

COLD.

Concept explained



Foreword

We are living in challenging times. Climate change is in full swing, raising the temperatures in summer in many countries. On the other hand, there is a need to lower our emissions and energy consumption. Our 35+ years of experience with small and large scale HVAC projects have helped us recognize the need and convenience of treating the air introduced into the building by a mechanical ventilation heat recovery unit. We at Remty-R believe the **COLD.** systems designed for cooling (and heating) in MVHR systems are an efficient and logical step forward in ensuring the well-being and comfort of the residents. However, we must not forget our common goal of reducing the emissions and preserving the planet. The only way to achieve both is to combine the best materials and knowledge. We hope you will find some in this little booklet.

Conditioning the air in centralised MVHR system

A Mechanical Ventilation Heat Recovery (MVHR) system is great addition to the building, ensuring fresh air and saving energy that would otherwise be lost. But, depending on the location of the building and season, there are weather conditions that require a bit more to establish comfortable conditions inside the building. One such case is during the summer season when outside temperatures reach their peak. With higher outdoor temperatures, the air has a higher ability to accumulate moisture. This means the absolute humidity values are much higher than the rest of the year.

Since the indoor temperatures in summer are typically 10°C lower than outside, a MVHR unit is able to cool (sensible) the hot incoming air. But this temperature difference is not enough for any serious cooling effect. What is even more problematic is that in the long run we supply the building with hot and humid air – we did not achieve any dehumidification in the heat exchanger of the MVHR unit.

Below is example of summer conditions of modern heat recovery unit with 90% heat recovery rate (non enthalpic heat exchanger):

Outdoor air: 35°C 50%rh

Indoor air: 25°C 60%rh

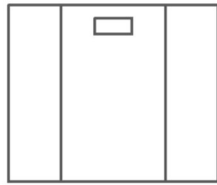
Extract air: 33°C 42%rh

Supply air: 27°C 80%rh

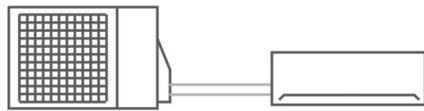
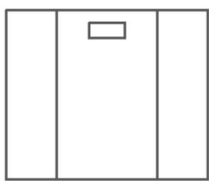
Looking at supply air temperature and humidity, it would be better to shut down the MVHR unit, but we need to breathe air...

Often family homes with MVHR systems have AC split systems installed on the wall or ceiling at the top of the staircase to help cool and dehumidify the air inside the building. They have better conditions compared to not having AC system, but individual rooms still get hot and humid air supplied by MVHR system. The effect of local (room) overpressure does not permit the cool air from staircase to enter the room. This results in discomfort because of formation of hot and cold zones inside the building. Some buildings may have either split AC or fancoil units inside each room. This way they achieve desired temperatures, but depending on the position of the AC/fancoil unit there is high possibility of discomfort due to blowing and noise.

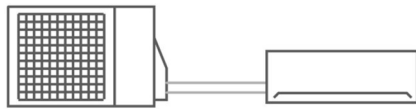
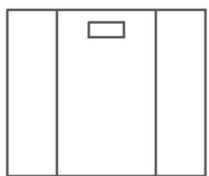
Good solution to the problem is conditioning the air that we supply to the rooms. We must cool the air below the point of condensation, thus reducing the temperature as well as moisture content. This will ensure pleasant indoor temperatures as well as reduced humidity and constant supply of fresh air. The supply distribution system will ensure low noise and blow free experience. Below is a summary of different combinations and their effect in summer season:



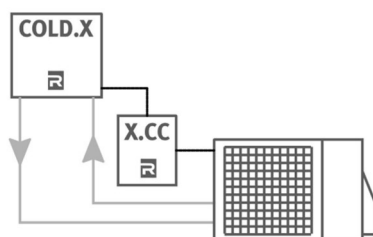
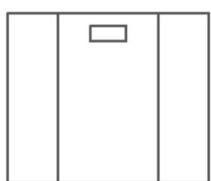
Only MVHR:
Hot and humid air supplied to the rooms.



MVHR with split AC:
Lower temperature but still humid air supplied to the rooms and with this formation of cold and hot zones.



MVHR with split AC for every room:
Good indoor conditions but not comfortable in terms of sound and blowing, also high investment.



MVHR with **COLD.X**:
Good indoor conditions with low noise and no blowing. Best in terms of price and performance.

On next pages we will explore different systems available in the **COLD.** family, developed specifically for central MVHR systems.

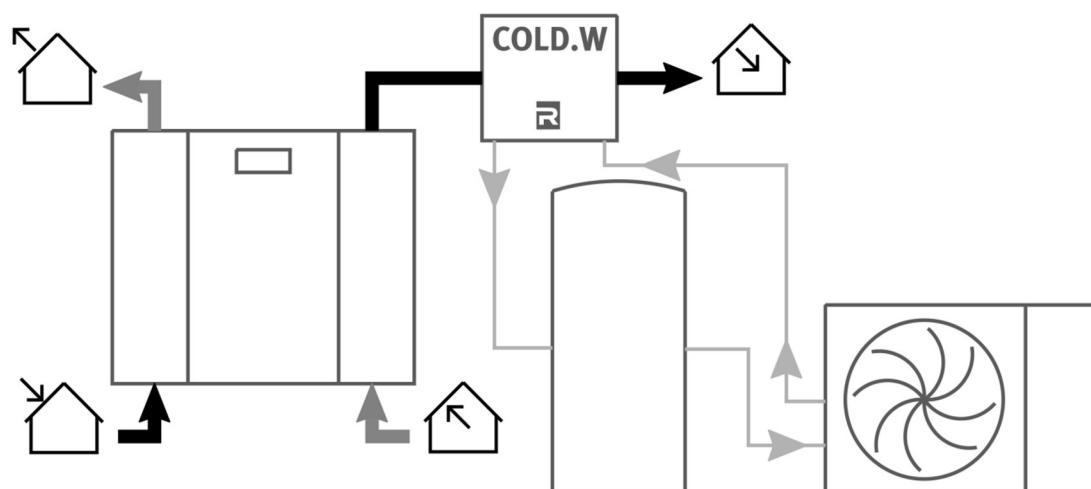
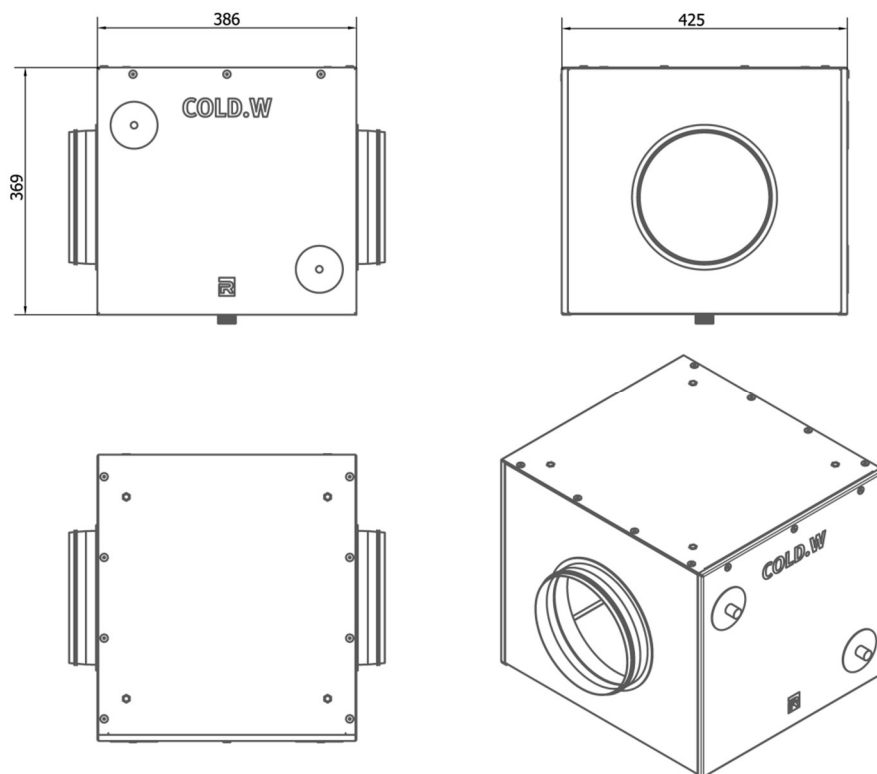
COLD.W



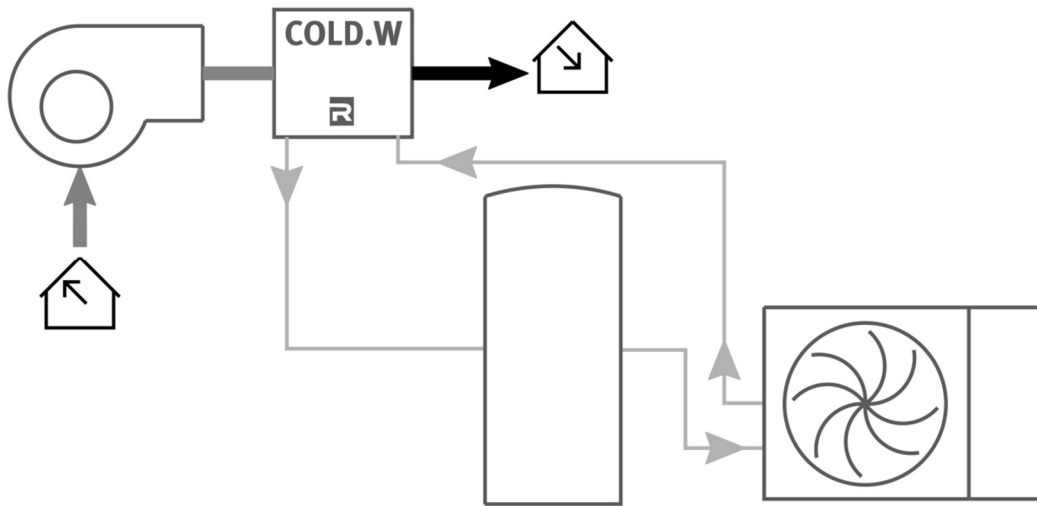
COLD.W is water (glycol) type heat exchanger intended for post cooling/heating in the MVHR system. It is best suited for combination with hydronic systems – heat pumps. There are many new homes built with heat pumps as a main source of heating and cooling. Majority of them have radiant water heating system installed for efficient heating in winter season. However radiant cooling in the summer cannot help with reducing the air humidity, which is one of the main parameters defining the comfort. **COLD.W** in comparison to radiant cooling, greatly reduces the temperature of the air but more importantly it dehumidifies the air. **COLD.W** can therefore be used as only cooling system or be used in combination with radiant cooling if more sensible cooling power is required.

Since temperatures of the air leaving **COLD.W** unit can be as low as 12°C, supply air distribution system must be insulated with closed cell insulation to prevent condensation forming on the outside of the ducts and elements of distribution system.

Weight	11.5kg
Air connections (diameter)	200mm
Piping connections	½"
Condensate drain connection	DN32
Cooling power (W7/10, IN600m³/h@27°C/60%rh)	3.3kW
Heating power (W45/40, IN600m³/h@20°C/30%rh)	3.5kW
Max. airflow	600m³/h
Max. medium temperature	60°C
Min. medium temperature	0°C
Max. medium pressure	8bar



Typical use of **COLD.W** unit with MVHR system and heat pump (see explanation of symbols on last page).



COLD.W used with fan in recirculating mode.

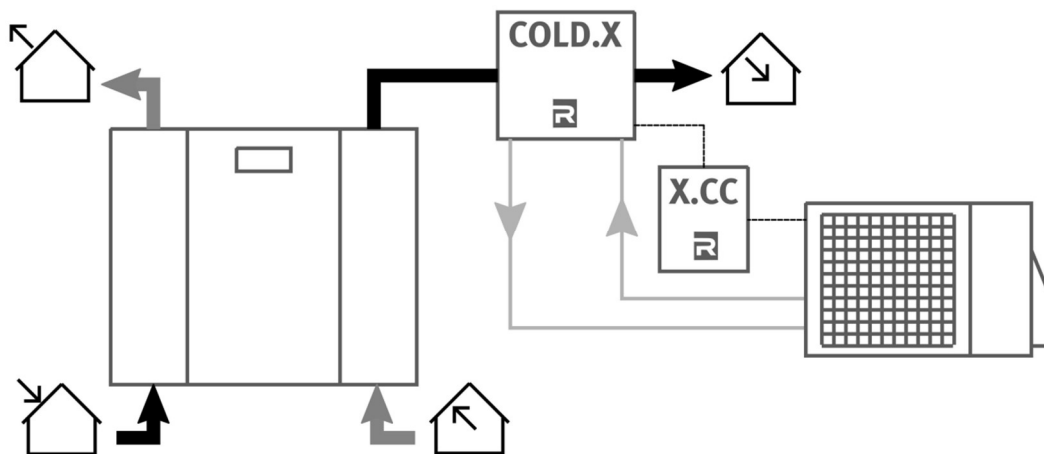
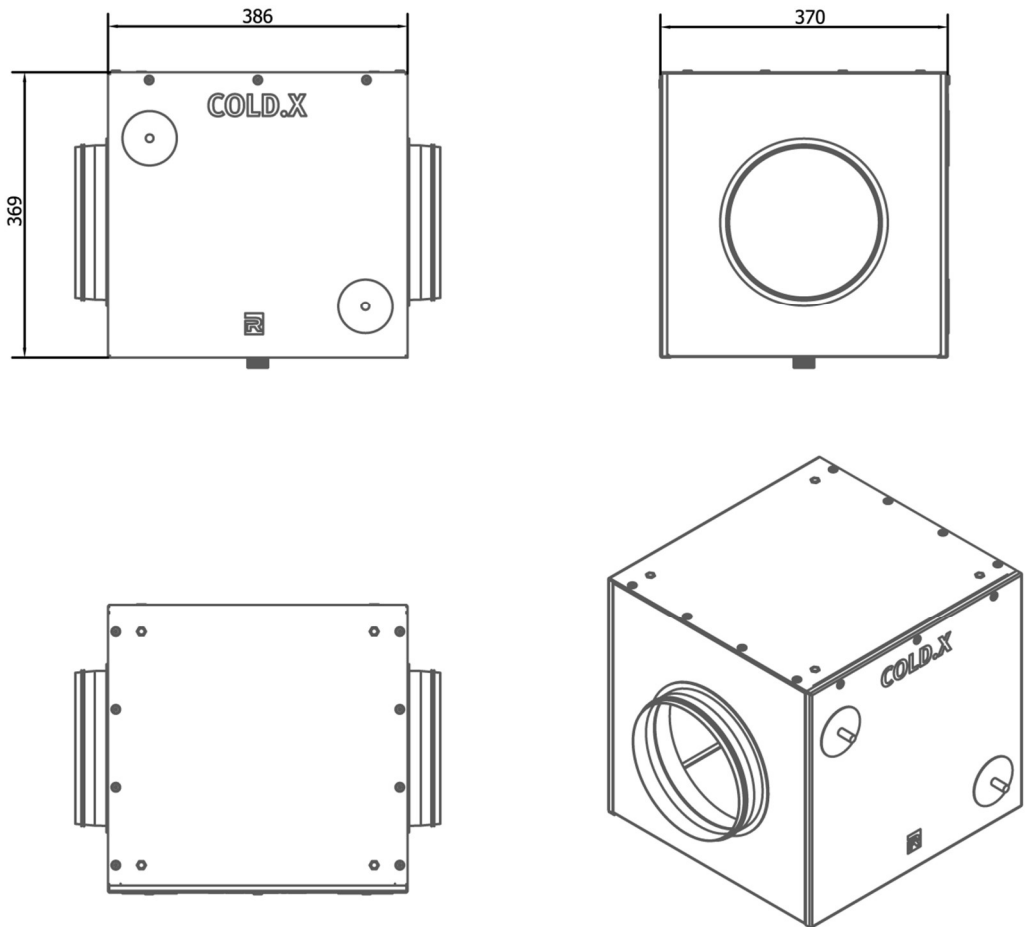
COLD.X



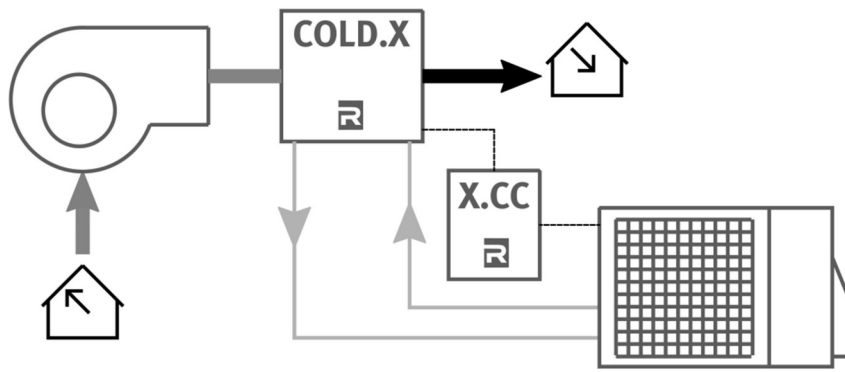
COLD.X is direct expansion type heat exchanger intended for post cooling (post heating if used as condenser) in the MVHR system. **COLD.X** must be combined with split AC outdoor unit of suitable capacity (2.5kW – 3.5kW) with possibility of external control and smart control system ensuring good and reliable working. The installation is generally the same as typical split AC system. As with the **COLD.W** unit, **COLD.X** can be standalone solution for cooling or be used in combination with radiant cooling to achieve more sensible power. Again, the low temperature of the supply air means that distribution system must be insulated with closed cell insulation to prevent condensation forming on the outside of the ducts and elements of distribution system.

Weight	10kg
Air connections	200mm
Piping connections	SAE1/4 and SAE3/8
Internal volume	0.7l
Condensate drain connection	DN32
Cooling power (600m ³ /h, IN 27°C/60%rh)*	3.2kW
Heating power (600m ³ /h, IN 18°C/30%rh)*	3.3kW
Min. airflow (depends on parameters of supply air)	~150m ³ /h
Max. airflow	600m ³ /h
Max. medium pressure	42bar

*Depends on the outdoor unit type.

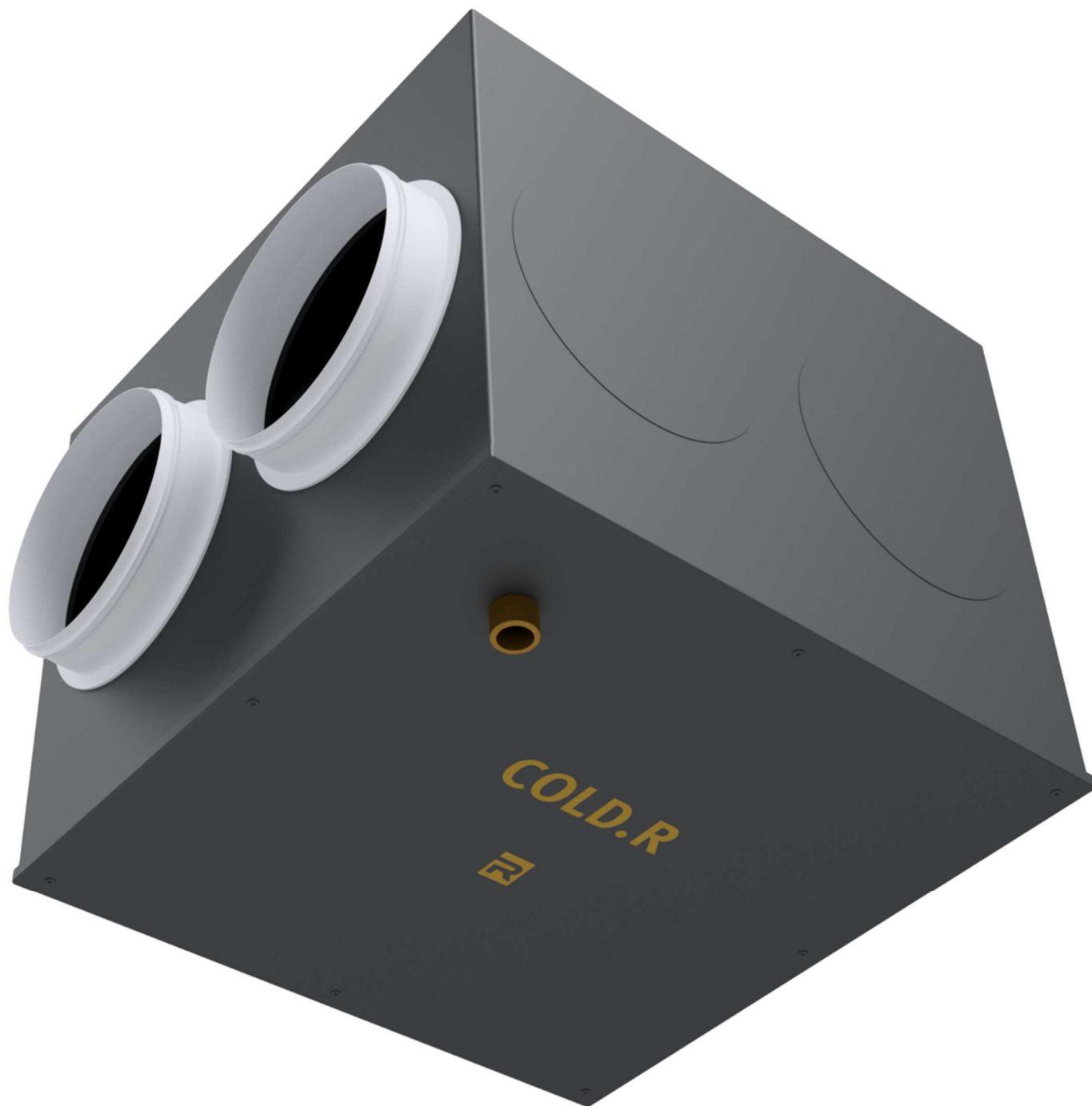


Typical use of **COLD.X** unit with MVHR system.



COLD.X used with fan in recirculating mode.

COLD.R



COLD.R is air heat recovery exchanger intended to be used in combination with either **COLD.W** or **COLD.X** unit, for existing MVHR installation, where supply distribution system cannot be insulated. Since temperatures of the supply air leaving **COLD.W** or **COLD.X** unit can be very low, **COLD.R** raises the temperature to around 20°C. This is normally above the wet bulb temperature of air inside the building and this way condensation forming on the outside of the ducts and elements of distribution system is prevented. We sacrifice some sensible cooling power, but the effect of fully dehumidified and to some degree cooler air is achieved. If more sensible power is required, combination with radiant cooling is very good option. In existing installations this is only way to ensure comfort efficiently.

Weight

8kg

Air connections

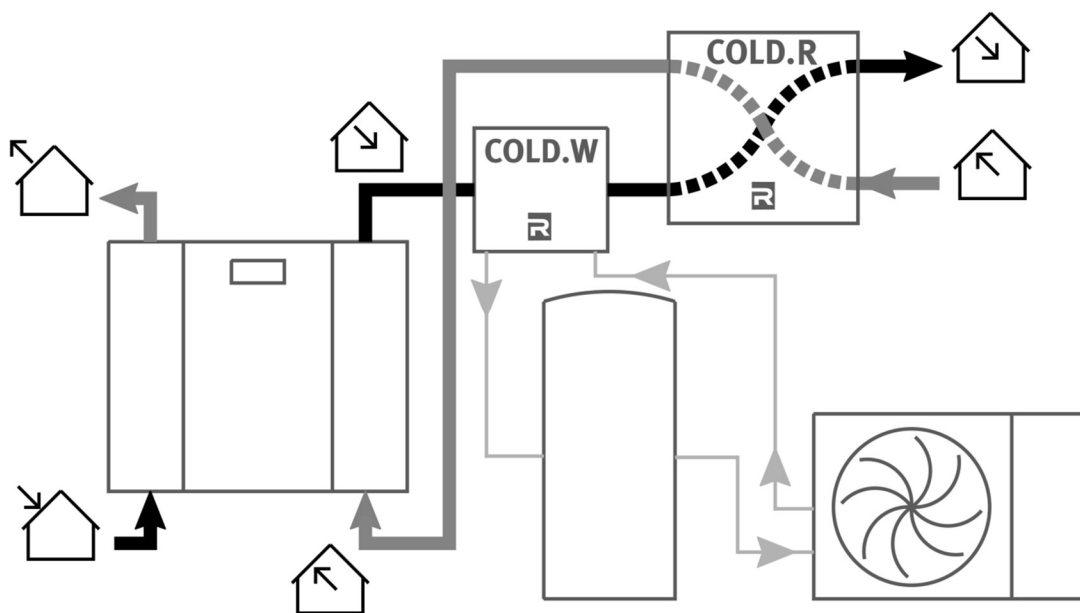
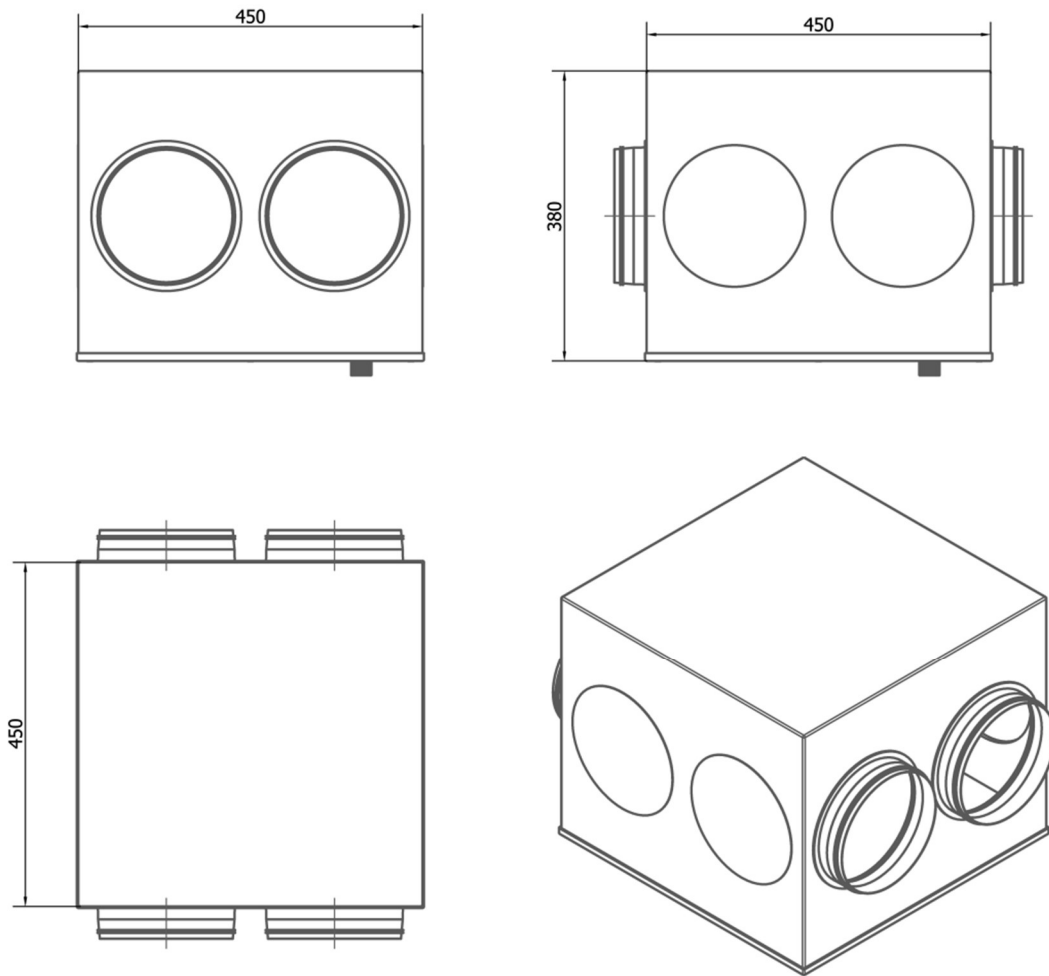
180mm

Condensate drain connection

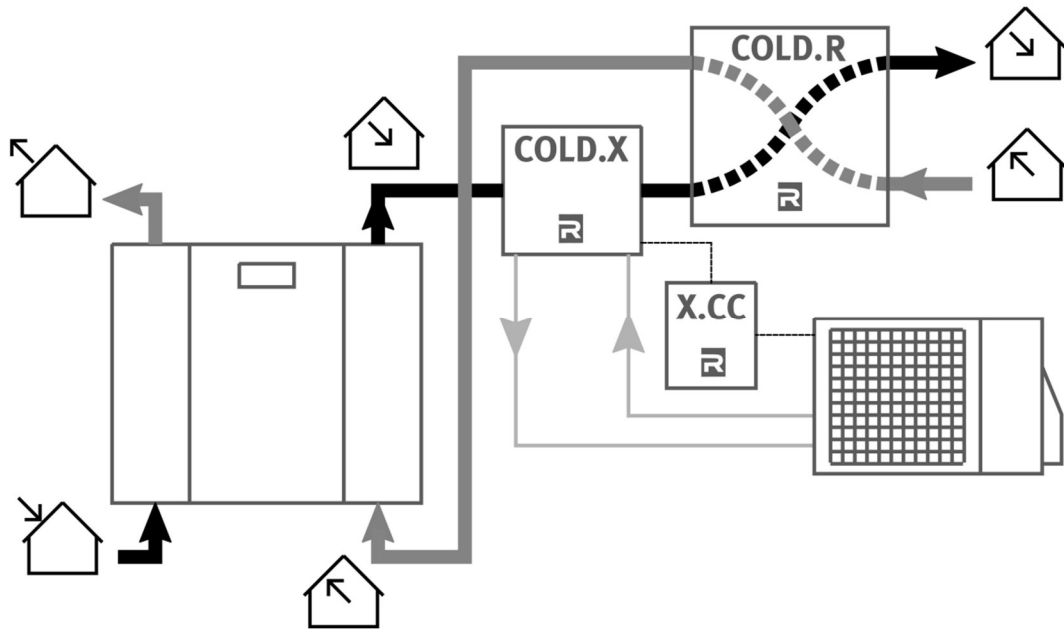
DN32

Max. airflow

400m³/h





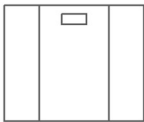



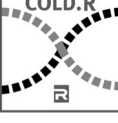
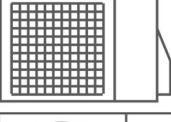





MVHR system in combination with **COLD.R** + **COLD.W** and heat pump.



MVHR system in combination with **COLD.R + COLD.X**.

Legend

	Outdoor air (ODA)
	Supply air (SUP)
	Extract air (ETA)
	Exhaust air (EHA)
	Mechanical ventilation heat recovery unit
	COLD.W duct water cooler/heater
	COLD.X duct direct expansion cooler/heater
	COLD.X control cubicle
	COLD.R duct heat recovery unit
	AC outdoor unit
	Heat pump unit
	Water inertia tank
	Fan