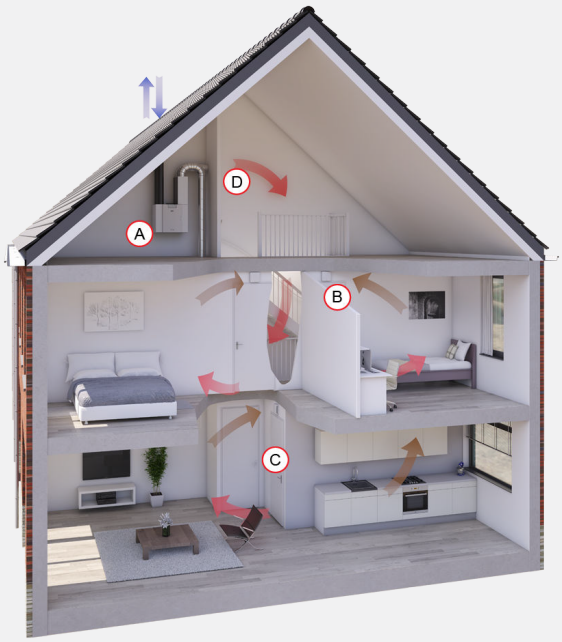
BRINK

Air for life

Monitoring

Multi Air Supply system
English



Contents

Abstract and conclusion

Brink Climate Systems carried out a monitoring project in which several homes were fitted with a Multi Air Supply system, comprising a Flair balanced ventilation unit and a number of Indoor Mixfans. The Indoor Mixfan is a small fan that is placed above or near the internal door and connects the habitable room with the central hall or staircase. These Indoor Mixfans are used to ventilate the habitable rooms. In this system, the Flair is used to blow in outside air into the central area -stair core or hallway- and to extract it from the wet rooms through ducts. The project was set up to demonstrate that this ventilation system can adequetely guarantee the air quality in the home. The homes are ventilated exclusively on the basis of CO_2 control.

Six homes were included in the monitoring project. Every home is structurally different and every home is equipped with a different number of Indoor Mixfans for ventilation of the habitable rooms. The homes are identified under the unit numbers of the central HRV unit:

- Flair2209_04, Haaksbergen
- Flair2607_14, Haaksbergen
- Flair3703_10, Hoogeveen
- Flair3308_05, Hoogeveen
- Flair3803_06, Rosmalen
- Flair4114_13, Olst

The project was initiated in 2020 and the measuring period ran until the end of May 2021. We used measurement data over the last four months for analysis, that is from February 2021 until the end of May 2021. Then it was evaluated whether the systems performed as expected. For that purpose, an analysis was carried out of all data from the sensors connected to the Flair units and from the sensors in the various habitable rooms with an associated Indoor Mixfan. The data analysis included two parts:

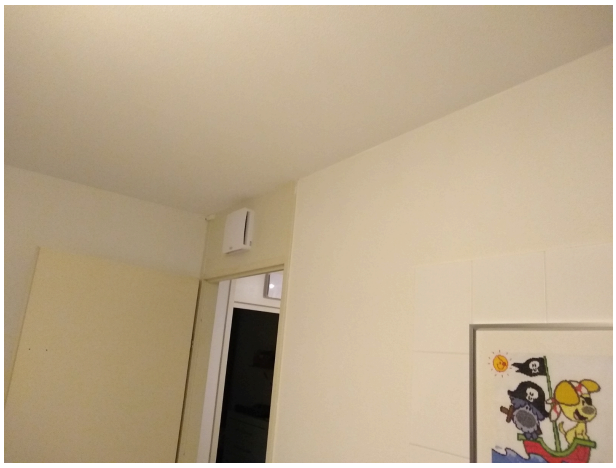
- Flair data analysis for evaluation of the control system.
- Categorisation of air quality parameters (CO_2) to evaluate the effectiveness of the control system.

Conclusion

- The Multi Air Supply system ensures a very good air quality in the habitable rooms of different homes in different configurations.
- Active system control is easy by switching between automatic and high mode for cooking and showering, but proper ventilation is also guaranteed with Flair in automatic mode.
- The right settings are easily standardised.
- For every separate home, it must be carefully analysed how the Multi Air Supply system can be configured for optimum performance.

1 Introduction

Brink Climate Systems carried out a monitoring project to demonstrate in practice that the Multi Air Supply system ensures a good air quality in various types of homes. For that purpose, the system was installed in six different homes and CO_2 sensors were used to monitor the air quality over a longer period of time.



2 Appliance and parameter categorisation

The study involved an analysis of six homes with different numbers of Indoor Mix fans in every home. Appendix I shows an overview all Flair units and their associated Indoor Mixfans. The Flair units themselves feature an ample number of sensors, but not all data is relevant. Where available, the sensors used for analysis remained limited to air quality sensors and control sensors:

- Current air flow rate exhaust *[m^3 / h]*
- Current air flow rate supply *[m^3 / h]*
- Discharge flow rate setting *[m^3 / h]*
- Supply flow rate setting *[m^3 / h]*
- Connected CO_2 sensors *[ppm CO_2]*
- Current control
- Temperature to dwelling

Table 1 details the categorisation of the air quality parameter CO_2.

Tabel 1 - Sensor categorisation

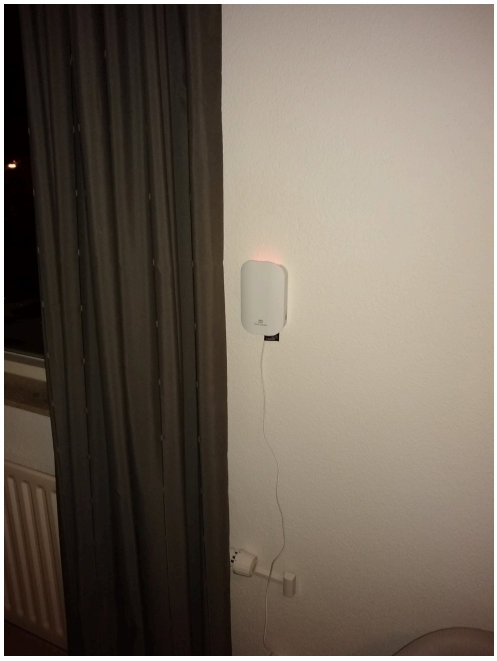
Sensor	Unit	Target values	Categorisation
CO_2	ppm	400 - 800	Optimum
CO_2	ppm	800 – 1,200	Acceptable
CO_2	ppm	> 1,200	Undesired

3 Data output of the Flair units via Brink Home

Data was processed over the months of February up to and including May. Start on 22-01-2021 and end on 31-5-2021. Based on the Flair's data output, it can be concluded that in every monitored home the HRV unit provides a sufficient flow rate for good air quality. Though there are differences in CO_2 values depending on the location of the sensor, all sensors report satisfactory air quality values and the HRV unit can supply sufficient flow rates for the stairs/landing/hallway and the living room. The CO_2 values in the hall, landing or staircase are very low. Generally around 600 ppm and often no higher than 800 ppm. In some habitable rooms, the CO_2 values may be a little higher for a brief period when there are many people in the room, but that is no different for standard ventilation systems.

4 Sensor data output from the sensors in the habitable rooms

Data was collected during the months of February up to and including May. Starts on 22-01-2021 and end 31-5-2021. The collected data was assessed against the values in Table 1. It can be mapped out for every sensor during what time percentage of the monitoring period the values comes within a certain category. Generally, the CO_2 values are very good in every home. The temperatures show that windows are not opened a lot and that the air quality is good. Even if the system is not used as intended, that will not immediately affect the air quality.
A major lesson learned is, that the system configuration requires careful attention with regard to thermal comfort to ensure that residents are protected from draught. Of course that applies to any ventilation system, but since the Multi Air Supply system is configured differently, the design deserves additional attention.



Monitoring sensor

5 Conclusions and recommendations

- The Multi Air Supply system ensures a very good air quality in the habitable rooms of different homes in different configurations.
- Active system control is easy by switching between automatic and high mode for cooking and showering, but adequate ventilation is also guaranteed with the Flair in automatic mode.
- The Multi Air Supply system must very carefully be configured to ensure that it does not lead to discomfort and other complaints.
- The right settings are easily standardised.
- Central CO_2 sensor in the hall or stairwell:
    - should be set to 600 ppm low and 800 ppm high. These settings guarantee a satisfactory quality and the HTV unit does not respond too quickly to changes in CO_2 values.
    - The sensor must measure the CO_2 concentration of the mixed outdoor air from the HRV unit and the air exhausted from the habitable rooms by the Indoor Mixfans. This means the sensor must be mounted at a free location, not directly in the outdoor air flow from the HRV unit, but not directly in the airflow of an Indoor Mixfan either. In addition, the sensor in a toilet or bathroom must be close to the exhaust and as far away as possible from the HRV unit supply.
- Modes HRV unit
    - Basic values for the HRV unit settings for every mode are as follows.
        - Mode 0: 50 m^3/h.
        - Mode 1: 100 m^3/h.
        - Mode 2: 150-200 m^3/h, depending on the number of persons. 25 m^3/h per person.
        - Mode 3: 300 m^3/h.
- Indoor Mixfans habitable rooms
    - Bedroom 2 adults. Settings: 50 m^3/h. CO_2 low 600 ppm and CO_2 high 1,200 ppm. This is the most quiet mode. As from a CO_2 value of 600 ppm, the Indoor Mixfan will gradually increase the flow rate and will only reach its maximum flow rate at 1,200 ppm. In practice, 1,200 ppm will not be reached, provided the gap under the door is large enough.
    - Bedroom 1 person. Settings: 35 m^3/h. CO_2 low 600 ppm and CO_2 high 1000 ppm. At this setting, the Indoor Mixfan may reach its maximum flow rate of 35 m^3/h at a lower CO_2 value. When only one person is present, the Indoor Mixfan will respond quietly.
    - With three people in one room, two Indoor Mixfans are required. These can then be set to 35 m^3/h. CO_2 low 600 ppm and CO_2 high 1000 ppm.
    - With four people in one room, for instance in the living room, both Indoor Mixfans should be set to a maximum of 50 m^3/h and the settings for the CO_2 values must be 600 ppm low and 1,200 ppm high.
    - When two Indoor Mixfans are used for one room, they must be coupled as Master-Slave.
- Indoor Mixfan living room with open-plan kitchen:
    - For an open-plan kitchen, no Indoor Mixfan is needed. In that case the kitchen air exhaust already ensures an air supply from the stair core. The supply can then be arranged from the staircase or the hallway with a grille high above the door. This grill must have baffles that discharge upwards so the supply air from the hall mixes along the ceiling with the air from the room. The kitchen air discharge must be set to match the calculated ventilation air flow for that living room.
    - A CO_2 sensor must be installed in the living room and connected to the HRV unit. The living room is ventilated on the basis of demand. Settings for this CO_2 sensor are 800 ppm low and 1,200 ppm high.
    - If no Indoor Mixfan is needed for the living room, but it does require a grille above the door, the gap under the door should be as narrow as possible to prevent draught.
- Indoor Mixfan living room without open-plan kitchen
    - A living room without open plan kitchen or exhaust provision will require an Indoor Mixfan, usually two units. In this case the central CO_2 sensor of the HRV unit should be placed in the hallway as closely as possible to an exhaust point, so a toilet or kitchen.

    - If the home is designed in such a way that a dining table or couch is likely to be placed in the circulation area, close to the door to the hallway, for the sake of comfort a different supply to the living room must be chosen than the one underneath the door. The gap under the door needs to be sealed and a different point must be chosen for the air supply from the hallway to the living room.
      For example, this could be a supply grille in the wall between the hallway and the living room.
    - If there is insufficient room in this wall and the only available space is above the living room door, that is where the supply grille will be placed. In this case, the Indoor Mixfan above the door is omitted. This does require mechanical extraction in the living room for drawing in air from the corridor through underpressure (extraction point just like in the wet rooms).
- Supply grille HRV unit
    - Preferably, the grille should be the one developed by Brink for this purpose. It muffles extra noise, but it also make it possible to steer the airflow. That way the airflow can be steered away from the circulation area as much as possible.
    - If still a different grille or supply air valve is chosen, then it should be taken into account that a large volume of air will be blown in through this grille. It should be able to handle that. Also, in this case,
    - the supply should be kept out of the circulation area as much as possible.
- Open connection stairwell
    - The supply grille of the HRV unit must have an open connection to the Indoor Mixfans and to the exhaust points in the toilet, bathroom and kitchen.
    - If the stairwell has doors, the connection must be made with the aid of a regular or acoustic grille.
- Operation
    - Preferably, a wireless multiple switch should be installed in both the bathroom and the kitchen.
      It allows the user to temporarily select cooking/showering mode.
    - At regular automatic operation, setting 1 must be selected.

I Flair units and associated Indoor Mixfans

Flair unit / home	Indoor Mixfan
Flair2209_04, Haaksbergen	CG.TRHCV.05.3371 - Living room CG.TRHCV.05.3370 - Bedroom daughter 1 CG.TRHCV.05.3357 - Bedroom mother CG.TRHCV.05.3353 - Study CG.TRHCV.05.3358 - Bedroom daughter 2
Flair2607_14, Haaksbergen	CG.TRHCV.05.3366 - Living room CG.TRHCV.05.3373 - Bedroom mother CG.TRHCV.05.3365 - Study CG.TRHCV.05.3368 - Bedroom mother
Flair3703_10, Hoogeveen	CG.TRHCV.05.3364 - Bedroom daughter 2 CG.TRHCV.05.3362 - Bedroom son CG.TRHCV.05.3372 - Bedroom parents
Flair3308_05, Hoogeveen	CG.TRHCV.05.3354 - Bedroom mother CG.TRHCV.05.3361 - Bedroom daughter CG.TRHCV.05.3359 - Bedroom daughter
Flair3803_06, Rosmalen	CG.TRHCV.05.3374 - Living room CG.TRHCV.05.3356 - Bedroom child 1 CG.TRHCV.05,780 - Bedroom parents CG.TRHCV.05.3367 - Bedroom child 2
Flair4114_13, Olst	CG.TRHCV.05.3369 - Living room CG.TRHCV.05.3360 - Study CG.TRHCV.05.3355 - Guest room CG.TRHCV.05.3363 - Bedroom