zehnder
always the best climate

ComfoClime Q

Marketing kit



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Preface

IMPORTANT!
Carefully read this document before use.

This document provides all the information required for ComfoClime Q. It is also intended as a reference for servicing, so that this can be carried out in a responsible manner. The unit is subject to continuous development and improvement. As a result, the ComfoClime Q may slightly differ from the descriptions.

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The following pictograms are used in this document:

Symbol	Meaning
	Point of attention / important informations.
	Risk of compromised performance or damage to the ventilation system / risk of personal injury.
	Consult the document before using/operating the equipment.

1 Project information

1.1 Project idea

ComfoClime Q is a new unit that combines heat recovery ventilation with active air post-treatment realizing the concept of climatic ventilation.
The recent advance of high energy efficiency standard in buildings calls for a new way in treating the air and in comfortable climatization of the indoor environment aiming to the utmost energy saving in both cases.
The full control and management of the system is implemented through an APP running on current smartphones.

1.2 Project target

The target is to create a complete system able to guarantee the continuous air renovation along with a further contribution for the climatization demand ensuring always the maximum comfort for the user.
In order to reach the highest efficiency the newest technologies have been adopted like heat pumps with inverter based compressor and R32 refrigerant gas.
ComfoNET will allow the complete communication between all the components.
Thanks to the state of the art internal aeraulic circuit (patented by Zehnder) the design thermal power is higher than 3,3KW in heating and higher than 4KW in cooling.
The key driver of the ComfoClime Q concept is to provide a device which is the only climatization source for the house, getting rid of any gas boiler based system as well as any emission system such as radiant panels. The only energetic vector will be the air, at low flow and speed and with all the advantages of the exclusive technology of Zehnder that consider full air renovation with no recirculation whatsoever.
This is a total change of paradigm in the field of heating and cooling design for residential projects and Zehnder as first mover can pave the way to the introduction of those systems.

1.3 Key technical improvements

Mechanical

The technical concept is based on the state of the art air-to-air heat pump combined with the ComfoAir Q technology and its smart air-treatment focused on the outmost comfort and healthy conditions for the user.

1. The ComfoClime Q is especially developed for the ComfoAir Q family: in particular ComfoClime Q has been designed under specifications coming from Zehnder Germany. These conditions demand the pairing of the ComfoClime Q with a ComfoAir Q450 ERV; a nominal air flow of 300 m3/h; a thermal output of at least 3kW in heating; a total accessibility to the internal components from the front
2. The ComfoClime Q and the ComfoAir Q are always connected by an EPP adapter.
3. The design of the ComfoClime Q will be in line with the ComfoAir Q style.
4. The ComfoNet connection between the ComfoClime Q and the CAQ is maintained.

Electronics/software

The ComfoClime Q has a brand new control system, based on an Arduino hardware technology where the main electronic board (called Airduino) includes a wifi module, a modular gateway and it's fully compatible with the Zehnder ComfoNet II logic. The main advantage of having such an electronic board is that it is possible to abandon the ComfoConnect Lan C box to allow all the communication among components and with the external environments such as the Internet.

Experience and physics have proven that in order to maximise the efficiency of the ComfoClime Q, especially on hot days, it is necessary to have a proper amount of exhaust air flow. That because the coil working as condenser needs a lot of air flow to fully dissipate all the heating generated by the gas compression.

2 Marketing information

2.1 Product idea

The ComfoClime Q is a unit designed for climatic ventilation to be used in combination with a CAQ thus obtaining a very high overall thermodynamic efficiency. Indeed, the heat pump inserted in the ComfoClime Q uses as energy sources the air exiting from the CAQ, both at the inlet and outlet. So in winter (or any heating season) the heat pump won't have, as cold source, the external air as it is, but the air already "preheated" passively by the CAQ. The ComfoClime Q unit is connected to the CAQ via ComfoNet. The system communicates externally through a wifi connection and is managed via a dedicated smartphone/tablet app. The system manages to communicate with the app as long as the phone / tablet is within the range of the local wifi network. In the future the modular gateway will allow remote connection via the internet. The ComfoClime Q is designed to offer the higher performance ialong with an enthalpic heat exchanger (in the CAQ). The reason for the choice of the enthalpic exchanger stems from the fact that these can give a more effective support to the subsequent work of the heat pump in terms of "saved" dehumidification. Consequently, the system requires only one condensate drain for the part belonging to the ComfoClime Q (the heat pump part) and it is not required, as known, for the CAQ ERV.
The ComfoClime Q is designed to provide the desired comfort conditions in the dwelling, giving the user the possibility to operate directly on the setpoint temperature in heating season as well as in cooling season.
The entire combination must be placed on the floor, because the weight is too high for wallmounting!
The ComfoClime Q must be secured to the wall using the mounting bracket. It is mandatory to place the ComfoClime Q on the Zehnder support frame. Between the ComfoAir Q and the ComfoClime Q an adapter set (two standoffs and four gaskets) is required and is supplied with the ComfoClime Q.

The ComfoClime Q can be installed indifferently on left or right configuration accordingly to the CAQ layout.
The commissioning will automatically define its working mode.

2.2 System idea

The idea is to create a stand-alone system that provides home air conditioning combined with a continuous air exchange without recirculation guaranteed by the CAQ. The system is therefore composed of a ComfoClime unit for post-treatment of the air downstream of the CAQ and the CAQ itself; therefore the ComfoClime Q must be intended as a whole package composed by one ComfoAir Q 450 ERV and the heat pump module (the actual ComfoClime) other than all the accessories. To complete, the adopted distribution system must be absolutely insulated against the formation of condensation in the cooling season but also to save energy both in heating or cooling mode.

The management of the internal comfort temperature can be defined in two ways:

- measurement of the average extraction air temperature (ETA);
- measurement of the temperature in a reference room through a remote thermostat (Room Controller Q) which is part of the system ComfoClime Q.

In the first case, a temperature sensor at the inlet of the extract air intake in the ComfoClime Q reads the temperature of the extracted air ETA (which actually is the average value of the temperature in the building) and consequently the ComfoClime Q control processes the correct supply temperature of the new air Tsup, comparing it to the setpoint fixed in the house and as a function of the DT between this and the ETA.
In the second case, the temperature sensor is located inside the room controller and therefore it measures the room temperature exactly in the room where it is installed which will become the reference room. Furthermore the room controller, thanks to a relay mounted on board, can control an additional source of electrical heating (or a radiator or a radiant circuit head or an electrical post-heating resistor mounted in the emission nozzle of that room) to provide a plus of heat at the user's demand.
The rest of the house will be treated using as reference setpoint the ETA value read by the internal sensor.

2.3 Target group

Target Group description/behaviour Benefits from our product

The paramount market target for the Comfoclime system is the sector of high energy-efficient modern houses, not necessarily passive ones but oriented to, already not equipped with a primary heating/cooling system. It goes without saying that the more efficient the envelope is in terms of thermal insulation, the greater is the effectiveness of the ComfoClime Q and the lower its electrical consumption will be. All in a system integrated with the HRV (represented by the CAQ) and using a dedicated, proprietary and reliable communication system. It should be noted that the thermal powers expressed by the ComfoClime Q settle on 3,3 KW in heating and about 4 KW in cooling at the working conditions deriving from the presence of the CAQ which guarantees passive energy recovery. The ComfoClime has been tested in external operating conditions from -7°C to + 35°C.



Under the tested conditions the ComfoClime Q does not undergo oscillations or continuous on/off cycles thanks to the modulating inverter technology and the state of the art controls of the HP circuit.

2.4 Benefits

The ComfoClime Q System offers the following benefits:

- takes advantage of the free energy originating from CAQ passive energy recovery;
- the adopted heat pump relies on the inverter technology with the use of R32 gas: this leads to the advantage of optimizing electric consumption (savings) thanks to the continuous modulation of the absorption typical of the inverter-based systems and the use of more modern and performing compressors that use this gas with a very low environmental impact. Furthermore, we look at the regulatory evolution that tends to eliminate from the market other refrigerant gases (such as R410 and R134A) in the short term, granting a long commercial lifespan to the ComfoClime Q;
- use of a single and integrated software platform for the complete management of the system, via app on smartphone/tablet, which allows the set-up and monitoring of important and useful parameters by the user, as well as time programming and ordinary management maintenance.

2.5 Unique Selling Points

Exclusive features of a ComfoClime Q system that make it unique, innovative, original and esthetically elegant:

- the combination of a HRV unit with an air post-treatment unit gives a unique technical solution for climatic installations in highly insulated houses, saving money, space and costs and time for installation.
- dehumidify the air flow in warm seasons.
- the ComfoClime Q is specially developed to be used in combination with a ComfoAir Q unit. The adapter set is needed to connect both units and is provided with the ComfoClime Q as standard.
- the ComfoClime Q tempers the incoming fresh air before it is distributed to the individual rooms. This results in comfortable supply air temperature during warm periods as well as cold ones.
- the ComfoClime Q also reduces the humidity of the incoming fresh air before it is distributed to the individual rooms. this dehumidification also contributes to a comfortable climate during warm periods.
- opposed to air conditioning of a single room, a ComfoClime Q system brings cool and dry fresh air through the whole house in summer and warm air in winter.
- the management of the whole system is done through a dedicated APP which allows to set up all the parameters as well as to program the system on a weekly scheduler choosing between different scenarios.
- the possibility to add accessories like a room controller allows the user to have a “zoning” in the house, customizing the temperature in desired rooms.
- the limit is set to 8 zones.

3 Product information

3.1 Product name

The product name is ComfoClime Q.

The product ComfoClime is available in 1 version/package made of 1 ComfoAir Q 450ERV, one air-to-air heat pump.

3.2 System with ComfoClime Q and the performance afterwards

ComfoClime is not meant to be the only heating/cooling source in the building!
The target of this product was indeed the field of passive houses (even prefab houses) therefore it's of the utmost importance a correct communication about the performances and the purpose of the ComfoClime Q.

Usually the ventilation flow rate for cooling is higher than the ventilation flow rate for hygiene.

Performance of a ventilative cooling system like ComfoClime Q:

- The ComfoClime Q takes energy away from the supplied ventilation air.
- Therefore, the supplied ventilation air is reduced both in temperature and in humidity.
- The performance of the ComfoClime is noticed because the supplied ventilation air is cooler and less humid than without ComfoClime, which results in a more comfortable supply of ventilation air during hot and humid periods.

3.3 ComfoClime Q working principle

The working principle of heat recovery ventilation with an air-to-air heat-pump cooling system is explained in the below figure.

Thanks to the ComfoAir Q, a fan extracts air from the building (ETA) that, through a heat exchanger, transfers the heat (in winter) or the cold (in summer) to the supplied fresh air (without recirculation whatsoever). Under favourable conditions, the extracted air bypasses the exchanger when heat recovery is not needed or even unsuitable. The extracted air leaves the building as exhaust air (EHA); another fan conveys fresh outdoor air (ODA) towards the building through the heat exchanger where it gains heat (in winter) or cold (in summer). Before this so-called pre-supply air (P-SUP) is supplied to the living areas, it can be still post-cooled/heated by the air-to-air heat-pump which, actually, is represented by the ComfoClime Q.

This air-to-air heat pump, based on an inverter technology through an inverter-based compressor, using R32 a refrigerant gas and depending on the way the circuit is working, can performs as a heater as well as a cooling device.

The two coils of the heat pump are strategically placed in the supply channel and in the exhaust one. The outdoor and the extract channels are completely free and let the air flowing through directly into the ComfoAir Q and so to the heat exchanger.

If the heat pump is configured in HEATING MODE, the coil in the supply channel works as the condenser (warming up the fresh air) while the other one works as the evaporator in the exhaust duct.

In cooling mode, of course, the cycle is inverted so the evaporator will cool down the supply air and the condenser warms up the exhaust air.

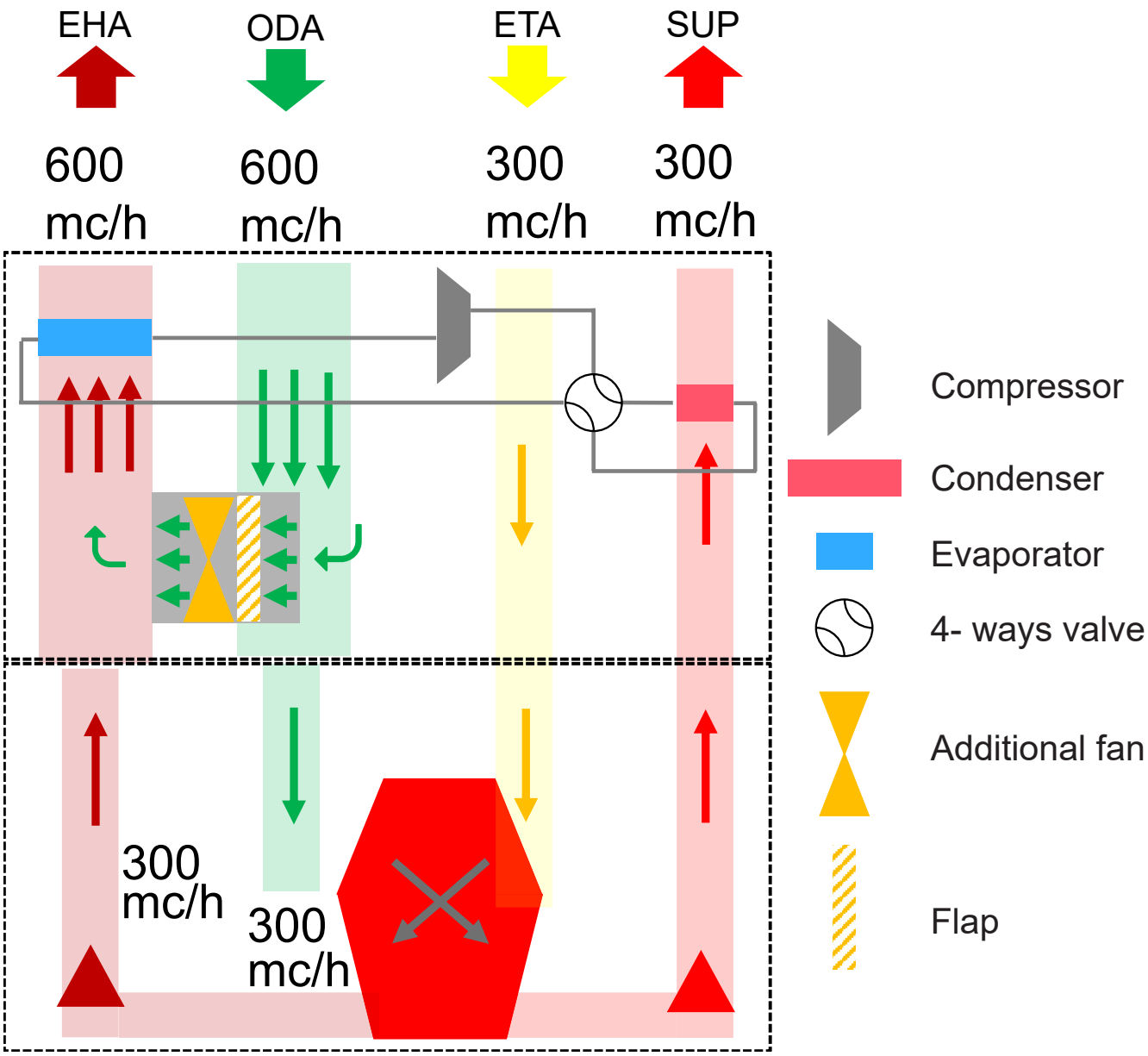
As any heat pump, the evaporator side tends, inevitably, to freeze because of the very low temperatures achieved (often well below 0°C) and the humidity still present in the air passing through the coil will frost. Hence the frost grows increasingly until it packs with ice the whole coil. At that point a defrosting phase is absolutely necessary because the thermodynamic cycle is clogged and halted. This phenomenon is very likely to happen during the heating season because the evaporator is hit by humid but already cold air and its temperature is very close to the icing point (let alone the dew point which is already abundantly overstepped).

When the heat pump calls for a defrost cycle, the internal software reverses the gas direction and the role of the two coils is swapped. This way the “new” condenser (formerly the evaporator), warms itself up melting the ice but in the meanwhile the other coil, working as an evaporator, starts cooling down the actual supply air. This condition is not comfortable to the user who’d feel hit by cold air (in winter). To avoid such unpleasant situation, Zehnder has patented a feature that avoids the spread of cold air in the house opening the two bypasses before the coils so that the one in the supply channel will divert the air flow from the temporary evaporator (formerly the condenser) and the second flap will deviate the exhaust air in its duct to flank the coil and avoid to slam against it which is packed with ice (formerly the evaporator). This inversion lasts until the defrost is accomplished but a further smart function make the bypasses wait before closing back because the supply channel still has the inner coil quite cold and that would bring to a delivery of cold air for the time needed to the coil to restore its high temperature as a condenser. Moreover, since during the defrost cycle the supply temperature is actually not so warm but at the very same temperature gained in the CAQ, the ComfoClime reduces the air flow in the CAQ in order to limit its speed and the uncomfortable feeling to the user.

Example of ComfoClime working in cooling mode. Once the cycle is inverted, the coil in the supply duct becomes the condenser and the other one in the exhaust duct becomes the evaporator. During a defrost cycle the bypasses close the passage through the coils so that the air stream deviate beside them.

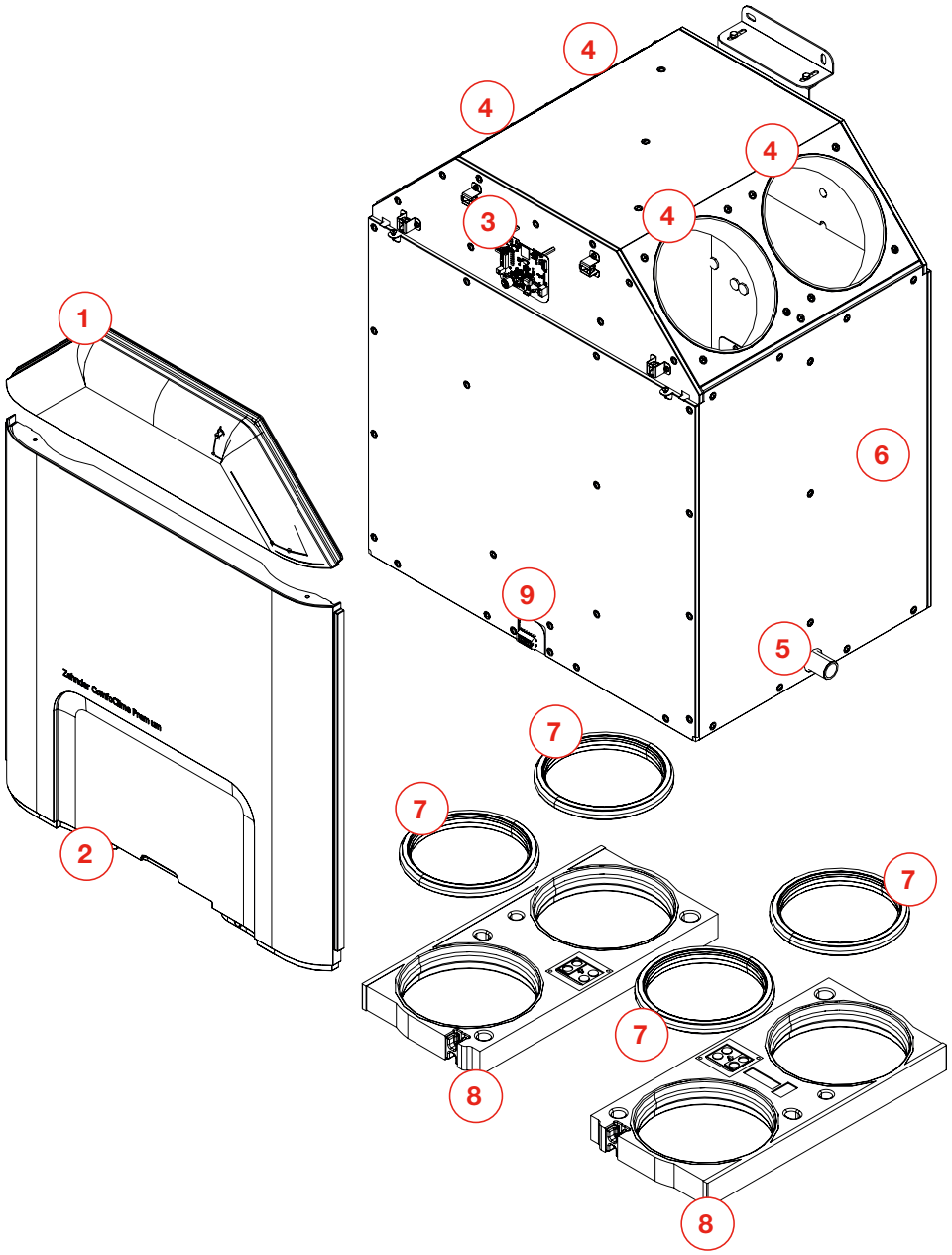
The exclusive feature of the ComfoClime Q is the presence of a third fan strategically placed between the ODA and the EHA channels. The role of this fan is to increase up to double the airflow hitting the coil in the EHA channel that works as the condenser in cooling season or as the evaporator in heating season. The advantage of a higher airflow is that the coil can exchange more energy with it: in cooling mode the coil, being the condenser, needs a lot of air in order to dissipate all the heating load transferred by the hot gas flowing in it so the increase of air stream does the trick. On the converse, in heating mode, the same coil (always the one in the EHA channel) must “receive” energy (that means the warmer possible air) so, even because the delta T is not wide whatsoever, the alternative is to be hit by as much air as possible.

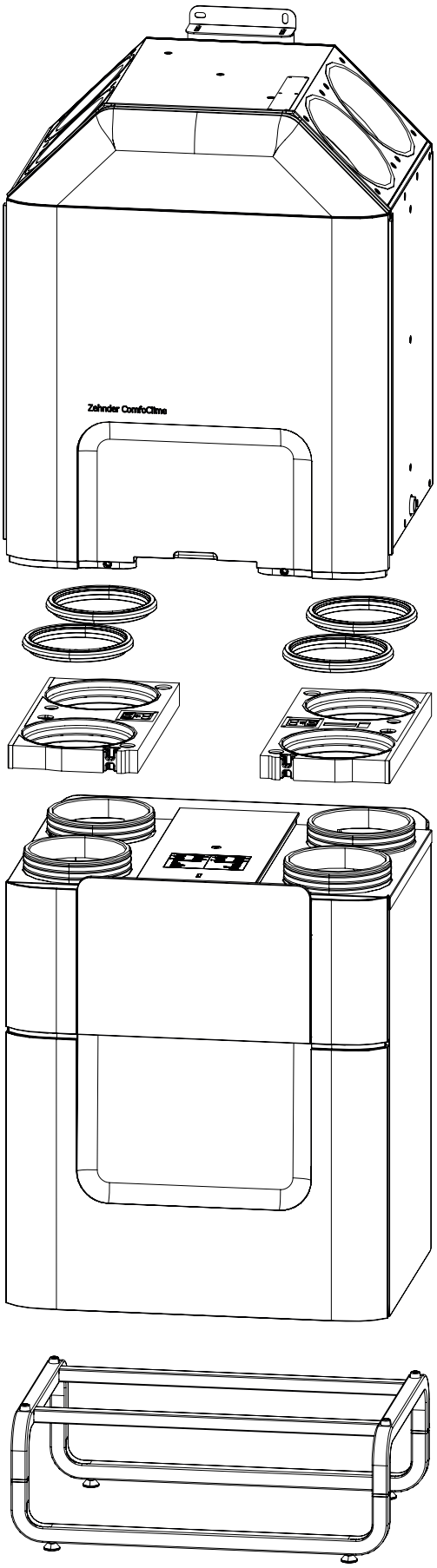
Given that configuration we can say that the system is “unbalanced” if we look at it on the whole (because it manages up to 300 m3/h on the indoor side and up to 600 on the outdoor side thanks to the third fan) but, seen separately from each others, the two parts are always perfectly balanced (ODA/EHA and SUP/ETA).


EHA
ODA
ETA
SUP
600 mc/h
600 mc/h
300 mc/h
300 mc/h
300 mc/h
300 mc/h
Compressor
Condenser
Evaporator
4- ways valve
Additional fan
Flap

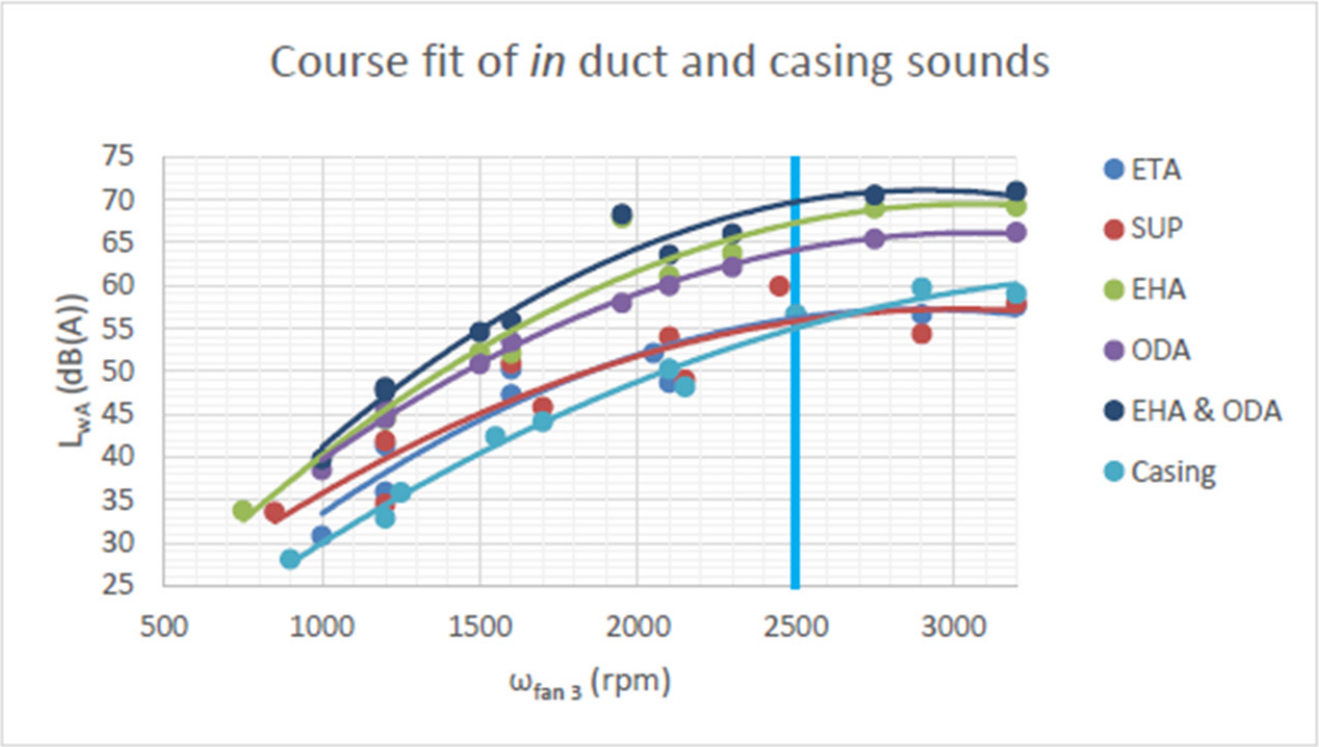
3.4 Unit composition

1. **ComfoClime Q black transparent upper front cover**
2. **ComfoClime Q plastic front cover**
3. **Airduino board**
4. **Outdoor side DN200 (actual 215mm)**
   Indoor side DN160 (actual 175mm)
5. **Condensation drain DN32 on both sides**
6. **ComfoClime Q frame**
7. **Gaskets**
8. **EPP standoffs**
9. **ComfoNet connector**

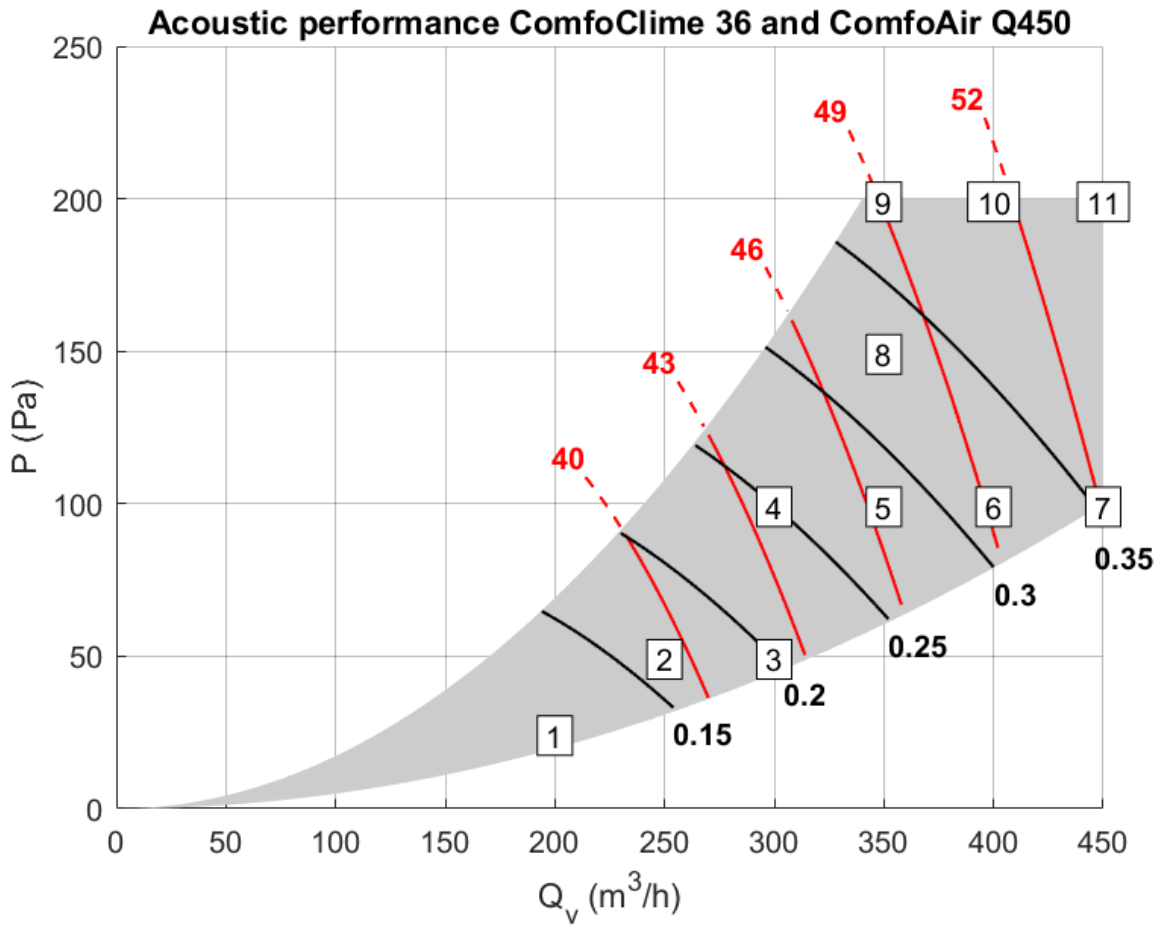



Zehnder ComfoClima

3.6 Noise level

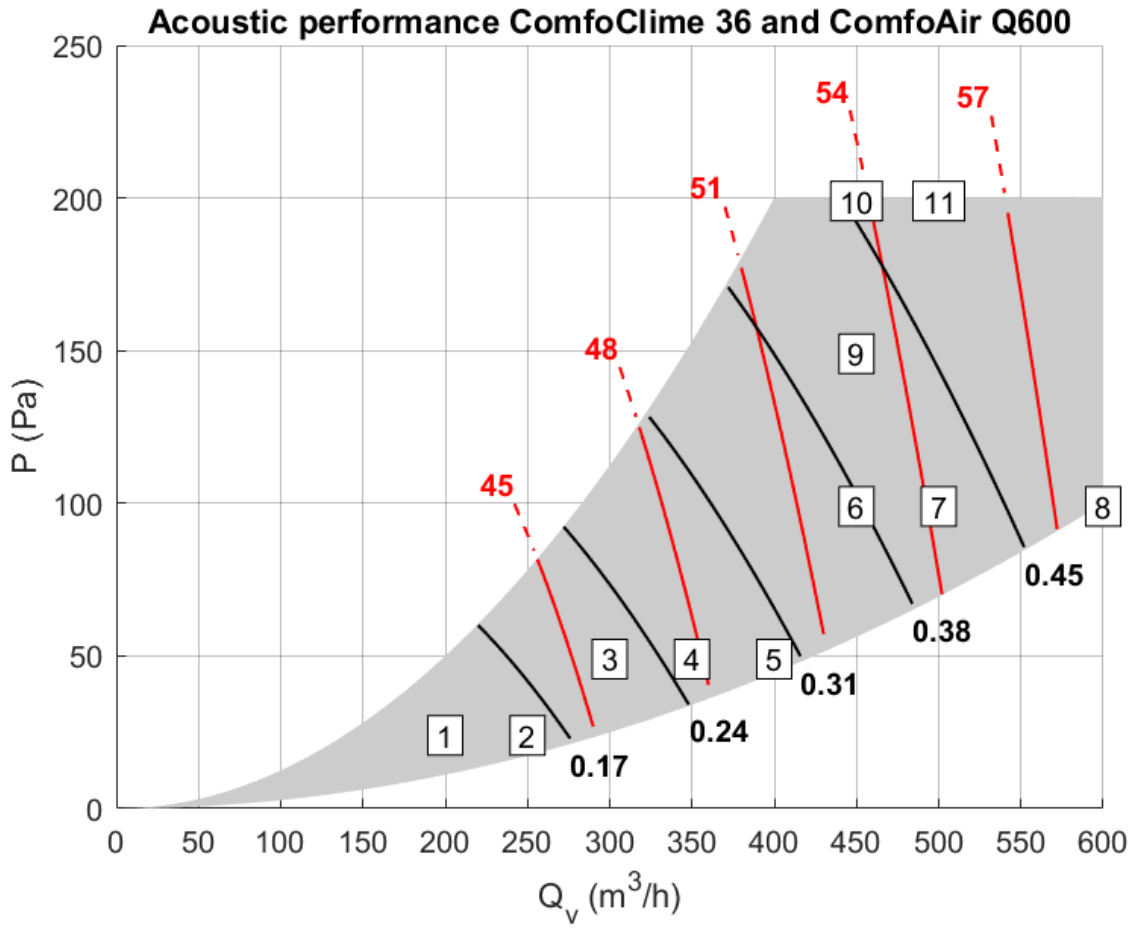


The figure below shows a graph of the ComfoClime Q acoustical performances. The black lines indicate the flow and pressure at which a certain Specific Fan Power (SFP) is reached. The red lines show the casing radiation level.



11 relevant working conditions are shown in detail:

POINT	QV	PEXT	ETA OA Lw,A,duct	SUP OA Lw,A,duct	Casing OA Lw,A
(#)	(m3/h)	(Pa)	(dB(A))	(dB(A))	(dB(A))
1	200	25	38,0	43,3	35,5
2	250	50	40,9	46,9	39,3
3	300	50	43,1	49,6	42,1
4	300	100	44,3	51,1	43,6
5	350	100	46,6	53,7	46,3
6	400	100	49,0	56,5	49,1
7	450	100	51,6	59,4	52,1
8	350	150	47,8	55,1	47,7
9	350	200	48,9	56,4	49,0
10	400	200	51,2	58,9	51,5
11	450	200	53,6	61,5	54,2



11 relevant working conditions are shown in detail:

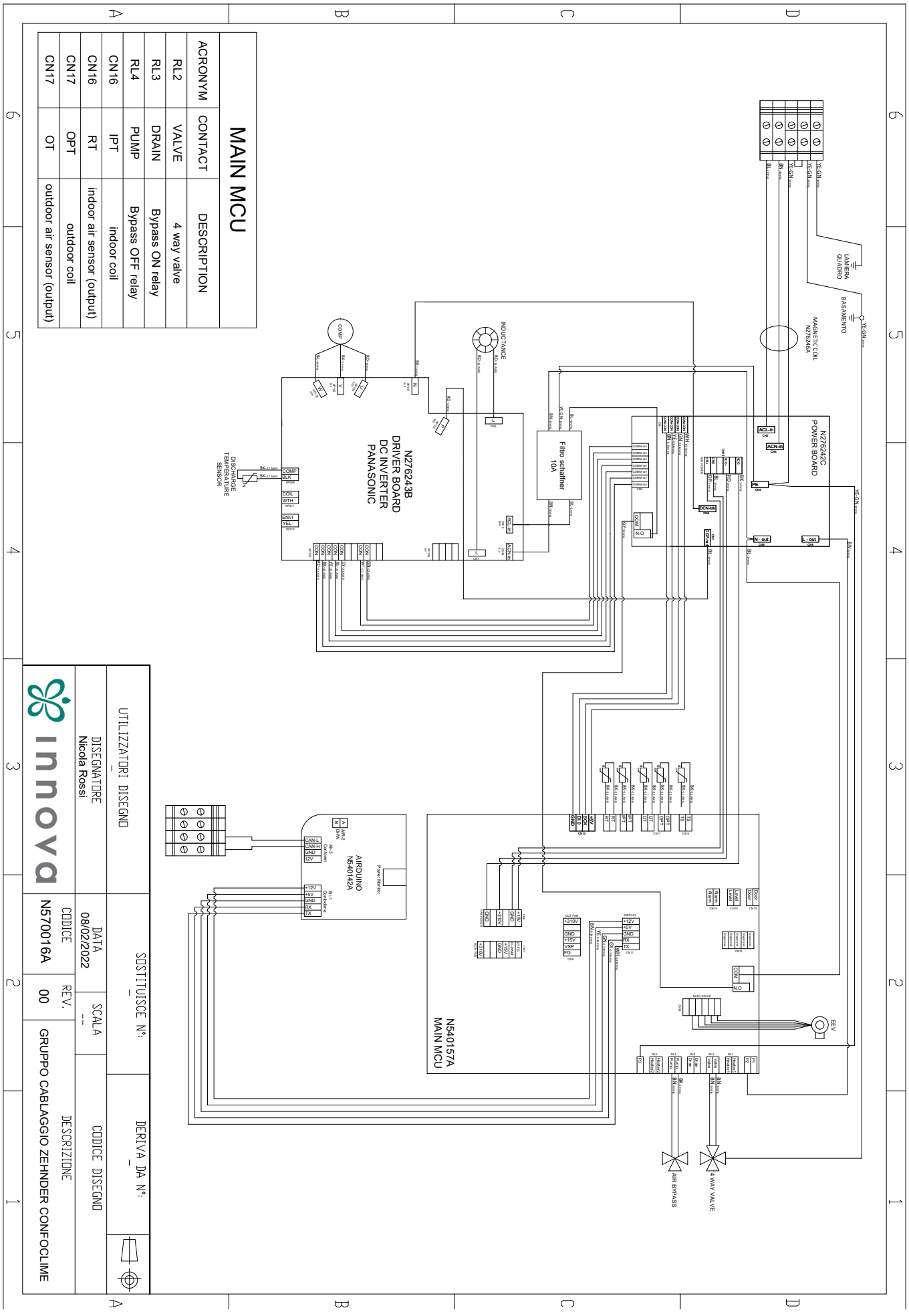
POINT	QV	PEXT	ETA OA Lw,A,duct	SUP OA Lw,A,duct	Casing OA Lw,A
(#)	(m3/h)	(Pa)	(dB(A))	(dB(A))	(dB(A))
1	200	25	40,5	46,2	42,2
2	250	25	42,1	48,3	43,7
3	300	50	44,3	51,0	45,8
4	350	50	46,0	53,2	47,6
5	400	50	47,8	55,4	49,5
6	450	100	50,4	58,5	52,4
7	500	100	52,3	60,8	54,7
8	600	100	56,3	65,4	59,8
9	450	150	51,0	59,3	53,2
10	450	200	51,7	60,1	54,0
11	500	200	53,5	62,2	56,2

The use of inverter technology and the progress made in the compressors field has made possible to modulate the thermal power developed by the refrigeration circuit, allowing it to cover a wider range of air flow rates than the previous on-off technology.

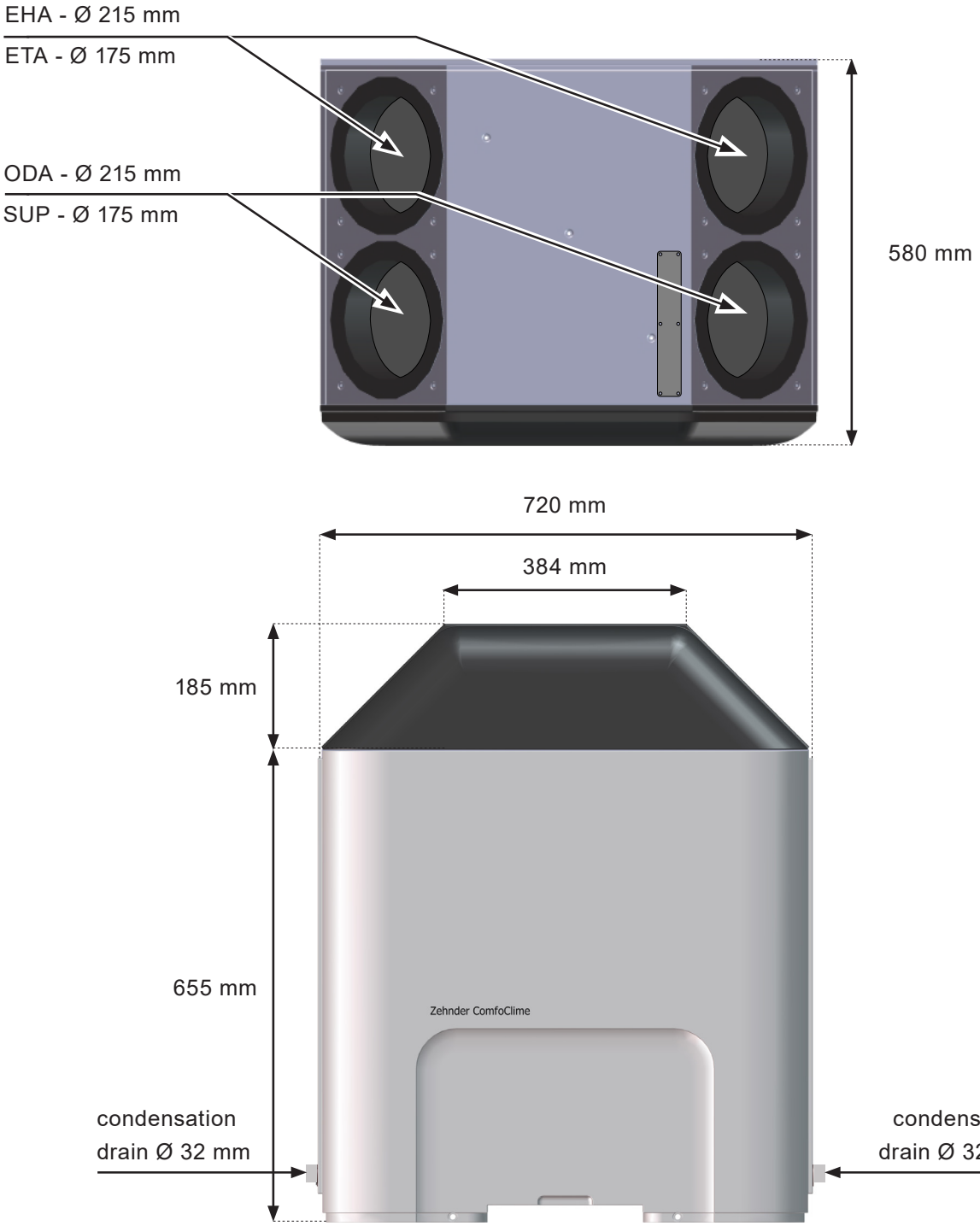
3.7 Electrical specifications

ComfoClime Q
Power supply 220/230V AC, 50/60Hz, 1 phase
Maximum electrical current 4,87 A
Maximum electrical absorption 1100 W

General electric scheme:



3.8 Dimensional sketch ComfoClime Q



44 Logistics & Distribution

4.1 Part numbers ComfoClime

Article numbers Climatic ventilation unit	SAP number
ComfoClime 24	10018995
ComfoClime 36	10018996

4.2 Part numbers accessories

Accessories part numbers Accessories	SAP number
ComfoRoom 	10018604

4.3 Part numbers spare parts

Mechanical Component Part number	Name
	ComfoClime by-pass actuator
	ComfoClime by-pass damper
	ComfoClime Q filter
	ComfoClime Q fan
	ComfoClime plastic bushing
	ComfoClime power board
	ComfoClime driver board
	ComfoClime short damper
	ComfoClime long damper
	SHUTTER BUSH
	RETURN SHUTTER
	SHORT TIE ROD
	LONG TIE ROD
	TRAY
	FIXED ACTUATOR BUSH
	ACTUATOR TRANSFER
	LONG SHUTTER

Mechanical Component Part number	Name
	SHORT SHUTTER
	EPP ADAPTER
	O-RING RUBBER SEALS
	ANTI-TIPPING KIT
	WALL BRACKET
	CONDENSATE DRAIN TRAP
	TEMPERATURE SENSOR 2.0 5,28Kohm DOUBLE L = 1000mm
	RUBBER CAP FOR CONDENSATE DRAIN
	TERMINAL BLOCK
	FRONT PANEL
	AESTHETICS SUP. FRONT
	WIRING GROUP

Electronics Part number	Name
	AIRDUINO ELECTRONIC BOARD
	POWER BOARD
	COMPRESSOR DRIVER BOARD
	HEAT PUMP ELECTRONIC BOARD

5 Sales support

5.1 Communication & Documentation

- User's quick guide (available on ZegWeb)
- Marketing Introduction Kit (available on ZegWeb)
- Installer manual (available on ZegWeb)
- Service manual (available on ZegWeb)
- User manual (available on ZegWeb)
- BIM files

5.2 Contacts

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Zehnder Marketing Kit_REV00-05-2022_Subject to change

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