

## Aquavent

Air handling units for ventilation and dehumidification of indoor swimming pool areas.



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# AQUAVENT

## Air handling units for ventilation and dehumidification of indoor swimming pool areas.

Designed for energy efficient ventilation during the dehumidification process. The energy recovery is carried out by means of heat recovery system in combination with a heat pump. By sequential operation of both, we provide enough heat energy to operate the unit at all times of the year. In the transition period, when the outdoor air temperatures are slightly higher, we even have an excess of thermal energy that can be used to a certain amount to heat the pool hall and as option pool or sanitary water.

Due to the possible need to cover transmission losses in the whole or in part, the units have a built-in water heating coil. Taking into account the efficiency of heat recovery and the difference between input and output energy in the heat pump, we can conclude that the total efficiency of the recovery system and the heat pump is greater than 90%.

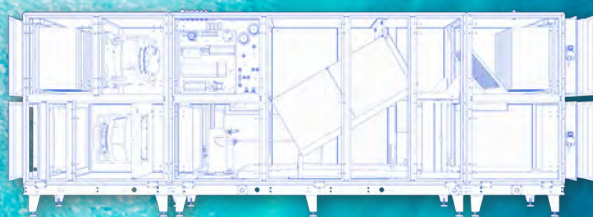
For the well-being of bathers and to protect building construction, it is necessary to bring enough fresh air into the pool area and to keep air humidity within a certain level. With correct dimensioning of airflow we can ensure both, also in an energy efficient way by using a mixing chamber.

Standard Aquavent units are not suitable for salt-water or thermal-water pools.



## Reliable energy-efficient operation and long lifetime of the unit.

Aquvent units are equipped with advanced and factory tested components such as fans, heat exchangers, heaters, coolers, filters, protection equipment, control system, etc. They are designed for the higher corrosion requirements and very high air humidity. All components and body design are predefined in airCalc ++ selection software, where all calculations can be performed in accordance with the needs of the project or indoor swimming pool for which the selection is made.



### DPH

- Plate heat exchanger (cross/counter flow)
- integrated heat pump
- horizontal air flow direction
- 9 sizes
- nominal air flow up to 34.000 m<sup>3</sup>/h



### DPH-V

- Plate heat exchanger (cross/counter flow)
- integrated heat pump
- vertical air flow direction
- 4 sizes
- nominal air flow up to 6.300 m<sup>3</sup>/h

# The casing

Protected against corrosion due to the presence of very high humidity, chlorine and other corrosive substances.

It consists of a mounting frame, panels and a base frame. Casing frame profiles and double-shell insulated panels come with an interrupted thermal bridge. The panels are bolted onto the frame from the outside.

The casing interior is smooth, without half-open hollow sections or protruding sharp screw points. All exposed interior integrated elements have their edges smoothly cut, and have chamfered or rounded edges.

## Mechanical properties in accordance with EN 1886:

- Thermal transmittance class **T2**
- Thermal bridging class **TB2**
- Mechanical strength casing class **D1**
- Casing air leakage class **L2**

## Doors and removable panels

Doors with hinges and removable panels are available to access the interior of the air handling unit.

## Base frame

The base frame is made of ZnAlMg (DX51D + ZM) coated steel. It protects the lower section of the air handling unit against corrosion and damage, ensures structural strength and rigidity. The frame enables transport of the unit and assembly on site.

## Condensate trays

Condensate trays are made of polypropylene.



## Handles and hinges

- **handles:** black painted polyamide (A66+PA6I/X GF50),
- **hinges:** black painted steel cast iron.

## Assembly brackets

Aluminium (EN AB 46100) brackets for precise coupling of housing sections.



### Panels and built-in elements

Double-shell insulated panels with an interrupted thermal bridge. The panels are bolted onto the frame from the outside.

#### Thermal and acoustic insulation:

- Material type: rockwool
- Insulation thickness: 50 mm
- Insulation density: 100 kg/m<sup>3</sup>
- Non-combustible, class A1 acc. to EN 13501-1

**Internal panel sheet:** prepainted galvanized steel RAL9006

**External panel sheet:** prepainted galvanized steel RAL9006

**Built-in elements:** ZnAlMg coated steel, additionally painted

### Frame profiles and corners

The aluminium profile frame (AlMgSi) is made of hollowed aluminium sections (EN AW-6060) and rounded fiberglass reinforced nylon corners (PA6+GF20%).

### Joints and sealing tapes

Self-adhesive polyethylene sealing tape is used for joints between the fixed non-removable panels and the frame.

All sealing tapes and the poured PU sealing compound have a closed-cell structure and are resistant to aging, molds and other microorganisms.

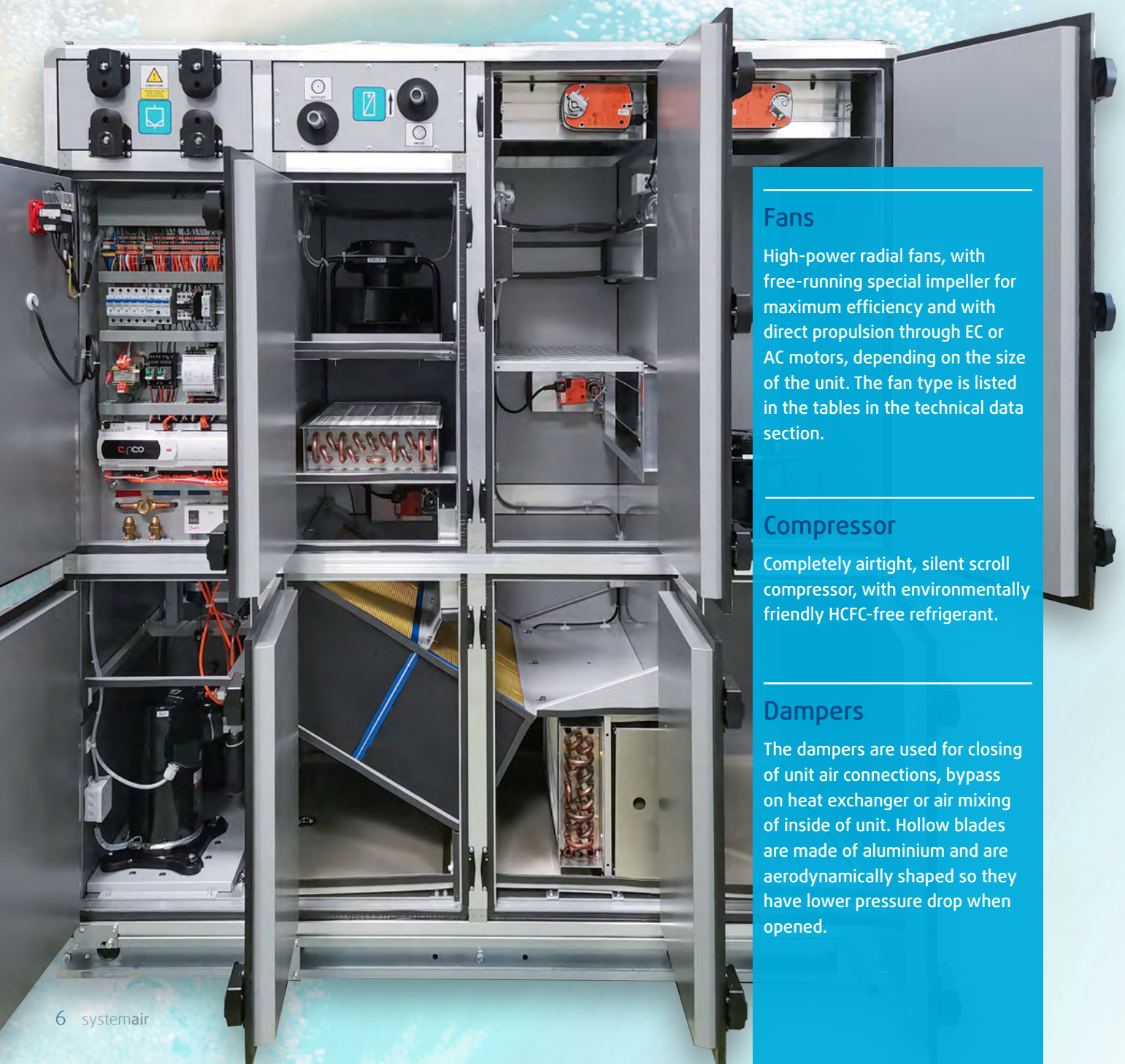
### Ruspert protected screws

Ruspert protected screws are covered with a three-layer-coated-film allowing maximum corrosion resistance. The 1st layer is made of metallic zinc, the 2nd of high-grade anti-corrosion chemical conversion film, and the 3rd outer layer is a baked ceramic surface coating. All three layers combined by the Ruspert treatment are not only incredibly anti-corrosive but also bonded in an extremely rigid combination.



# Components

Aquavent components are designed for higher corrosion requirements and work normally in high air humidity conditions, despite all, standard units are not suitable for salt-water or thermal-water pools.



## Fans

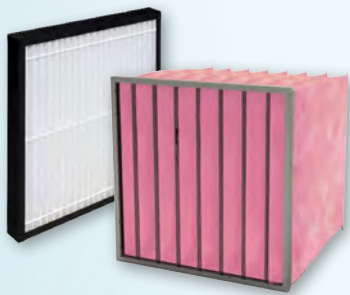
High-power radial fans, with free-running special impeller for maximum efficiency and with direct propulsion through EC or AC motors, depending on the size of the unit. The fan type is listed in the tables in the technical data section.

## Compressor

Completely airtight, silent scroll compressor, with environmentally friendly HCFC-free refrigerant.

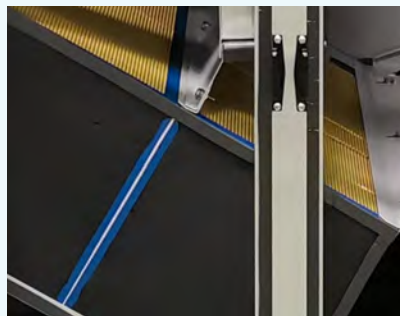
## Dampers

The dampers are used for closing of unit air connections, bypass on heat exchanger or air mixing of inside of unit. Hollow blades are made of aluminium and are aerodynamically shaped so they have lower pressure drop when opened.



## Filters

The quality of filters according to EN ISO1689-1: 2016. Filters with quick-release mechanism, outdoor air filters ePM10 60% (M5) or ePM2.5 70% (F7) and extract air filters ePM10 60% (M5) or ePM2.5 70% (F7).



## Plate heat exchanger

Epoxy coated aluminium plate heat exchanger is available in cross-counter flow execution. Heat transfer takes place directly through a partition wall, without any transfer of medium or moisture. Plate heat exchanger has a bypass for free cooling option in summer. Under whole section there is sloped drip tray for condensate drainage.



## Heating & cooling coils

**Evaporator, condenser and water heating coil** with aluminium frame, copper tubes and aluminium fins. Water heating coil has threaded connections.

## Preheater

The electric or water preheater of the outdoor air prevents the formation of ice in the mixing section and the freezing of the control damper in the heat recovery system. That is recommended to be selected as an option. If the unit is designed to operate in areas with very low outdoor temperatures for extended periods of time. It is designed to heat approximately 30% of the nominal airflow to at least -10 °C. It is placed after the outside air filter, but before the mixing zone. It can be selected in two versions: as a water heater or as an electric heater.

## Flexible connections

Flexible connections are airtight and easily assembled. On both sides there is a preinstalled gasket that perfectly seals the connection to the duct. The frame is made of painted galvanized steel, canvas is non-hygroscopic.

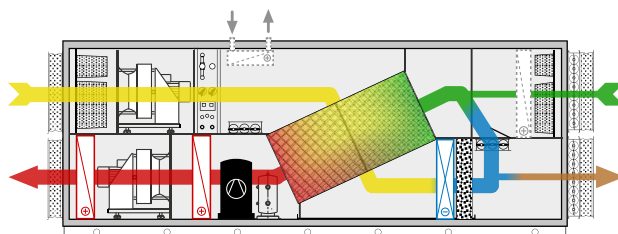
# Operation modes

The Aquavent units always run on the most energy efficient mode and retains the swimming pool areas in a comfortable indoor climate without steamed windows.

## DPH

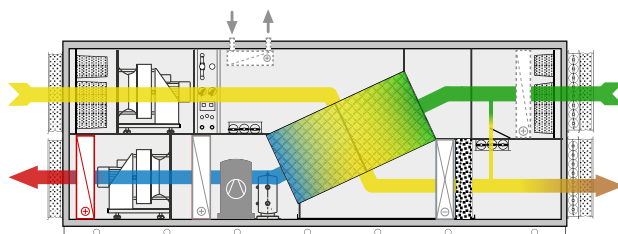
### Bath mode with dehumidification demand

The compressor is on and extract air is cooled down and dehumidified after heat recovery again by evaporator. Depending on the dehumidification demand and outdoor condition recirculation air is mixed with 30-100% outdoor air and then heated up by heat recovery, condensing coil from heat pump cycle and if necessary by post heating coil (water or electric).



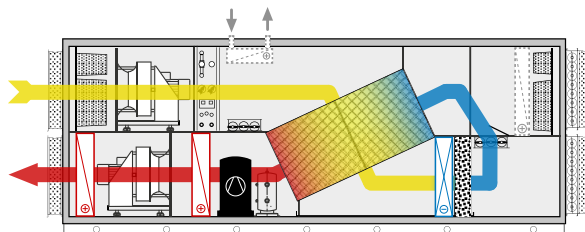
### Bath mode with dehumidification demand (summer mode)

If the humidity of the outdoor air is high enough, the unit works mostly with 100% outdoor air. If necessary, post heating coil (water or electric) is used. If room temperature is higher than setpoint and if outdoor temperature can be used for cooling, bypass of heat recovery is opening.



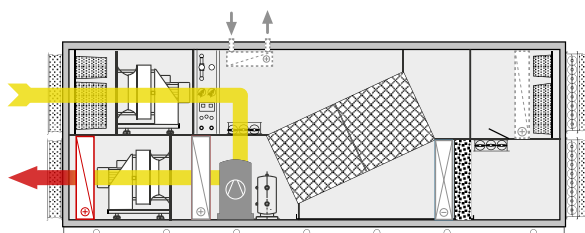
### Rest mode with dehumidification demand

If the unit is in rest mode by time channel and room humidity is increasing above a certain level, compressor is switched on to dehumidify in recirculation mode.



### Rest mode without dehumidification demand

If the unit is in rest mode by time channel and room humidity is OK, then unit fans are running in step 1 and only room temperature control is on.

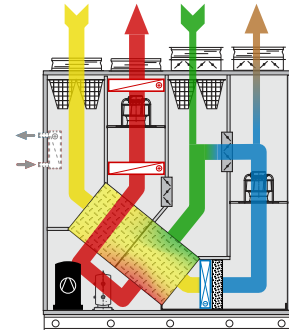




## DPH-V

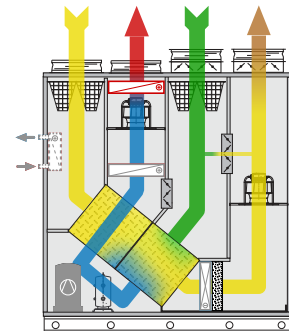
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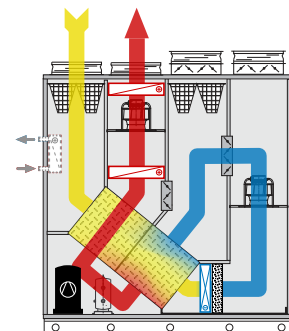
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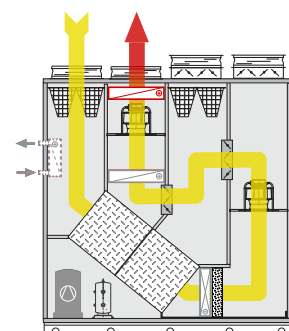
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### Rest mode without dehumidification demand

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# Technical data

## AguaVent DPH

AquaVent DPH		025	040	063	100	130	160	200	250	350
Nominal air flow (at external pressure 350 Pa)	m <sup>3</sup> /h	2500	4000	5710	10000	13000	16000	20000	25000	35000
Amount of outdoor air	%	Automatic from 0 - 100%								
Dehumidification performance according to VDI 2098 <sup>1)</sup>	kg/h	15,9	25,4	36,3	63,6	82,7	101,8	127,2	159,0	222,6
Heat recovery efficiency	%	66,9	66,6	66,3	64,3	64,9	65,3	65,2	65,8	65,1
Heat recovery output	kW	10	15,9	22,6	38,4	50,4	62,3	77,8	98,1	135,8
Hot pump output	kW	7,13	11,05	16,0	26,5	36,0	45,6	53,6	72,0	91,2
Heat pump - refrigerant		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Post heater (water 80/60 °C, inlet air +22 °C)	kW	18,26	25,8	38,3	63,0	53,3	91,6	128,1	146,2	188,4
Water flow	l/s	0,22	0,30	0,47	0,77	0,65	1,12	1,63	1,80	2,31
Water resistance	kPa	5,9	6,4	7,7	8,5	7,9	13,0	8,4	9,1	8,4
Compressor absorbed power	kW	1,56	2,34	3,32	5,54	7,29	9,43	11,1	14,6	18,9
Compressor voltage (50 Hz)	V	3 x 400	3 x 400	3 x 400	3 x 400	3 x 400	3 x 400	3 x 400	3 x 400	3 x 400
Nominal el. power - supply fan	kW	1,05	1,90	3,35	5,70	6,75	11,00	11,40	15,00	22,00
Absorbed el. power - supply fan <sup>2)</sup>	kW	0,92	1,89	2,79	4,62	6,23	7,13	7,93	10,98	17,00
Nominal el. power - extract fan	kW	1,05	1,90	3,35	3,45	5,70	6,75	6,90	11,00	15,00
Absorbed el. power - extract fan <sup>2)</sup>	kW	0,66	1,17	1,62	2,98	4,01	5,23	5,52	9,02	12,76
Voltage - sup. / ext. fan (50 Hz)	V	3 x 400	3 x 400	3 x 400	3 x 400	3 x 400	3 x 400	3 x 400	3 x 400	3 x 400
Unit nominal input power	kW	3,66	6,14	10,02	14,69	19,74	27,18	29,40	40,60	55,90
Unit separated in 3 modules <sup>3)</sup>										
Total length	mm	4185	4800	4800	5895	6120	6120	5970	7075	7525
Length of largest module	mm	2435	2675	2675	3590	3590	3590	3590	4200	4460
Width	mm	780	780	1080	1080	1380	1680	2095	2095	2395
Height <sup>4)</sup>	mm	1495	1495	1495	2095	2095	2095	2095	2695	2695
Total length with pre-heater	mm	4485	5100	5100	6240	6465	6465	6430	7375	7825
Total weight approx.	kg	790	930	1090	1570	2050	2320	2450	3760	4710
Pool water condenser (optional)										
Heat output <sup>5)</sup>	kW	7,13	11,1	16,0	26,5	36,0	45,6	53,6	72,0	91,2
Water amount	m <sup>3</sup> /h	0,78	1,20	1,74	2,88	3,91	4,96	5,83	7,83	9,91
Water resistance	kPa	40,3	25,1	23,7	42,3	39,3	39,6	42,3	46,2	42,9
Temperature increase	°C	8,0	8,0	8,0	8,0	8,0	8,0	8,0	8,0	8,0

1. At nominal volume air flow, at supply air humidity 9 g/kg; at extract air humidity 14,3 g/kg
2. At an external pressure drop of 330 Pa
3. Consider entering possibilities into the facility!
4. Unit height without base frame (+ 90 mm).
5. Total heating power, pool water entry 28°C.

## AquaVent DPH-V

AquaVent DPH-V		015	025	040	063
Nominal air flow (at external pressure 350 Pa)	m <sup>3</sup> /h	1500	2500	4000	6300
Amount of outdoor air	%	Automatic from 0 - 100%			
Dehumidification performance according to VDI 2098 <sup>1)</sup>	kg/h	9,5	15,9	25,4	40,1
Heat recovery efficiency	%	65,6	67,7	67,5	66,7
Heat recovery output	kW	5,71	10,10	16,10	25,10
Heat pump output	kW	4,4	7,13	11,05	16
Heat pump - refrigerant		R134a	R410A	R410A	R410A
Post heater (water 80/60 °C, inlet air +22 °C)	kW	8,85	16,90	23,30	42,40
Water flow	l/s	0,11	0,21	0,29	0,52
Water resistance	kPa	5,68	6,10	6,50	7,90
Compressor absorbed power	kW	0,98	1,56	2,34	3,32
Compressor voltage (50 Hz)	V	3 x 400	3 x 400	3 x 400	3 x 400
Nominal el. power - supply fan	kW	0,75	1,05	1,9	3,35
Absorbed el. power - supply fan <sup>2)</sup>	kW	0,57	0,88	2,56	2,56
Nominal el. power - extract fan	kW	0,75	1,05	1,90	3,35
Absorbed el. power - extract fan <sup>2)</sup>	kW	0,55	0,94	1,36	2,45
Voltage - supply fan / extract fan (50 Hz)	V	1 x 230	3 x 400	3 x 400	3 x 400
Unit nominal power input	kW	2,48	3,66	6,14	10,02
Unit without separations <sup>3)</sup>		Wall thickness 50 mm			
Total length	mm	1860	2600	2600	2600
Length of largest unit, one split (upon request)	mm	1390	1945	1945	1945
Width	mm	780	780	1080	1380
Height <sup>4)</sup>	mm	1870	2095	2095	2095
Total weight approx.	kg	540	710	870	1030
Pool water condenser (optional)					
Heat output <sup>5)</sup>	kW	4,4	7,13	11,05	16,0
Water amount	m <sup>3</sup> /h	0,48	0,78	1,20	1,74
Water resistance	kPa	16,3	40,3	25,1	23,7
Temperature increase	°C	8,0	8,0	8,0	8,0

1. At nominal volume air flow, at supply air humidity 9 g/kg; at extract air humidity 14,3 g/kg
2. At an external pressure drop of 350 Pa
3. Consider entering possibilities into the facility!
4. Unit height without base frame (+ 90 mm).
5. Total heating power, pool water entry 28°C.

# Controls

The efficient AHU operation is ensured by a sophisticated control system that monitors and controls the operation of the installed components.

The desire of every user is a fully automatic operation of the air handling unit according to their needs. However, it is important that the control system allows easy adjustment of the working parameters either via a hand-held terminal or a building management system, which allows the parameters to be set via a computer or smartphone.

- fan speed control,
- automatic bypass damper (cold and heat recovery),
- heating and cooling coil pump and valves control,
- outdoor air and exhaust air damper control,
- mixing chamber control,
- dehumidification system control,
- alarming of measured parameters (temperature, humidity, pressure) with alarm limits management,
- weekly operating schedule (the intensity of ventilation, supply air temperature and humidity),
- ethernet or Modbus interface for remote access,
- custom control modification on request.

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## Fully integrated control system

Air handling units manufactured in the factory, including the implementation of the control system either in the factory or on the site of installation, including the commissioning, training of operating personnel, and issuing the control system operating and maintenance instructions. The manufacturer issues the declaration of conformity for the entire unit and provides the CE label for the device.

Components, such as electric cabinet, control and measuring devices (sensors, motor drives, differential pressure switches, thermostats, etc.), remote control management, etc., provide full functionality of the Aquavent air handling units, with the possibility of:

## Fully adjustable

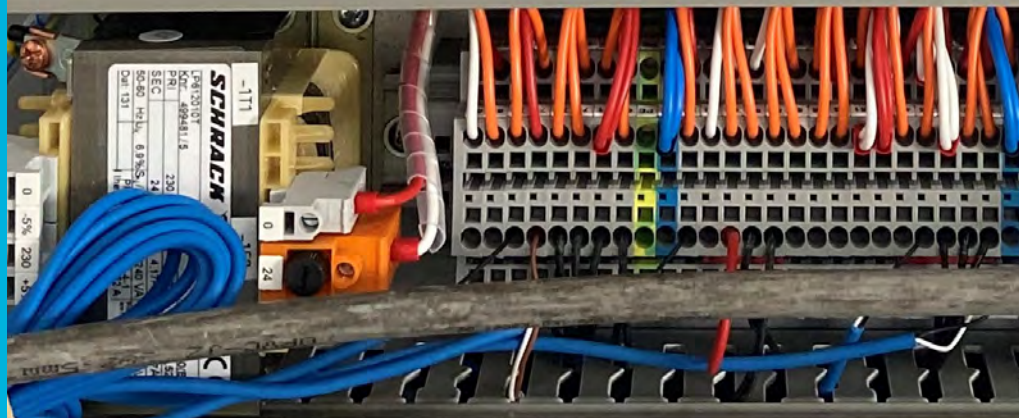
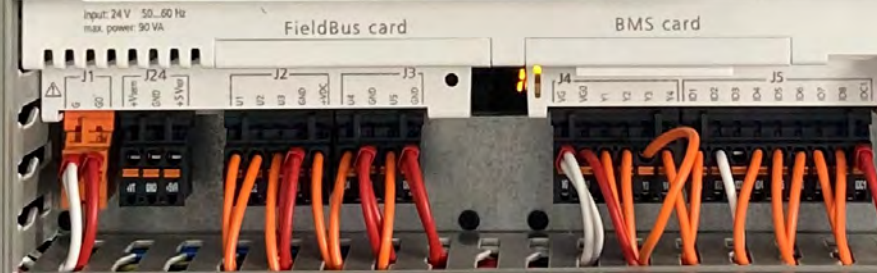
Factory-installed control system allows easy monitoring and adjustment of operating parameters for both maintainers and users. Access to some settings may be restricted and assigned to certain users only.



## Control box

The electric control box is installed in an empty section of the casing in such a manner that it does not obstruct the air flow. It is closed on all sides, and with all electrical requirements and displays for the operation of the swimming pool air handling unit, integrated in the unit and with all function modules, temperature and humidity sensors, air damper actuators wired ready for connection.

All measurements are possible without opening of access doors and without affecting air flow. Service connectors for cooling system, high and low pressure controls, high and low pressure gauges, gauge glass, output control.





# Standards

## **EN 1886:2007**

Ventilation for buildings – Air handling units – Mechanical performance.

## **EN 13053:2019**

Ventilation for buildings – Air handling units – Rating and performance for units, components and sections.

## **EN 16798-3:2017**

Energy performance of buildings – Ventilation of buildings – Part 3: For non-residential buildings – Performance requirements for ventilation and room-conditioning systems.

## **EN 1751:2014**

Ventilation for buildings – Air terminal devices – Aerodynamic testing of damper and valves.

## **EN 308:1997**

Heat exchangers – Test procedures for establishing the performance of air-to-air and flue gas heat recovery devices.

## **EN ISO 12100:2010**

Safety of machinery – General principles for design – Risk assessment and risk reduction.

## **EN ISO 13857:2019**

Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs.

## **EN 60204-1:2018**

Safety of machinery – Electrical equipment of machines – Part 1: General requirements.

## **EN 60034-1:2010**

Rotating electrical machines – Part 1: Rating and performance.

## **EN 16890-1:2016**

Air filters for general ventilation – Part 1: Technical specifications, requirements and classification system based upon particulate matter efficiency (ePM).

## **VDI 2089**

Heating, ventilation, sanitary and electrical systems in indoor swimming pools for public use.

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### **Machinery Directive**

Aquavent units are manufactured according to the safety demands of the EU Machinery Directive 2006/42/EC. This is confirmed through the issuance of corresponding Declaration of Conformity and CE label.



