electric resistance is signalled on the T-EP with the activation of the icon .

## CONTROL PANEL


For more information about the electric resistance intervention logic, please refer to the dedicated chapters (p. 43-44).

Residential Heat Recovery Counterflow units RHR-CF are equipped with a **visual warning signal when the filter needs replacing**. The signal is displayed via an icon on the main screen of the T-EP panel.

When the filters need replacing, the icon  will turn on. Once the filters have been replaced, it is recommended to follow the warning icon removal procedure in order to reset the next countdown.

The T-EP control can be used to inhibit one or several functions among Party, Holiday, Manual, AUTO, machine shut-down ("OFF"), clock, weekly programming. When the **lock function** is active, the icon  will appear on the auxiliary function lock screen and the locked functions will be disabled on the user screens.

Through 3 different dry contacts, the electronic board is also used to control:

- the **remote ON/OFF function** (contact C1-C1 closed = unit OFF)
- the **"Booster"** mode (contact C2-C2 closed="Booster" active) that, as with the "Party mode", determines a 30% increase in fan speed with respect to the nominal speed for the next 3 hours. If the function is active, the corresponding icon  on the T-EP will also be active
- the "fireplace" function or the "boiler" function (contact C3-C3).  
If the unit is interfaced with a negative pressure ambient pressure switch and is set in the DIP-SWITCH configuration recommended in presence of a natural draught chimney, the unit is turned off automatically when the fireplace is lit. This occurs in order to prevent the ambient pressure induced by the action of the dual flow ventilation unit from counteracting the natural draught of the fireplace and releasing smoke into the room.  
If the unit is interfaced with a remote switch and is set in the DIPSWITCH configuration recommended in presence of an atmospheric boiler, the unit is forced into a strong imbalance supply mode in order to facilitate ignition of the boiler. The mode remains active as long as the switch stays in the activation position.

Refer to the Installation Manual for more information.

## Interfacing with Modbus protocol

The machines are equipped with a Modbus communication port that enables the units to be included in a supervisory network, which can be consulted from an operating control unit for their remote tracking, control and monitoring. Thanks to the interfacing with the Modbus protocol, finally, the Residential Heat Recovery Counterflow units can be integrated into the more complex context of a global Building Management System. The Technical Manual for interfacing Residential Heat Recovery Counterflow units with Modbus protocol is available on request.

## CENTRALISED CONTROL

Generally, Residential Heat Recovery Counterflow units RHR-CF operate at a constant flow rate, which can be set at a percentage of the nominal value configured during installation.

A variable flow mode (AUTO) is also available, according to a control based on the ambient air quality index reading (humidity or CO<sub>2</sub>). This way, it is the minimum unit flow rate to be required to obtain the necessary air quality, thus improving internal comfort and energy consumption.

The central air quality sensors can be placed directly in the room or in the air extraction ducts.

Since in any case the unit electronics are designed to control only one central sensor, the control strategy is called "Centralised Control".

Two types of measurements can be selected when using the central sensor:

- Internal relative humidity, i.e. a measurement of indoor air salubrity compared to the risk of mould proliferation. All units are equipped with a humidity sensor located in the extracted air duct (for standard units, the humidity sensor is available as an accessory).
- Concentration of carbon dioxide, i.e. a measurement of the level of internal occupation. The CO<sub>2</sub> sensor, not supplied, is a 0-10V type commonly available on the market, to be installed directly inside the occupied room.

Regardless of the type selected, the AUTO mode is only available if the sensor is physically connected to the main control board. If the CO<sub>2</sub> sensor and the humidity sensor are simultaneously connected to the main electronic board, the auto mode will refer to the measurements from the CO<sub>2</sub> sensor.

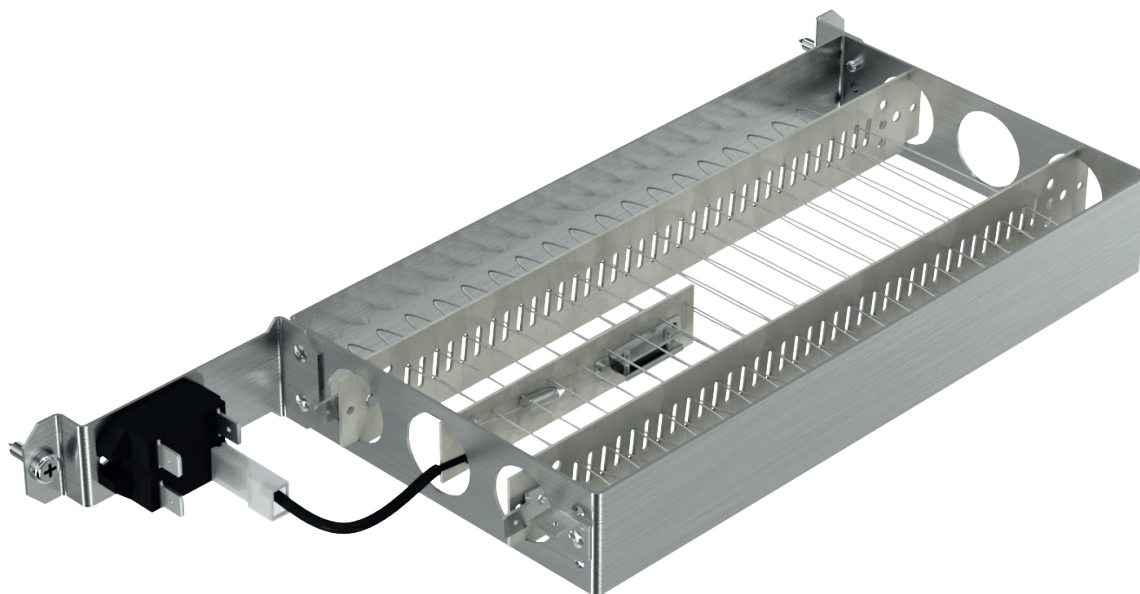
## VERSIONS WITH INTEGRATED RESISTANCES

When installing in regions with particularly harsh climatic conditions, the units must be equipped with an electric resistance (E versions). The latter is installed on the fresh air intake section so as to prevent freezing phenomena on the discharge air outlet side. If the fresh air temperature drops below the default limit, resulting in the risk of the counterflow heat exchanger freezing, the electric resistance is switched on and the thermal power is adjusted continuously in order to maintain the discharge air temperature within the desired range. The electric resistance is sized so as to ensure internal thermal comfort up to an outside temperature of -10°C and is designed to prevent the effects of frost while the temperature remains above -15°C. The units are kept in normal operating conditions until the supply air temperature drops below 5°C or until the outside temperature drops below -20°C; when these limits are exceeded, the machine is switched off for antifreeze emergency reasons ("Frost" alarm).

The electric resistance is fitted with a safety thermostat that turns off the unit in case of uncontrolled heating. In case the resistance does not start up, instead, the unit will turn off if the supply air temperature falls below 5°C.

| RHR-CF-V PRO and RHR-CF-V vertical version |      |
|--|------|
| Model                                      | W    |
| RHR-CF-V 180 PRO                           | 500  |
| RHR-CF-V 280 PRO                           | 900  |
| RHR-CF-V 370 PRO                           | 1250 |
| RHR-CF-V 460 PRO                           | 1600 |
| RHR-CF-V 170                               | 500  |
| RHR-CF-V 270                               | 900  |
| RHR-CF-V 360                               | 1250 |
| RHR-CF-V 460                               | 1600 |

| RHR-CF-H PRO horizontal and vertical version |     |
|--|-----|
| Model  | W   |
| RHR-CF-H 170 PRO                             | 600 |



## ACCESSORIES

### External electric heater

If a pre-heating coil is required only after the unit has been purchased, a circular electric heater accessory for duct application is available for each unit.

The electric heater technology has been selected and developed for typical HVAC applications. Armoured electric duct heaters have been used (single phase 230Vac - 50Hz power supply). The electric heater is equipped with all the required safety measures and is regulated through a modulated pulse width signal generated by the central PCB in response to operation of the PID controller.

**RHR-CF-V PRO and RHR-CF-V vertical version**

| Model            | Type        | W    |
|------------------|-------------|------|
| RHR-CF-V 180 PRO | RHR-EH 600  | 600  |
| RHR-CF-V 280 PRO | RHR-EH 900  | 900  |
| RHR-CF-V 370 PRO | RHR-EH 1250 | 1250 |
| RHR-CF-V 460 PRO | RHR-EH 1600 | 1600 |
| RHR-CF-V 170     | RHR-EH 600  | 600  |
| RHR-CF-V 270     | RHR-EH 900  | 900  |
| RHR-CF-V 360     | RHR-EH 1250 | 1250 |
| RHR-CF-V 460     | RHR-EH 1600 | 1600 |

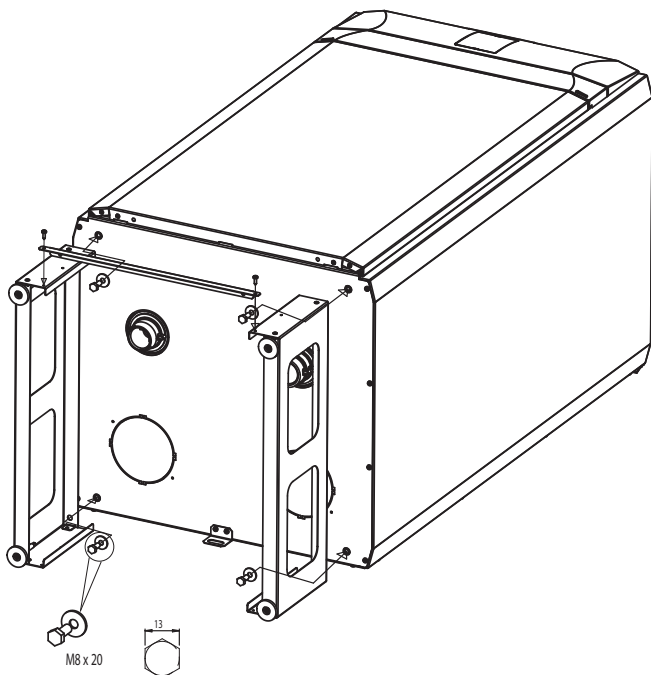
**RHR-CF-H PRO horizontal and vertical version**

| Model            | Type       | W   |
|------------------|------------|-----|
| RHR-CF-H 170 PRO | RHR-EH 600 | 600 |



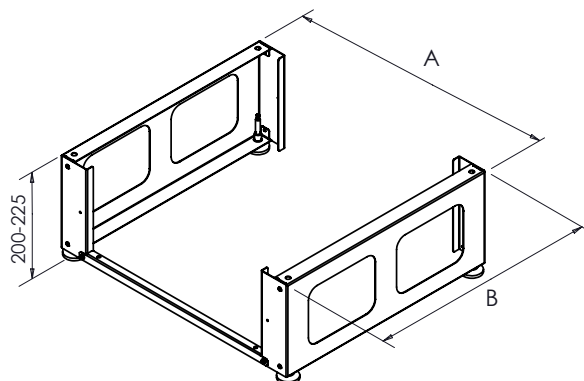
### Feet

Feet screwed in and lifting structure. The height of the feet can be adjusted from 200 to 225 mm.



**RHR-CF-V PRO and RHR-CF-V vertical version**

| Model            | Type             | A   | B   |
|------------------|------------------|-----|-----|
| RHR-CF-V 180 PRO | RHR-FEET 180-270 | 523 | 534 |
| RHR-CF-V 280 PRO | RHR-FEET 280-360 | 523 | 584 |
| RHR-CF-V 370 PRO | RHR-FEET 370-460 | 583 | 634 |
| RHR-CF-V 460 PRO | RHR-FEET 370-460 | 583 | 634 |
| RHR-CF-V 170     | RHR-FEET 170     | 523 | 549 |
| RHR-CF-V 270     | RHR-FEET 180-270 | 523 | 534 |
| RHR-CF-V 360     | RHR-FEET 280-360 | 523 | 584 |
| RHR-CF-V 460     | RHR-FEET 370-460 | 583 | 634 |



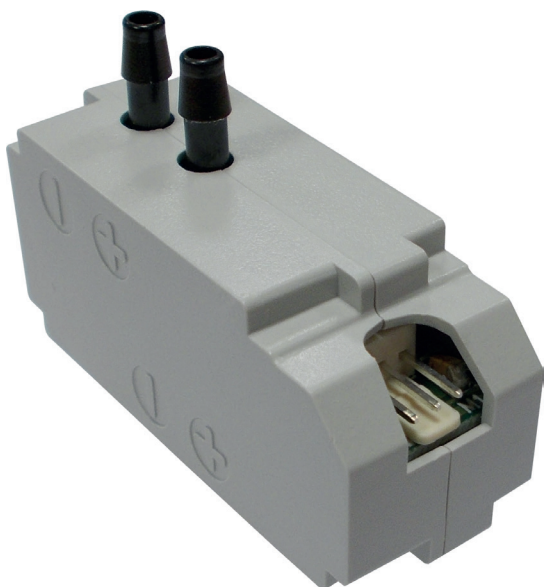
## ACCESSORIES

### Pressure sensor for automatic control of RHR-DP flow rates

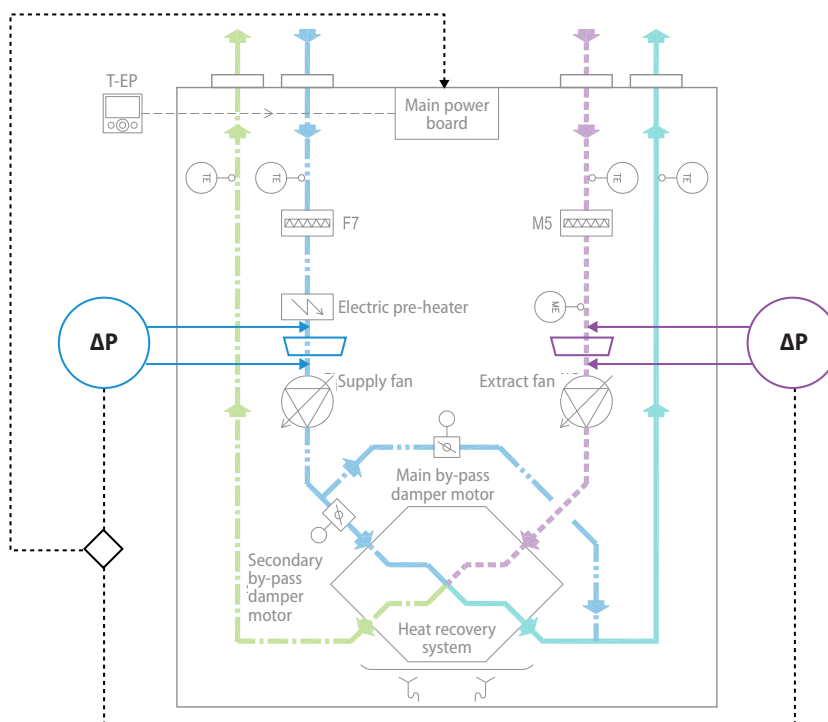
(standard on RHR-CF-V PRO, not available on RHR-CF-H PRO units)

RHR-CF-V units can be equipped with an automatic flow rate control device.

The calibration system of standard units consists in a manual balancing operation performed by the responsible technician, using a digital pressure gauge. After the first calibration, the unit control board is programmed to maintain the nominal and partial flow rate close to the desired value through fan speed control (indirect flow rate control method). Alternatively, an advanced control strategy is envisaged, enabling automatic flow rate calibration and maintaining it thanks to the action of differential pressure switches connected to the suction nozzles of the centrifugal fans. The pressure drop measured by this type of sensors is directly related to the flow rate of the fans, so that it can be considered as a direct flow rate measurement. If the units are equipped with accessory transmitters, the main control board detects the actual system flow rates at all times, making it react automatically to maintain the desired actual values.



| Type   | Code    |
|--------|---------|
| RHR-DP | 9021200 |



**Automatic control system**  
operating diagram

## ACCESSORIES

### Pressure sensor for automatic control of RHR-DP flow rates

(standard on RHR-CF-V PRO)

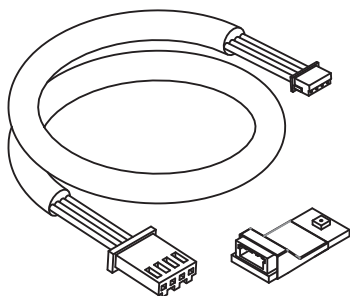
Below are the main benefits of installing an automatic flow rate control system on the units:

| Topic  | Benefits  |
|--|---|
| The flow rate calibration is much easier         | The system simply asks for the desired flow rate value and configures it automatically without any further intervention. No pressure gauges are required.   |
| The flow rate is not affected by filter clogging | <p>Without the automatic flow rate control system, failure to periodically replace the filters leads to an inevitable reduction in the flow rate that the unit manages to deliver.</p> <p>The system with direct measurement of the exchange flow rate through pressure transducers ensures that the flow rate stays constant regardless of the extent of filter clogging.</p> <p>The filters should however be replaced regularly according to the rules recommended in this brochure, since in any case filter clogging leads to a significant increase in the electric power consumption of the unit and does not guarantee the best hygienic standards.</p> |

The automatic flow rate control system is compatible with the “AUTO” variable flow modes.

### Capacitive humidity sensor

(standard on RHR-CF-V PRO)



| Type   | Code    |
|--------|---------|
| RHR-HR | 9021218 |



## TABLE OF COMPLIANCE WITH REGULATIONS EU 1253/14 AND EU 1254/14

### Compliance with EU 1253/14

| VERIFICATION ITEM   | DECLARATION OF CONFORMITY   |
|---|---|
| The VUs must be equipped with multiple speed drive or speed variator.                         | The units are equipped with centrifugal fans featuring backward-curved blades directly coupled with brushless synchronous electronic motors, with integrated inverter for continuous modulating speed through 0-10 V control signal.  |
| The SEC value, calculated for an average climate, should not exceed 0 kWh/(m <sup>2</sup> .a) | For models <b>RHR-CF-H 170 PRO, RHR-CF-V 180/280/370 PRO</b> , which belong to energy class A+, the SEC is below -42 kWh/m <sup>2</sup> a.<br><br>For models <b>RHR-CF-V 170/270/360/460</b> and <b>RHR-CF-V 460 PRO</b> , which belong to energy class A, the SEC is below 0 or equal to -40 kWh/m <sup>2</sup> a. |
| All BVUs must be equipped with a thermal bypass device  | To ensure the maximum amount of free-cooling, all units are provided with by-pass dampers for total by-pass of the heat recovery unit by the supply air flow  |

### Compliance with EU 1253/14 - Annex IV

|  |   |
|--|---|
| a) Supplier name or brand  | Lindab AB   |
| b) Supplier model identification   | <b>RHR-CF-H 170 PRO</b><br><b>RHR-CF-V 180/280/370/460 PRO</b><br><b>RHR-CF-V 170/270/360/460</b>   |
| c) Specific energy consumption (SEC) in kWh/(m <sup>2</sup> .a) for each applicable climate zone; and SEC class; | <b>RHR-CF-H 170 PRO</b><br><b>RHR-CF-V 180/280/370/460 PRO</b><br><br>Temperate Climate<br>-42.05/-42.32/-42.29/-42.47/-40.1 kWh/m <sup>2</sup> a<br>Cold Climate<br>-81.5/-81.6/-81.6/-82.0/-78.6 kWh/m <sup>2</sup> a<br>Hot Climate<br>-16.8/-17.2/-17.2/-17.2/-15.4 kWh/m <sup>2</sup> a<br><br><b>RHR-CF-V 170/270/360/460</b><br><br>Temperate Climate<br>-39.4/-39.3/-39.7/-38.4 kWh/m <sup>2</sup> a<br>Cold Climate<br>-77.2/-76.9/-78.3/-76.6 kWh/m <sup>2</sup> a<br>Hot Climate<br>-15.2/-15.1/-14.9/-13.9 kWh/m <sup>2</sup> a |
| d) Type declared according to EU 1253/14   | BVU   |
| e) Type of drive installed   | Continuous speed variator   |

## TABLE OF COMPLIANCE WITH REGULATIONS EU 1253/14 AND EU 1254/14

| VERIFICATION ITEM   | DECLARATION OF CONFORMITY  |
|---|--|
| f) Type of heat recovery system   | Static sensitive heat recovery unit  |
| g) Thermal efficiency of the heat recovery unit according to EU 1253/14                       | <p><b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/>           92.1%/91.5%/91.4%/92.5%/88.6%</p> <p><b>RHR-CF-V 170/270/360/460</b><br/>           87.0%/86.5%/90.1%/88.6%</p>                                     |
| h) Maximum flow rate  | <p><b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/>           170/180/280/370/460 m<sup>3</sup>/h</p> <p><b>RHR-CF-V 170/270/360/460</b><br/>           170/270/360/460 m<sup>3</sup>/h</p>                       |
| i) Power absorbed by the fan drive, including all motor control devices, at maximum flow rate | <p><b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/>           50/50/70/120/215 W</p> <p><b>RHR-CF-V 170/270/360/460</b><br/>           45/76/125/215 W</p>  |
| j) Sound power level $L_{WA}$   | <p><b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/>           44.9/38.9/43.1/46.3/47.9 dBA</p> <p><b>RHR-CF-V 170/270/360/460</b><br/>           40.6/46.6/49.0/47.9 dBA</p>                                      |
| k) Reference flow rate  | <p><b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/>           120/130/200/260/320 m<sup>3</sup>/h</p> <p><b>RHR-CF-V 170/270/360/460</b><br/>           120/190/250/320 m<sup>3</sup>/h</p>                       |
| l) Reference pressure difference  | 50 Pa  |
| m) SPI  | <p><b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/>           0.193/0.174/0.174/0.179/0.237 W/m<sup>3</sup>/h</p> <p><b>RHR-CF-V 170/270/360/460</b><br/>           0.183/0.184/0.209/0.237 W/m<sup>3</sup>/h</p> |

## TABLE OF COMPLIANCE WITH REGULATIONS EU 1253/14 AND EU 1254/14

| VERIFICATION ITEM   | DECLARATION OF CONFORMITY   |
|---|---|
| n) Control factor and type of control in compliance with the relevant definitions and classification as set out in Annex VIII, Table 1  | <p><b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/> CTRL = 0.85<br/> Centralised ambient control with humidity sensor</p> <p><b>RHR-CF-V 170/270/360/460</b><br/> CTRL = 0.95<br/> Timer control</p>   |
| o) Maximum percentages declared (%) of internal and external leakage  | <p>Internal leakage:<br/> <b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/> 0.5%/1.2%/0.7%/0.5%/0.3%</p> <p><b>RHR-CF-V 170/270/360/460</b><br/> 0.4%/0.4%/0.7%/0.3%</p> <p>External leakage:<br/> <b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/> 2.3%/1.7%/1.0%/0.8%/0.7%</p> <p><b>RHR-CF-V 170/270/360/460</b><br/> 1.8%/1.4%/2.7%/0.7%</p> |
| q) Position and description of the visual warning signal relating to the filter for RVUs intended for use with filters, including a text that emphasizes the importance of replacing the filter at regular intervals in order to safeguard unit performance and energy efficiency | <p>Please refer to the following parts of the brochure:</p> <ul style="list-style-type: none"> <li>• T-EP control description</li> <li>• Recommendations for filter replacement</li> </ul>  |
| s) Internet address with the disassembly instructions as indicated in point 3   | www.lindab.com  |
| v) AEC (Annual Energy Consumption)  | <p><b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/> Temperate 220/203/203/207/260 kWh/a<br/> Hot 175/158/158/162/215 kWh/a<br/> Cold 757/740/740/744/797 kWh/a</p> <p><b>RHR-CF-V 170/270/360/460</b><br/> Temperate 252/253/281/313 kWh/a<br/> Hot 207/208/236/268 kWh/a<br/> Cold 789/790/818/850 kWh/a</p>  |
| w) AHS (Annual Heating Energy Savings)  | <p><b>RHR-CF-H 170 PRO</b><br/> <b>RHR-CF-V 180/280/370/460 PRO</b><br/> Temperate 4690/4670/4667/4697/4591 kWh/a<br/> Hot 2120/2111/2110/2124/2076 kWh/a<br/> Cold 9170/9136/9131/9189/8982 kWh/a</p> <p><b>RHR-CF-V 170/270/360/460</b><br/> Temperate 4507/4492/ 4601/ 4555 kWh/a<br/> Hot 2038/2031/ 2080/ 2060 kWh/a<br/> Cold 8817/8787/ 8787/ 8912 kWh/a</p>                       |



## Good Thinking

**At Lindab**, good thinking is a philosophy that guides us in everything we do. We have made it our mission to create a healthy indoor climate – and to simplify the construction of sustainable buildings. We do that by designing innovative products and solutions that are easy to use, as well as offering efficient availability and logistics. We are also working on ways to reduce our impact on our environment and climate. We do that by developing methods to produce our solutions using a minimum of energy and natural resources, and by reducing negative effects on the environment. We use steel in our products. It's one of few materials that can be recycled an infinite number of times without losing any of its properties. That means less carbon emissions in nature and less energy wasted.

**We simplify construction**