COLD.

Concept explained

Cooling solutions for your MVHR system.

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):

Air from outside: 35°C 50%rh

Air from inside: 25°C 60%rh

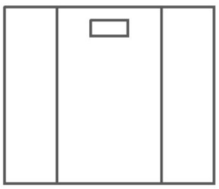
Air to outside: 33°C 42%rh

Air to inside: 27°C 80%rh

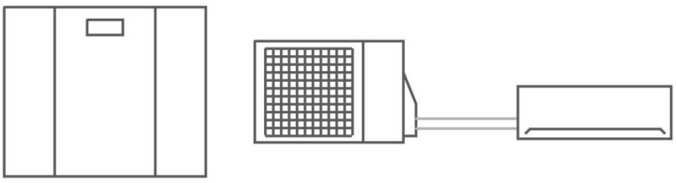
Looking at air to inside temperature and humidity, it would be better to shut down the MVHR unit, but we need to breathe air...

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.

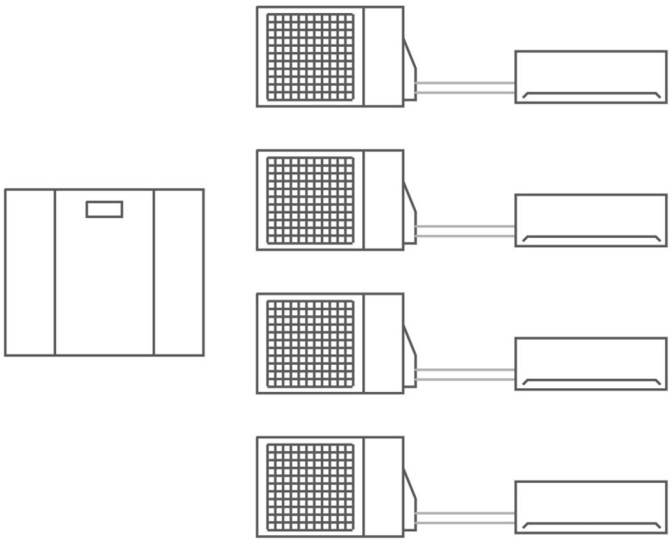
Good solution to the problem is conditioning the air that we supply to the rooms. We must cool the air below the point of condensation, thus reducing the temperature as well as moisture content. This will ensure pleasant indoor temperatures as well as reduced humidity and constant supply of fresh air. 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:



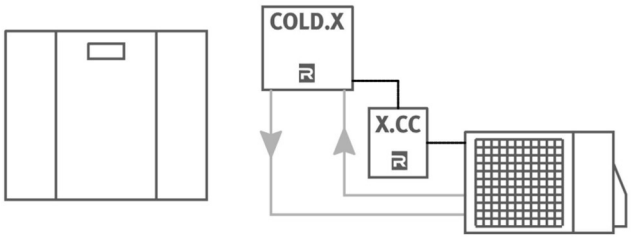
Only MVHR:
Hot and humid air supplied to the rooms.



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.

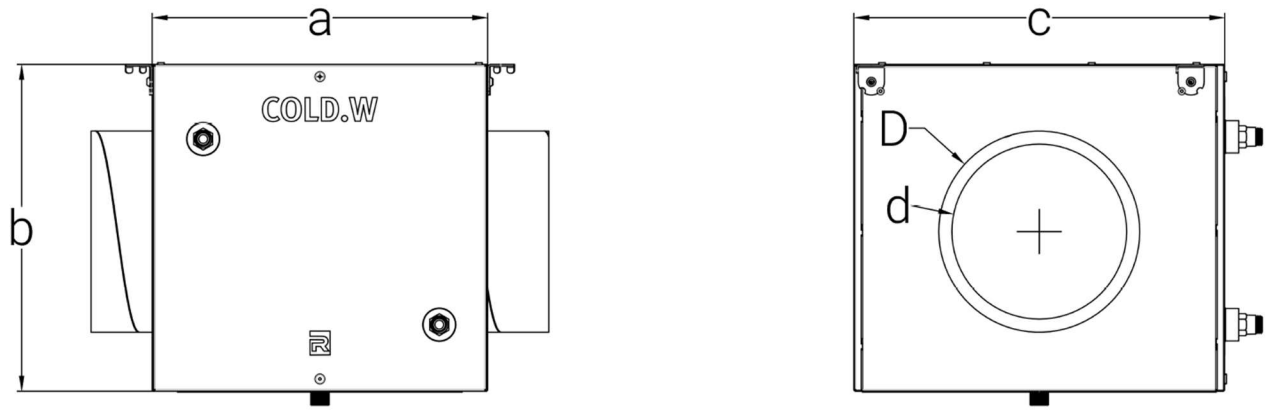
COLD.W

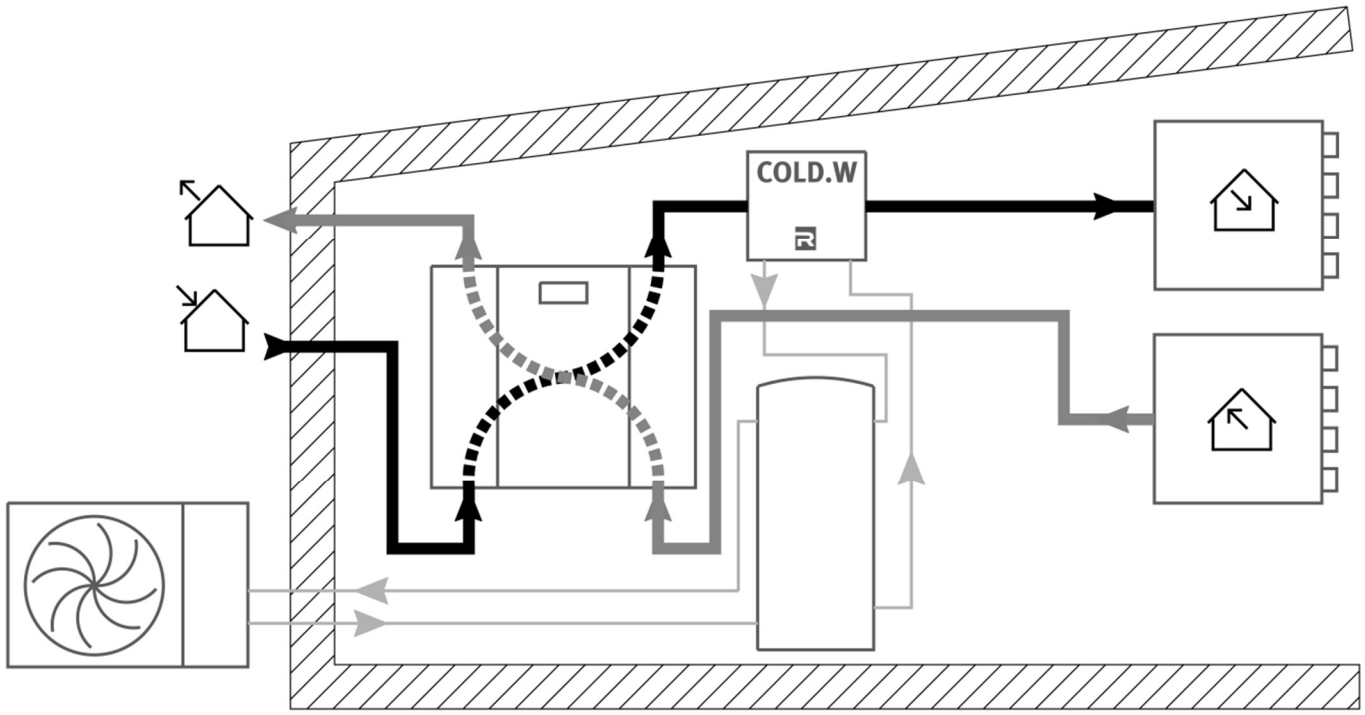
COLD.W is water (glycol mix) type heat exchanger intended for post cooling/heating in the MVHR system. It is best suited for combination with hydronic systems – heat pumps. There are many new homes built with heat pumps as a main source of heating and cooling. Majority of them have radiant water heating 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 lower than 10°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 and dimensions (a x b x c)	16kg (384x374x425mm)
Air connections (D/d)	232/200mm
Piping connections	½"
Condensate drain connection	DN32
Cooling power (W7/10, IN600m^3/h@27°C/60%rh)	3.3kW
Heating power (W45/40, IN600m^3/h@20°C/30%rh)	3.5kW
Max. airflow	600m^3/h
Max. medium temperature	60°C
Min. medium temperature	0°C
Working/test medium pressure	16/18bar

*Water flow = 612l/h





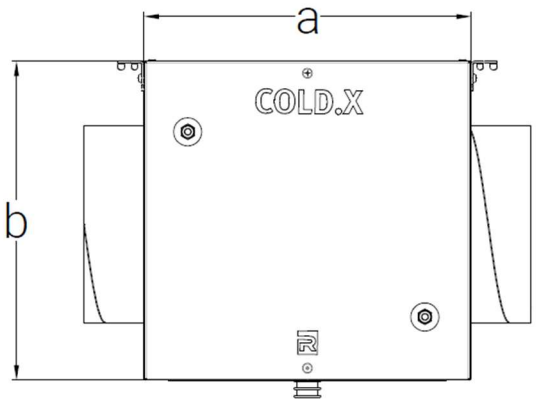
Typical use of COLD.W unit with MVHR system pump (see explanation of symbols on last page).

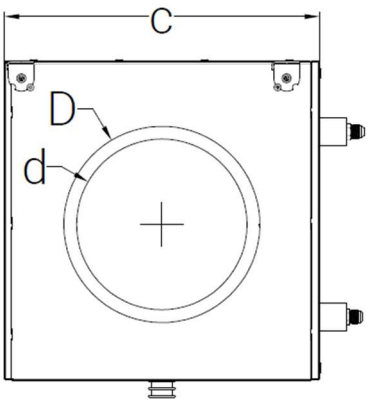
COLD.X

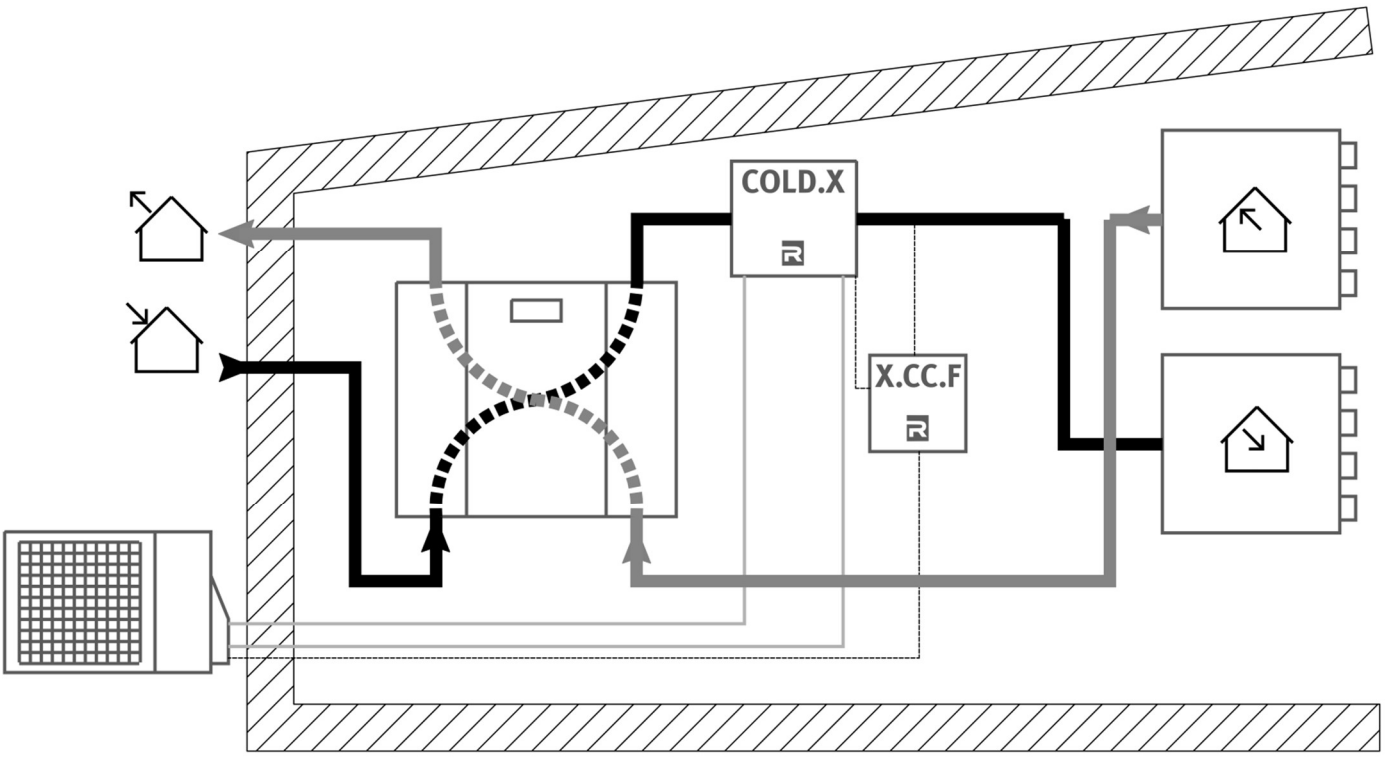
COLD.X is direct expansion type heat exchanger intended for post cooling (post heating if used as condenser) in the MVHR system. COLD.X must be combined with split AC outdoor unit of suitable capacity (2.5kW – 3.5kW) with possibility of external control and smart control system ensuring good and reliable 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 and dimensions (a x b x c)	17 kg (384x374x370mm)
Air connections (D / d)	232/200mm
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
Working/test pressure (medium)	42/61bar

*Depends on the outdoor unit type.







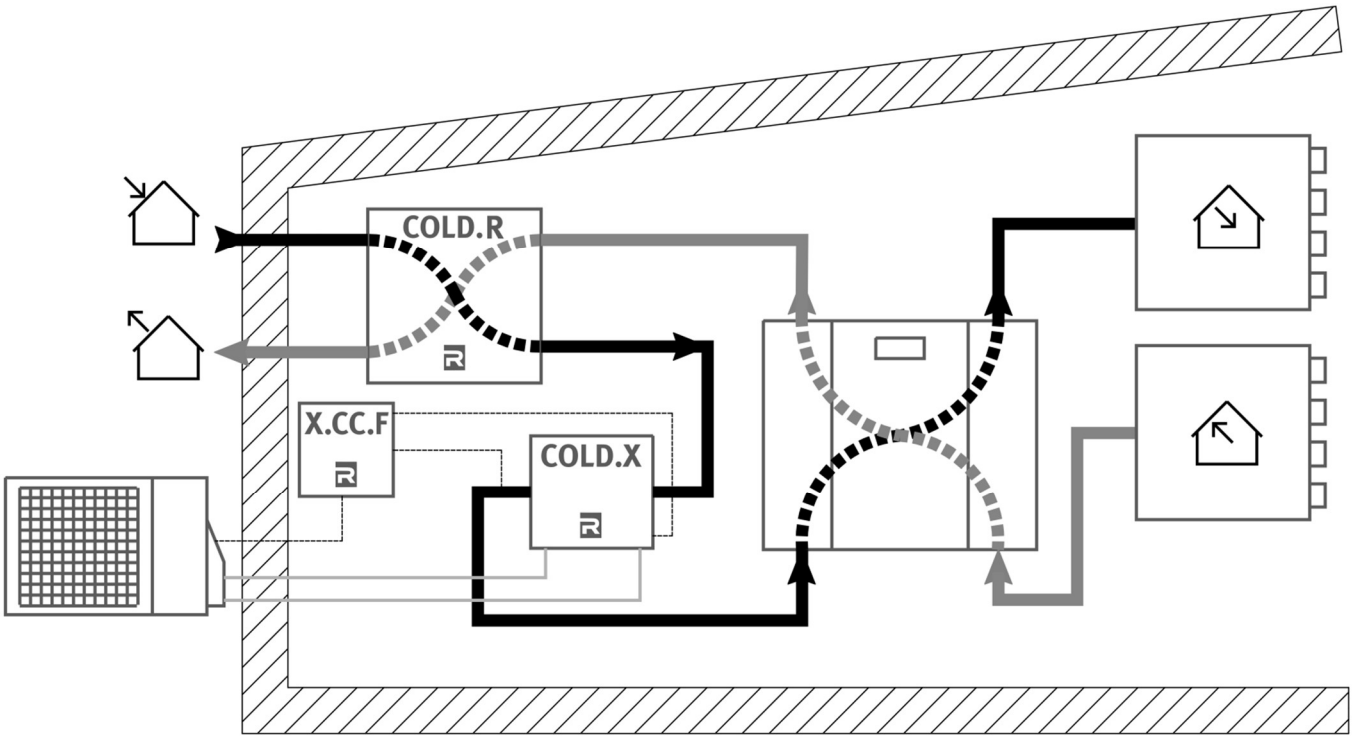
Typical use of COLD.X unit with MVHR system.

COLD.R

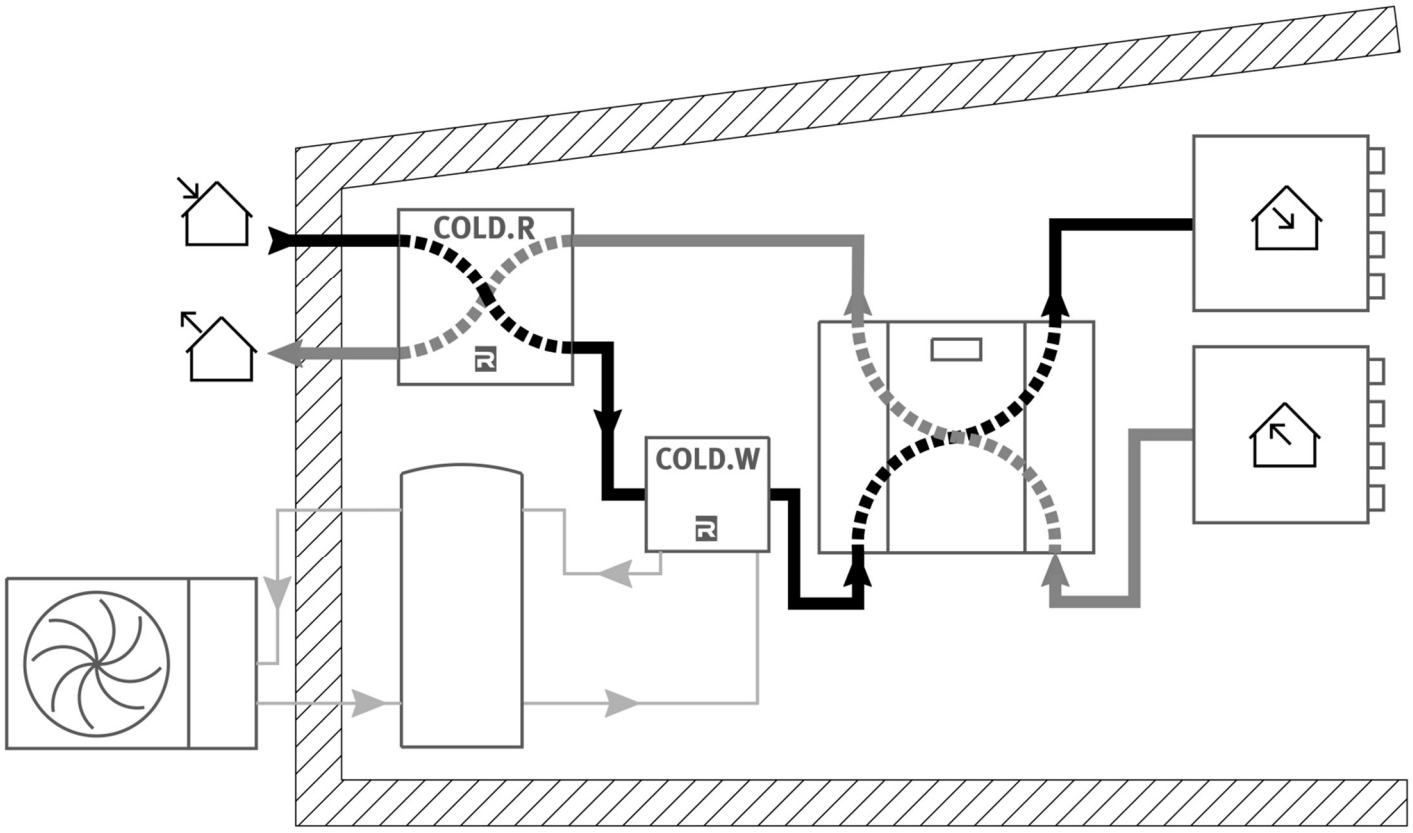
COLD.R is air heat recovery exchanger intended to be used in combination with either COLD.W or COLD.X unit, for existing MVHR installation, where supply distribution system cannot be insulated. There are two possible use cases for COLD.R unit. We can use it “before” or “after” the MVHR unit.

When there is lack of space between MVHR unit and distribution boxes, COLD.R can be used with COLD.W or COLD.X before the MVHR unit. COLD.R unit will in this case lower the temperature of air from outside, ensuring it’s kept below 30°C which is the limit for inlet air temperature to the COLD.X unit. It is however important to choose COLD.R version

with filter (air from outside). If this configuration is used with COLD.W unit, glycol/water mix must be used to avoid frost damage in the winter.

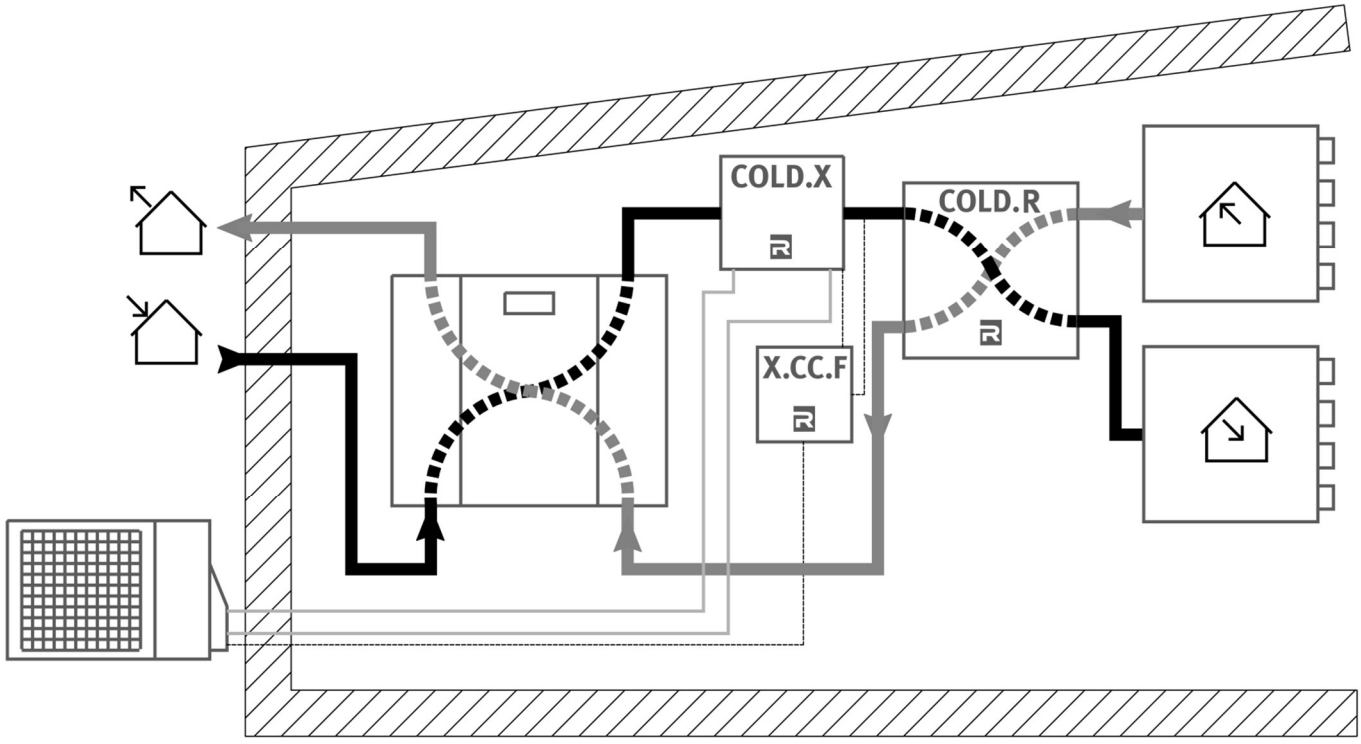


COLD.R with COLD.X before MVHR unit.

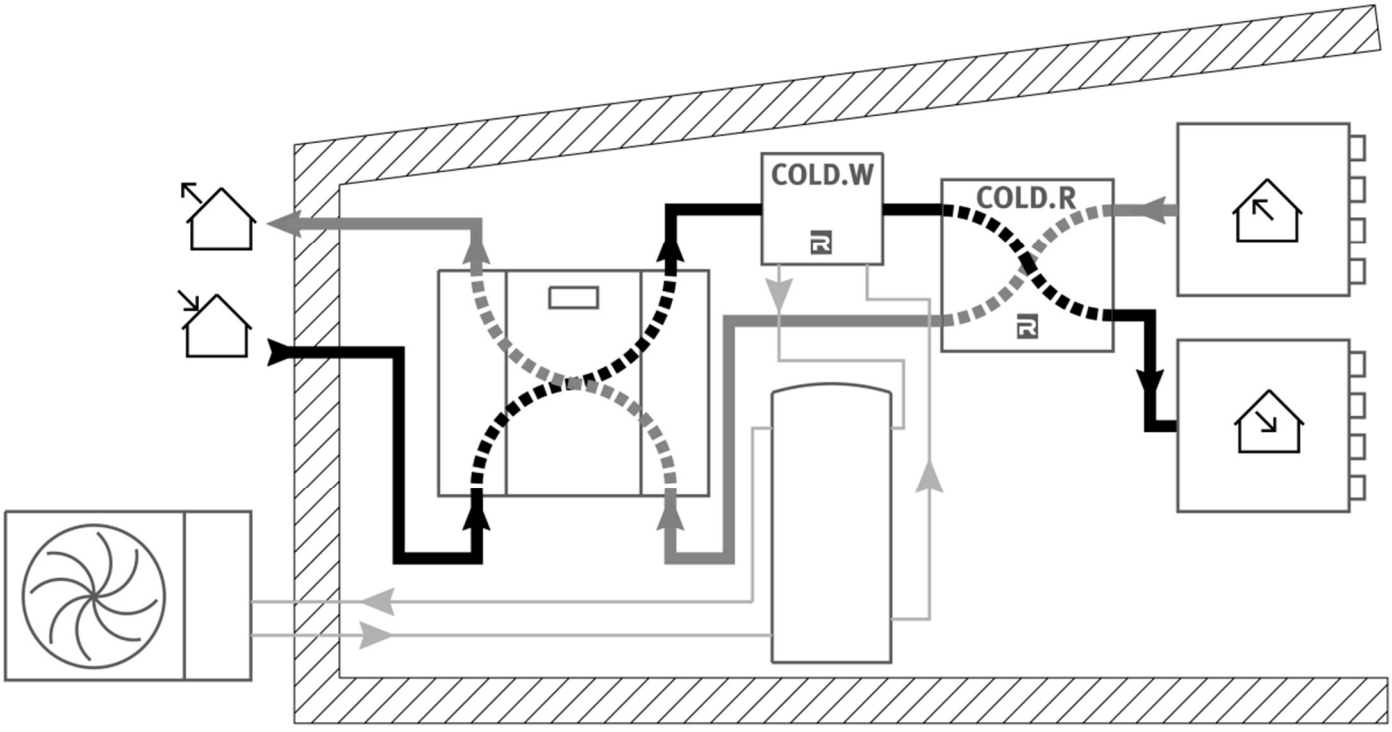


COLD.R with COLD.W before MVHR unit.

Other use case is to place COLD.R with COLD.W/X after the MVHR unit. This is slightly more efficient due to MVHR unit usually having higher heat transfer efficiency.



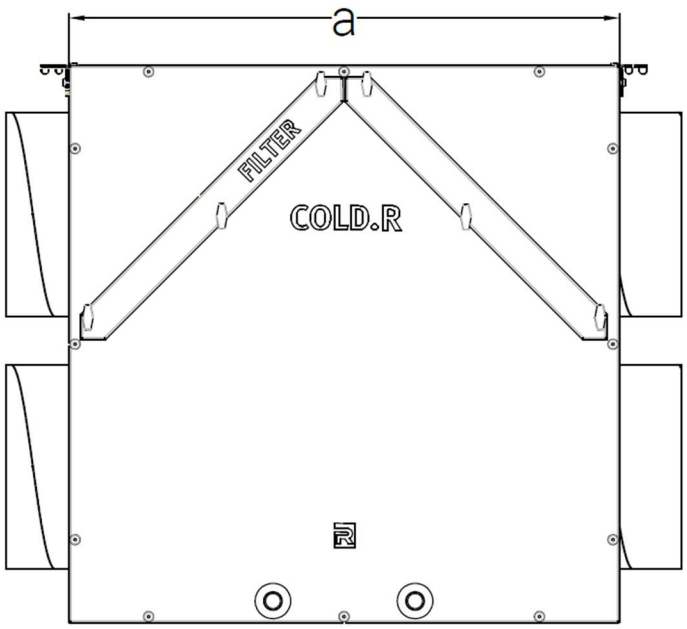
COLD.R with COLD.X after MVHR unit.

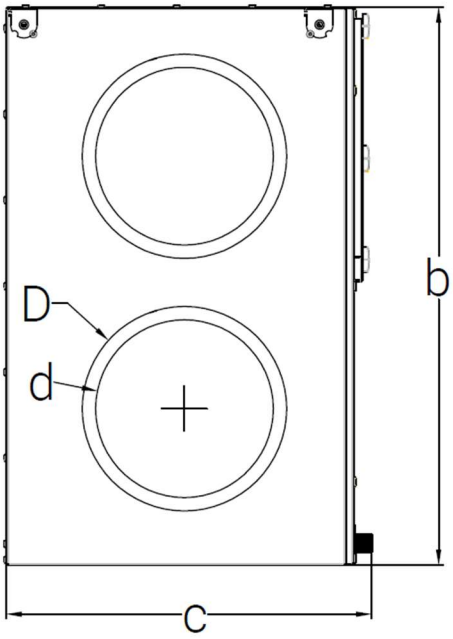


COLD.R with COLD.W after MVHR unit.

Temperature of air to inside is usually around 20°C and 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.

Version	COLD.R.4	COLD.R.6
Dimensions (a x b x c)	599x490x448 mm	740x630x412 mm
Weight	20 kg	25kg
Air connections (D/d)	212/180mm	232/200mm
Condensate drain connection	DN32	DN32
Max. airflow	400m³/h	600m³/h





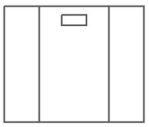
Legend

From outside

To inside

From outside

To outside



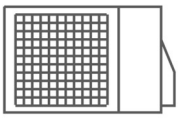
Mechanical Ventilation Heat Recovery unit (MVHR)

COLD.W duct water cooler/heater

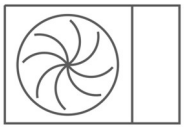
COLD.X duct direct expansion cooler/heater

COLD.X control cubicle

COLD.R air heat recovery unit

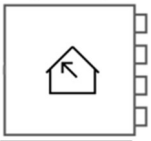


AC outdoor unit

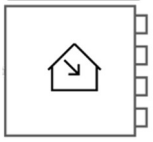


Heat pump unit

Water inertia tank



Distribution box of the air from inside



Distribution box of air to inside