



ventus VVS/COMPACT

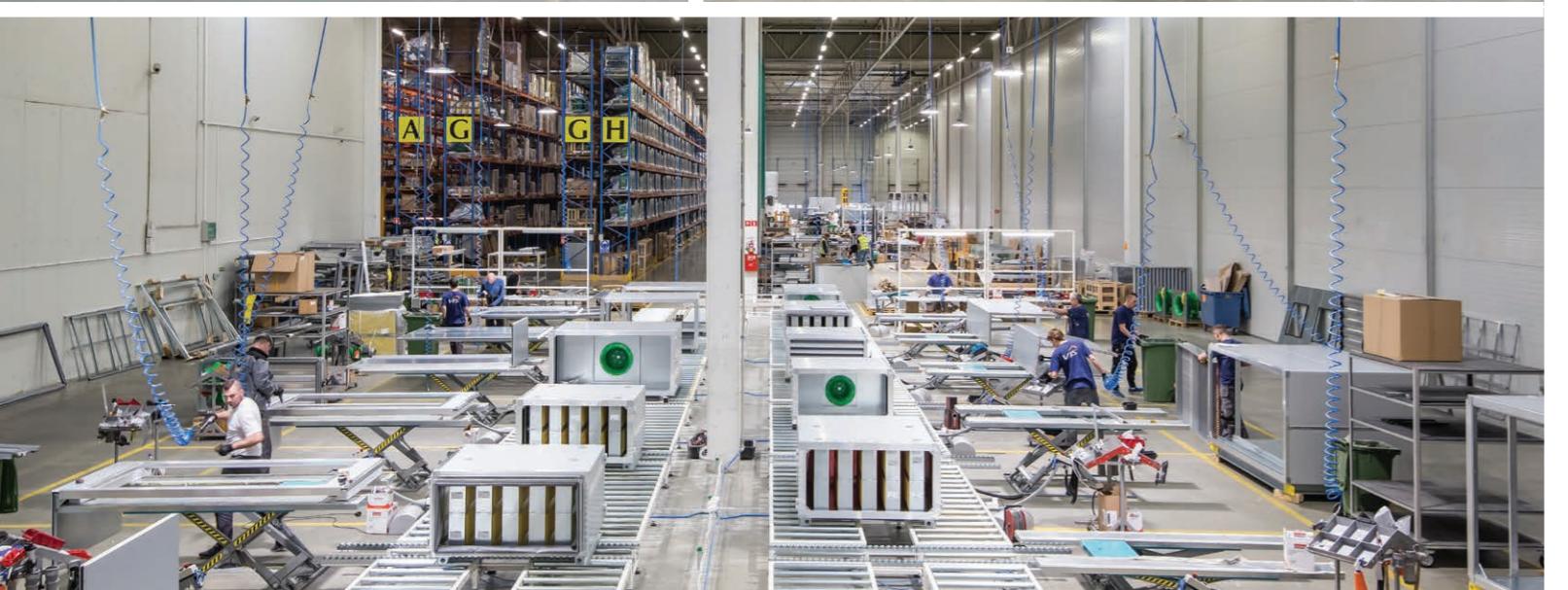
VOLCANO WING WING PRO

2022





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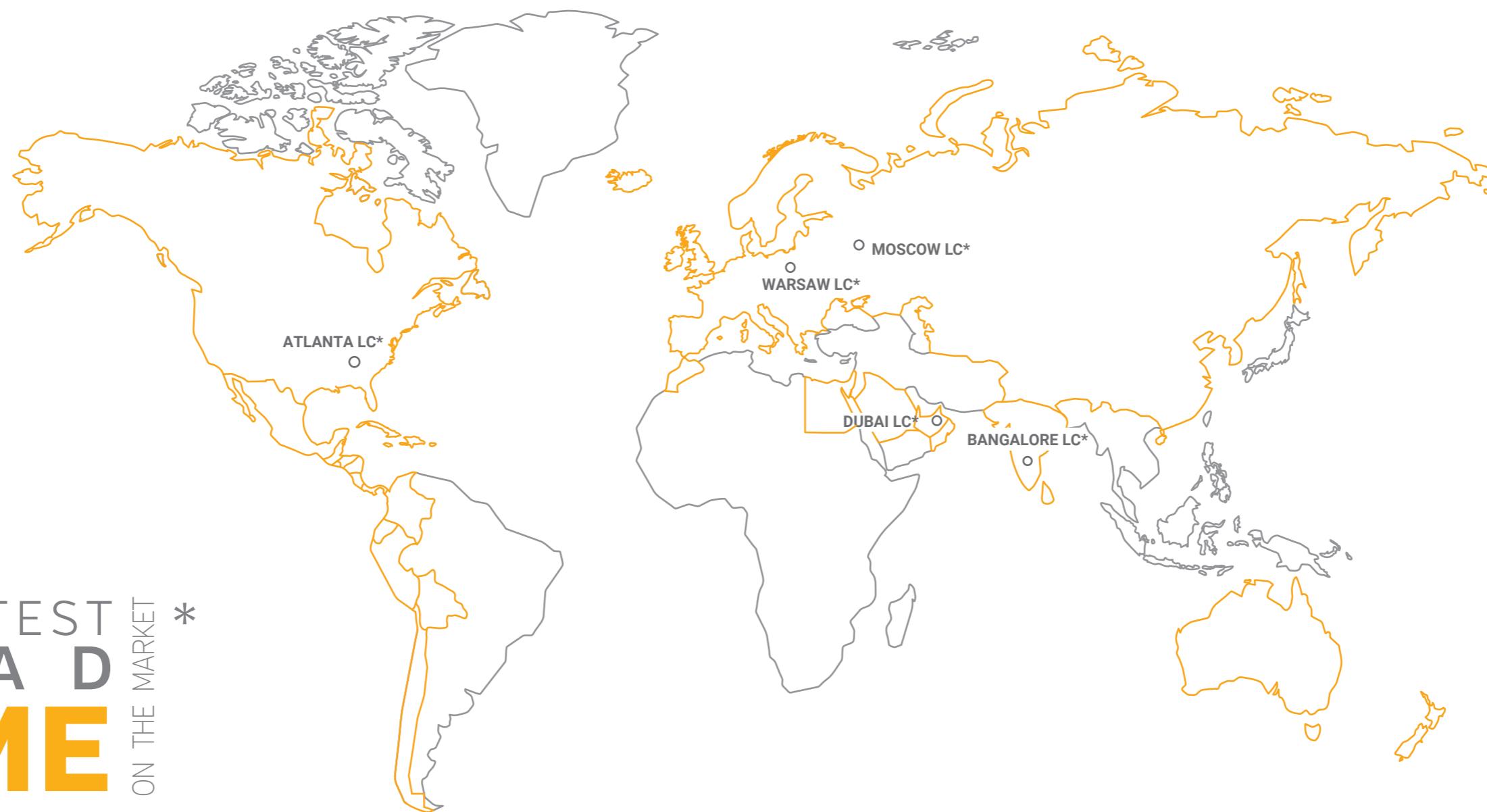
01
VTS Group

VTS GROUP – is a manufacturer
of technically advanced HVAC equipment,
combining innovative technologies in the field
of research&development, production
and logistics.

OUR MISSION

AHU#1

SHORTEST
LEAD
TIME
ON THE MARKET *



* Logistics center





3 PILLARS OF SUCCESS

Constantly highest quality of products. Best prices on the market. Shortest lead time. These 3 pillars of marketing policy allows VTS to be always one step head, wherever in the world.

Following the best practices of the branch, VTS has created a network of 5 efficiently running production and logistic centers (**Atlanta, Dubai, Moscow, Warsaw, Bangalore**), enable to ensure the shortest lead time on the market, wherever in the world.

SHORTEST L E A D **TIME**



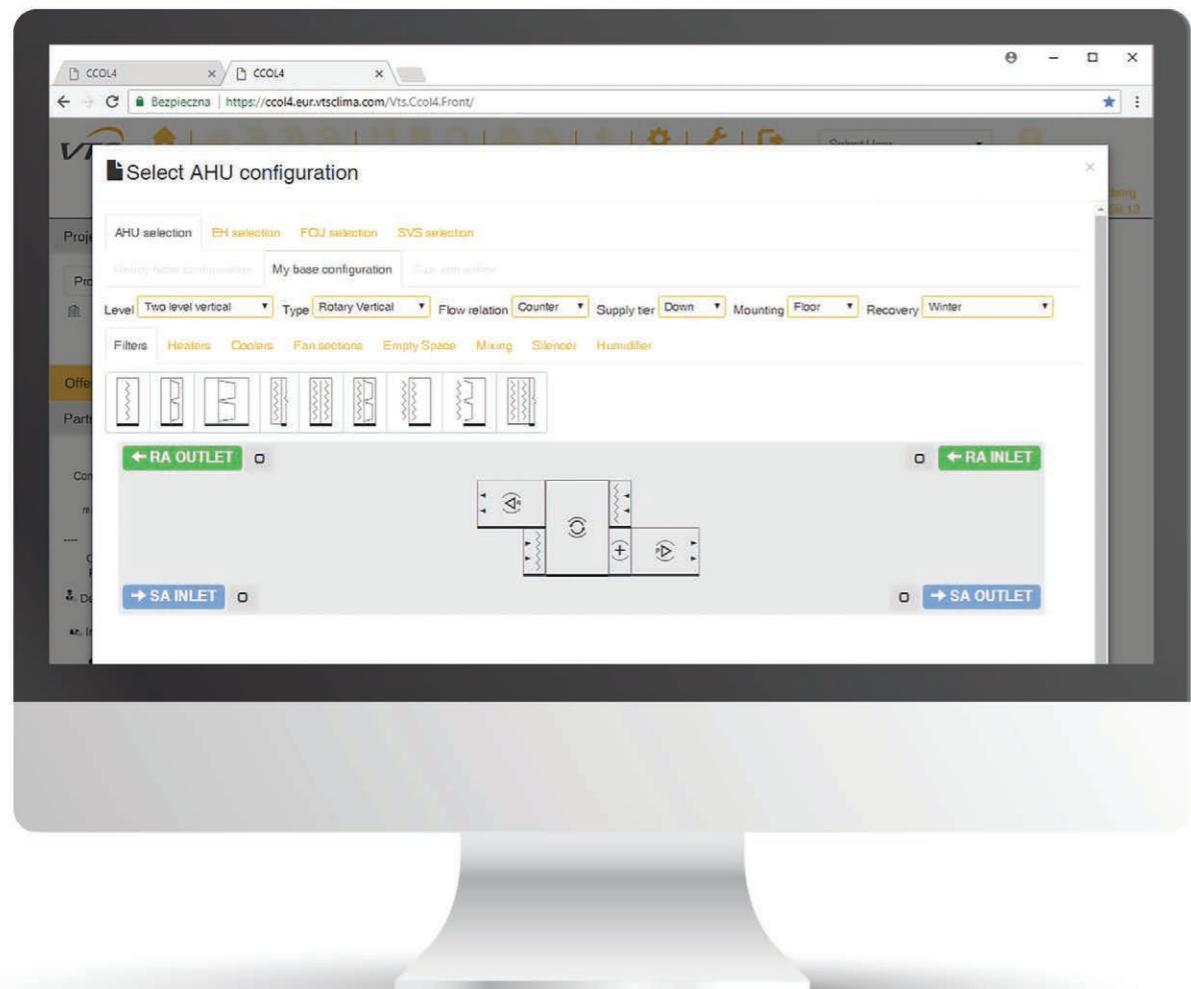
\$ COMPETITIVE **PRICE**

150 000
U N I T S
SOLD ANNUALLY

BEST Q **QUALITY**

UP TO **5** Y E A R S **WARRANTY**
FOR EACH U N I T





02

Support
for designers



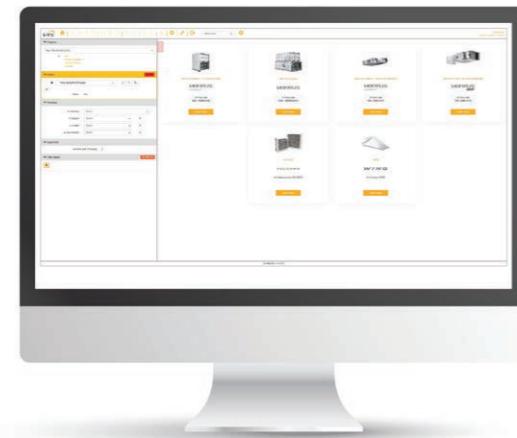
Support for designers

Support for designers



CLIMACAD ONLINE 4.0 (CCOL 4)

Infinite number
of configurations



Simple
and easy selection

Friendly
user interface

Integration with CRM,
ERP & WMA systems



CCOL4 OPTIMIZED FOR

» any
web-browser



» any operating system

» any device



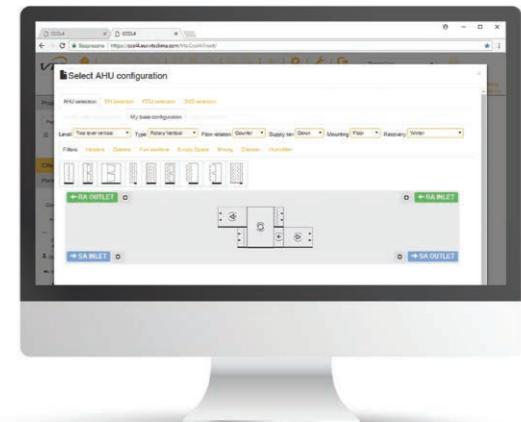
DATA EXPORT TO



CCOL 4.0 utilises latest technologies and software platforms. The tool has been developed in SaaS model (Software as a Service). Its best advantage is, that service is accessible wherever in the world. Any device equipped with web-browser and internet access is all you need to experience the power of our CCOL 4.0.

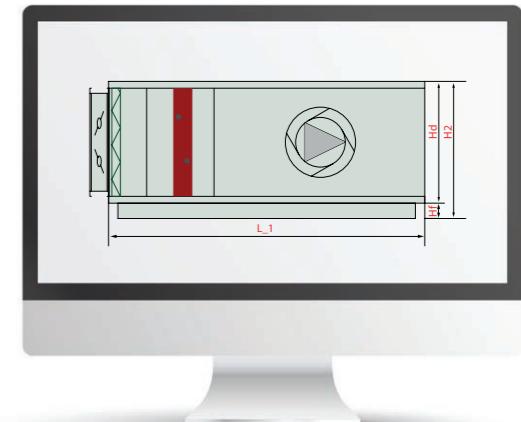
DESIGN VERSATAILTY

- » Infinite units configurations.
- » Detecting of configurations errors.



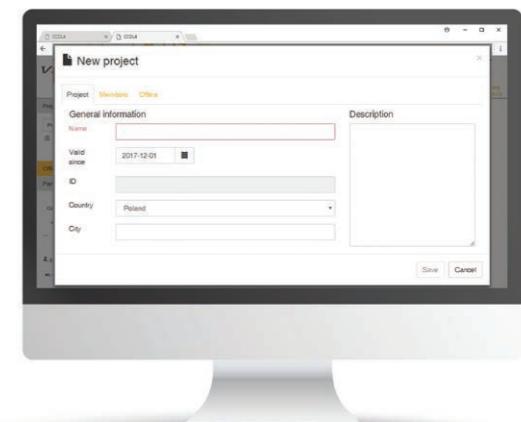
DYNAMIC AHU LENGTH DEFINITION

- » CCOL4 applies dynamic optimizing of AHU length based on automatic air treatment functions placements with regard to minimum gaps between them in order to secure their proper performance.



MANAGING OF YOUR DATA BASE

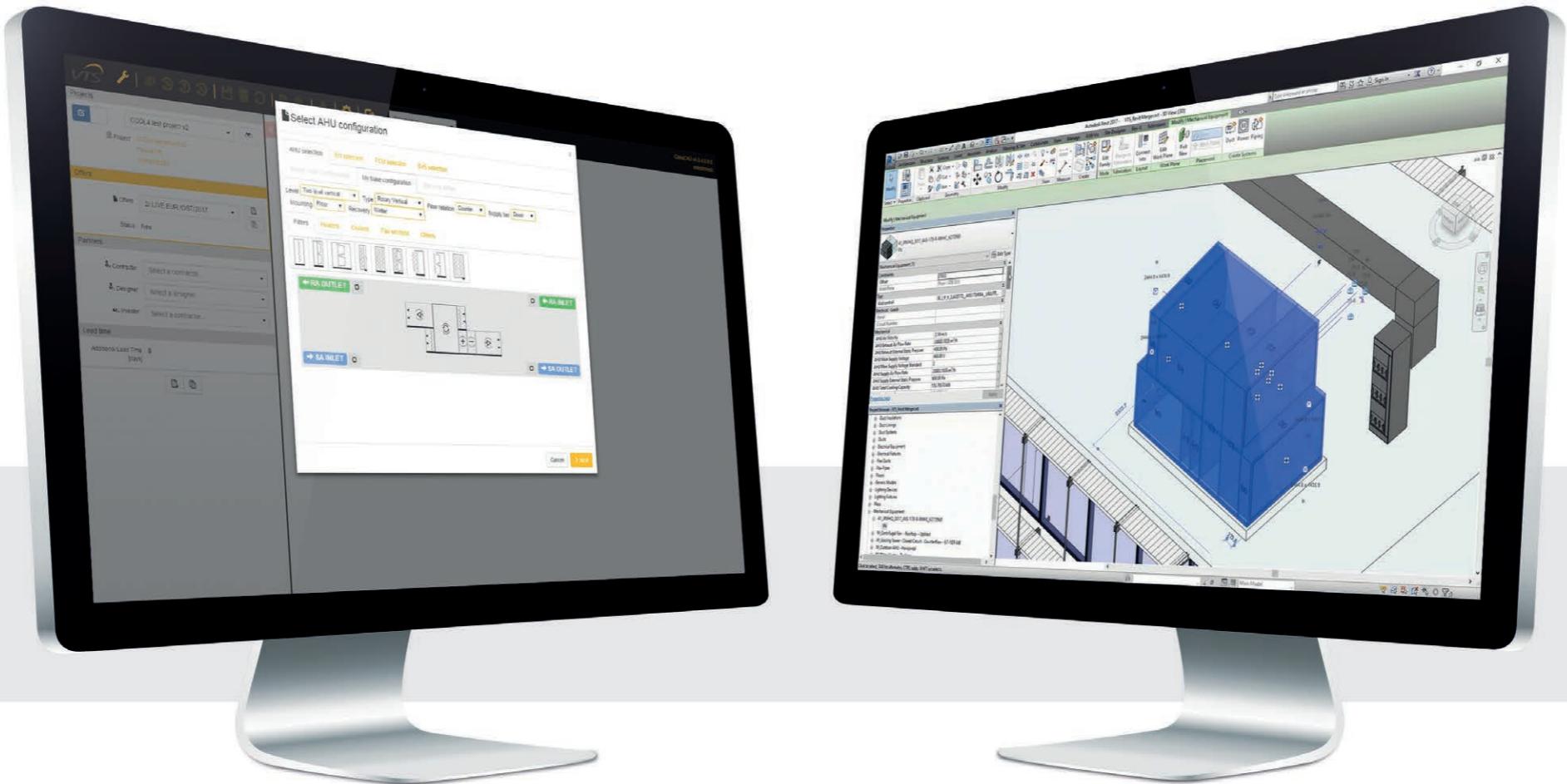
- » Self-creating and development by designer of own projects and AHU selections data base.
- » Sharing of self-made AHU selections with VTS engineers for pricing.



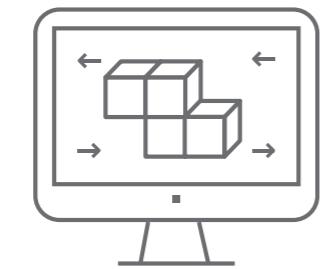
www.ccol4.com

VTS BIM - new approach to digital models of Air Handling Units

VTS has enabled dynamic generating of VENTUS VVS, VENTUS Compact and American VENTUS AVS units digital models as on-line service. This became possible thanks to implementation of new AHU selection tool – the ClimaCAD OnLine 4.0 [CCOL 4.0], equipped with .rfa [Revit®] files generator.



3 steps to generate the model:



1 Login to CCOL 4.0

You can login using our web-site:

www.ccol4.com

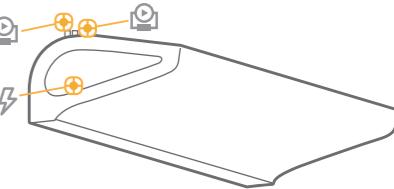
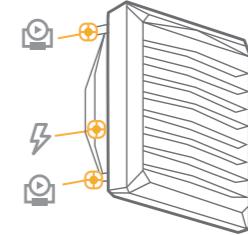
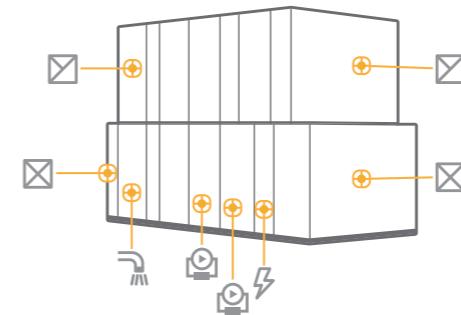
2 AHU configuration and parameters specifying

Intuitive unit configurator enables to select a unit, perfectly fitting to your design assumptions.

3 Selection export to .rfa file

In order to generate .rfa model, all you need to do is to enter personal information (including e-mail address) of a person to whom the model is to be sent. The system will automatically send the link to the site from where model can be downloaded. Entire process take no longer than 15 minutes.

As a result the client is given:



Digital model of the air handling unit with fully parametrized connectors:

- » Air,
- » Hydraulic,
- » Sanitary,
- » Electric,

and also a set of complete technical and dimensioning information, including clearly marked **maintenance** and **service zone** of the unit.

VTS enables also a library of static families for WING air curtains and VOLCANO air heaters.

The models includes:

- » parametrized electric and hydraulic connectors,
- » both vertical and horizontal mounting options,
- » presentation of units effective air range,
- » parametrized angle of heater's to the horizontal plane.

VTS **BIM** -air handling units perfectly fitted for designer's needs.

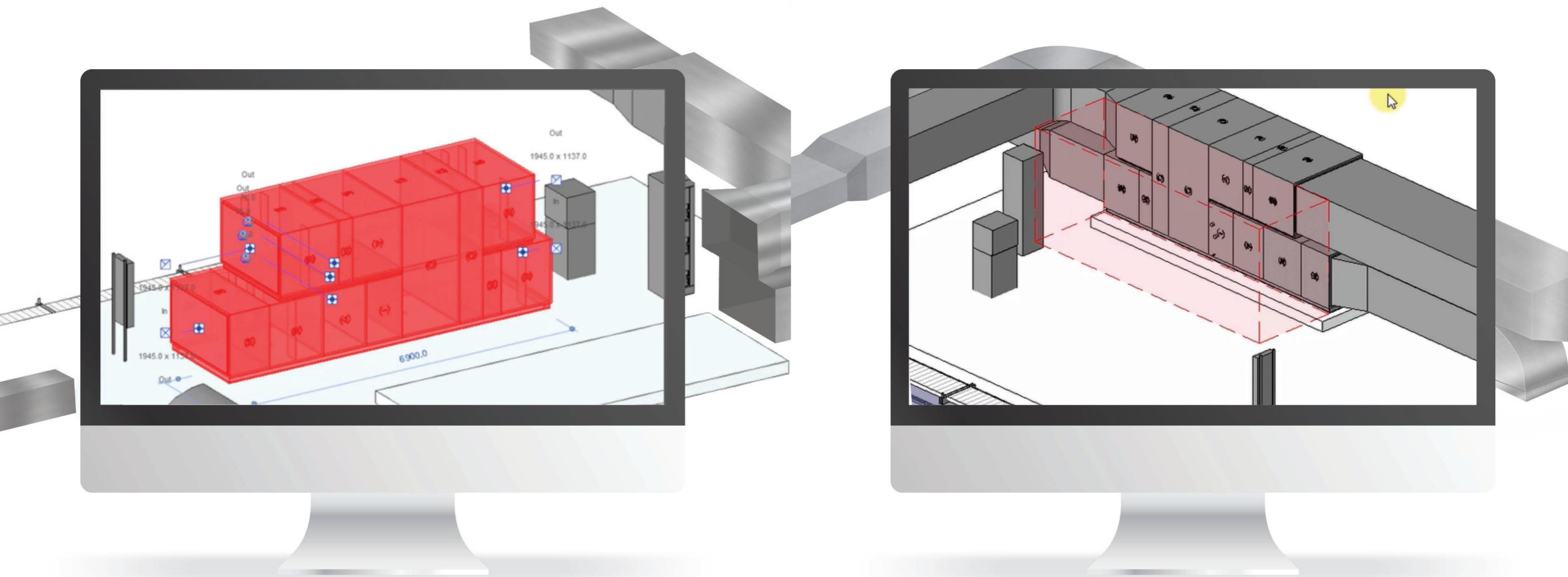
VTS supports generating of air handling units models in LOD 400 (Level Of Development) standard.

LOD
400
as standard

The VENTUS BIM families include maintenance and service zones of the units as standard.

These zones reserve minimum space to secure proper maintenance and repair conditions of the unit, and allow to avoid any collisions with remaining building elements or installations.

Service clearance
repair & maintenance
as standard.





03

VENTUS VVS



DURABLE
AND TIGHT
STRUCTURE



RELIABLE
COMPONENTS



SMART
CONTROLS



USER
SAFETY



Airflow
from **1 100 m³/h**
from **100 000 m³/h**



Up to **92%**
of energy recovery
efficiency

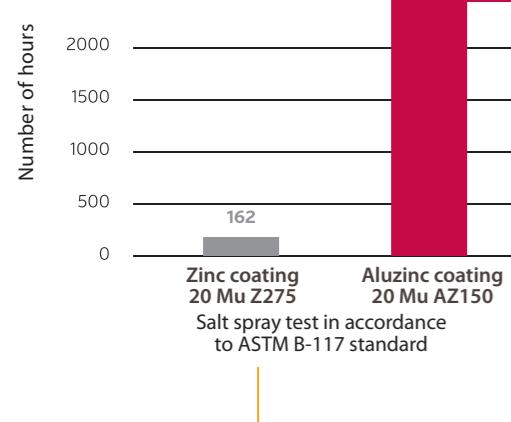


14
sizes

STRUCTURE



STEEL SKIN COATED
WITH ALUZINC AZ 150



CASING SKIN

- » Rigid, durable structure of the casing.
- » Low absorption of heat radiation and UV.
- » High resistance to weather conditions.

FAN SECTION CAGE

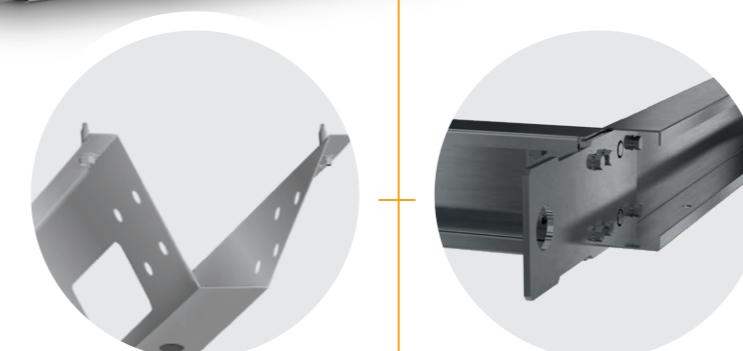
- » Improved longitudinal rigidity of the structure.
- » Facilitated sections joining.

FOUNDATION

- » Transport facilitation.
- » High resistance of the frame to deflection.



ALUMINUM
POSTS
OF SPECIAL
CONSTRUCTION
IN EACH AHU
TYPE



PROFIL V

VVS 021-180



PROFIL C

VVS 230-650

STEEL BASE FRAME
AS STANDARD FOR ANY TYPE
OF UNITS

STRUCTURAL POSTS

- » Broken thermal bridges as standard.
- » High resistance to weather conditions and UV radiation.

TIGHTNESS



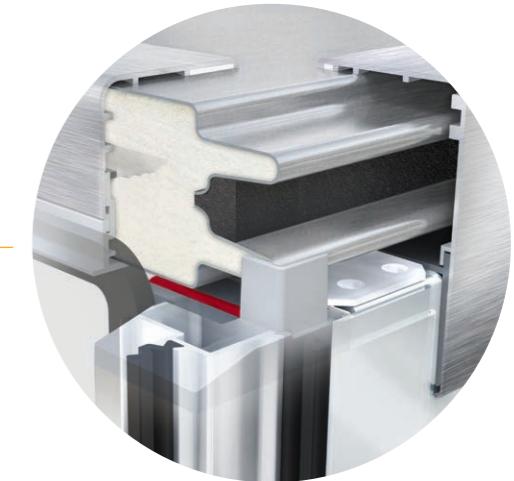
CANOPY

- » The canopy is made of 0,5 mm steel sheet, double side coated with 185 µm of zinc (DX51D AZ185).
- » Canopy is assembled of modules equipped with self-latching grooves securing perfect tightness of the joints. Modular structure of the canopy ensures its easy and safe assembly.

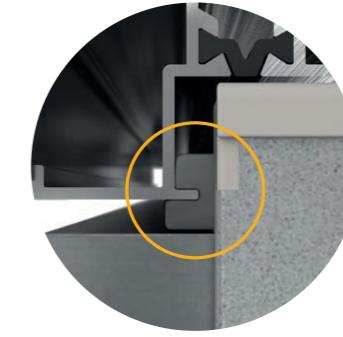


ERGONOMIC INSPECTION PANEL LOCK

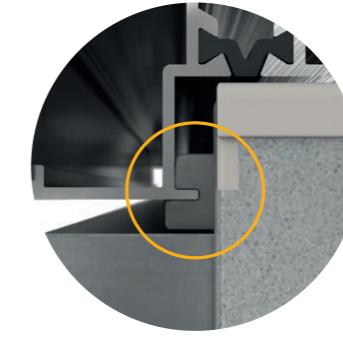
- » Highly aesthetic and ergonomic handles securing perfect tightness of inspection panels.



THERMAL BREAK



LABIRYNTH TIGHTNENING



ADDITIONAL POST SEALING



ADDITIONAL SEALING BLADE

ALUMINUM STRUCTURAL POSTS WITH ADDITIONAL SEALING BLADE AND THERMAL BREAK

- » Broken thermal bridge as standard – eliminates humidity condensation on units structural elements.
- » Blade along the inspection window ensures labyrinth tightnening between panel and AHU body – currently the most effective solution on the market, mainly applied to laboratory equipment.
- » Symmetrical groove in the vertical post's mounting feet secures its 100% tightness with the AHU casing structure.



ADDITIONAL CONFIGURATION FUNCTIONS - VVS 021-650 - RECUPERATOR [HEX & PREMIUM PLUS], REGENERATOR [HEAT WHEEL], SUPPLY & EXHAUST

Dimension	Function version	Remaining configuration functions – typical lengths of function arrangement						
		VVS021	VVS030	VVS040	VVS055	VVS075	VVS100	VVS120
F	L	F7/F9	762	762	762	762	762	762
		EU4/F5	366	366	366	366	366	366
H	L	H	366	366	366	366	366	366
		C	366	366	366	366	366	366
S	L	S	1098	1098	1098	1098	1098	1098
		E(e1)	366	366	366	366	366	366
E	L	E(e2)	762	762	762	762	762	762
		E(e3)	1098	1098	1098	1098	1098	1098
		M	762	762	762	762	762	762
W	L	W	1098	1098	1098	1098	1098	1098

Dimension	Function version	Remaining configuration functions – typical lengths of function arrangement						
		VVS150	VVS180	VVS230	VVS300	VVS400	VVS500	VVS650
F	L	F7/F9	762	762	762	762	762	762
		EU4/F5	366	366	366	366	366	366
H	L	H	366	366	366	366	366	366
		C	366	366	366	366	366	366
S	L	S	1098	1098	1098	1098	1098	1098
		E(e1)	366	366	366	366	366	366
E	L	E(e2)	762	762	762	762	762	762
		E(e3)	1098	1098	1098	1098	1098	1098
		M	1098	1098	1098	1098	1098	1098
W	L	W	1098	1098	1098	1098	1098	1098





COMPONENTS

DIRECT DRIVE PLUG FAN SET



Design and application

- » Centrifugal fan, without casing, single inlet, PLUG type, with backward curved blades.
- » Impeller made of SAN (styrene/acrylonitrile) construction material with 20% glass fiber.
- » Direct drive – fan impeller installed directly on motor shaft.
- » Fan section consisting of single or multiple fans (fan array) in order to ensure optimum working parameters.

Specification

- » Low and medium pressure ventilation systems with fan static pressure not exceeding 2000 Pascals.
- » Maximum fan set working temperature: 60°C.

> AC MOTORS



- » Fan and motor mounted on common housing, separated from AHU casing by set of rubber vibration absorbing mounts.
- » Motors of TEFC type (Totally Enclosed, Fan-Cooled).
- » Motors fitted for IEC standard.
- » Variable Frequency Drive (VFD) – standard equipment of the fan-set.

> EC MOTORS



- » Set of fan and motor mounted on common rail, fixed to the AHU fan diaphragm.
- » EC motors are Permanent Magnet motor, characterised by much higher efficiency vs traditional inductive AC motors.
- » EC motors (Electronically Commutated) – where mechanical commutator switching the windings has been replaced with electronic one.
- » Change of revolutions is done by means of changing the frequency rate of windings switching (rate or magnetic field rotating).
- » Highly inductive permanent magnets have applied in EC motors used by VTS, which enabled to achieve high torque at relatively small dimensions, together with reaching IE4 efficiency class.

CASING



Design and application

- » Casing structure made of 'sandwich' type panels formed in 'C' shape and reinforced by system of internal frames.
- » "Sandwich" double skin panels made of rigid polyurethane foam.
- » Indoor and outdoor application.
- » Inspection panels mounted on AHU side.
- » Casing supported on steel base rails.



Specification

- » Working temperature: (-40)°C ÷ (+90)°C.
- » Panel thickness: 40mm.
- » Thermal conductivity PPU $\lambda = 0,022 \text{ W/mK}$.
- » Casing fire resistance: non-flammable, non fire spreading (NRO).
- » Moisture absorption: 0,04%.
- » PPU density: $\rho = 42 \text{ kg/m}^3$.
- » Eurovent certification
 - Mechanical strength of casing: -1000 Pa ÷ 1000 Pa < 2mm (D₁ - PN EN 1886: 2008),
 - Casing tightness: (MB): (-400) Pa - 0,05 l/sm², (+700) Pa - 0,13 l/sm² (L₁ - PN EN 1886: 2008); (RU): (+400) Pa - 0,93 l/sm²,
 - Casing heat transfer coefficient: K= 0,6 W/m²K (T2 - PN EN 1886: 2008),
 - Thermal bridges coefficient: K_b = 0,52 (TB₃ - PN EN 1886: 2008).

PANEL FILTERS



Design and application

- » Pleated filtration fabric shielded by steel net, installed in 50 mm thick frame.
- » Filtration fabric made of polyester fibres.
- » Applied as initial air filtration stage.

Specification

- » Working temperature: max (+70)°C, 100% RH.

Filtration classes available

- » ISO Coarse 75% (ISO 16890) - G4 (EN779).

BAG FILTERS



Design and application

- » Filtration fabric made of polyester fibres.
- » Bags fixed to to 25 mm thick frame.
- » Filters of class M5 - bags length: 300 mm, Filters of class F7 & F9 - bags length: 600 mm.
- » Applied as initial, secondary or final air filtration stage.

Specification

- » Working temperature: max (+70)°C, 100% RH.

Filtration classes available

- » ISO ePM10 50% (ISO 16890) - M5 (EN779).
- » ISO ePM2,5 65% (ISO 16890) - F7 (EN779).
- » ISO ePM1 70% (ISO 16890) - F9 (EN779).





ROTARY HEAT WHEEL

**Design and application**

- » Rotor made of aluminum with shaft suspended on bearings, installed in steel housing.
- » Rotor filling – two layers of alternately wound aluminium foil – one flat, the other – corrugated – making small ducts for the air.
- » Rotor drive system with smooth revolutions control enabling to maintain highest recovery efficiency and to adjust degree of recovery performance.
- » Purge zone reducing the cross-contamination effect of contaminated exhaust air to supply to absolute minimum.
- » Set of gaskets installed both on the wheel outer edge and bar separating supply from exhaust air being an additional protection against cross-contamination.
- » Rotary heat wheel recovers sensible heat from return air to supply, which passes the unit in opposite direction. The process enables heat recovery in winter time, same as cool recovery in summer.
- » Humidity recovery from return to supply in case the rotor pad temperature is lower than dew point of return air – typically during winter season.

Specification

- » Up to 86% of energy recovery, depending on airflow rate and its velocity in the heat wheel window.

COUNTERFLOW HEXAGONAL RECUPERATOR

**Design and application**

- » Hexagonal heat recovery recuperator made of crosswise stamped aluminum plates, between which supply and exhaust air passes alternately in counterflow arrangement.
- » As standard, the recuperator is equipped with by-pass damper, enabling its securing against frosting and heat recovery capacity regulation.
- » Optionally, the recuperator can be equipped with integrated mixing box.
- » The recuperator provides sensible heat recovery for warmer air to the colder one. For winter season – recovery of heat from return air to supply. For summer – recovery of chill from return air to supply.

Specification

- » Energy recovery at very high supply and exhaust air stream separation (reaching 99,9%).
- » Heat recovery reaching up to 93% depending on flow rate face velocity of the air passing the recuperator.



CROSSFLOW PLATE HEAT RECUPERATOR

**Design and application**

- » Recuperator made of crosswise stamped aluminum plates, between which supply and exhaust air passes alternately in counterflow arrangement.
- » As standard, the recuperator is equipped with by-pass damper, enabling its securing against frosting and heat recovery capacity regulation.
- » Optionally, the recuperator can be equipped with integrated mixing box.
- » The recuperator provides sensible heat recovery for warmer air to the colder one. For winter season – recovery of heat from return air to supply. For summer – recovery of chill from return air to supply.

Specification

- » Energy recovery at very high supply and exhaust air stream separation (reaching 99,9%)
- » Heat recovery reaching up to 80% depending on flow rate face velocity of the air passing the recuperator.

RUN-AROUND COIL

**Design and application**

- » Set of two water coils – one in supply, the other one in exhaust airstream.
- » The coil in return airstream recovers the heat (cooler) and passes it to the coil in the supply air (heater) by means of heat-transfer fluid (water-glycol mixture). In case of chill recovery, entire process is reversed.
- » System applied for supply and exhaust air handling units installed remotely to each other."

Specification

- » Indirect Energy recovery (sensible heat) at 100% supply and exhaust airstreams separation.
- » Max heat-transfer fluid operation pressure: 1,6MPa=16bar (tested 21 bar).
- » Max glycol concentration: 50%.

MIXIN SECTION

**Design and application**

- » Section equipped with two air inlets/outlets aided with dampers, enabling regulation of fresh and recirculation air share (recirculation).

Specification

- » Direct Energy recovery (sensible and latent heat) resulting from partial mixing of fresh air with return one.
- » Control of fresh air share in entire airflow supplied to handled spaces.
- » Working temperature range: -40 ÷ +70°C.

WATER HEATER

**Design and application**

- » Block of copper pipes integrated with another block of aluminum fins, creating expanded heat exchange surface. Pipes are bonded to the collectors, equipped with headers (for connecting entire coil to the medium supply system).
- » Heating of the air supplied to the handled spaces.
- » Re-heating of the air as a part of air dehumidifying process.
- » The coil can be applied if heating medium is available (local boiler or district heating system).
- » Coil headers are equipped with medium damping valve and air vent.
- » Connecting the coil in parallel medium flow vs air, will result in its capacity reduction by over a dozen percent.

Specification

- » Max glycol concentration: 50%.
- » Max medium temperature: 150°C.
- » Max medium working pressure: 1,6MPa = 16bar (test: 21bar).
- » Heating capacity: parameter resulting from individual performance calculation of selected unit (CCOL).
- » Medium side pressure drop – parameter resulting from individual performance calculation of selected unit (CCOL).

ELECTRIC HEATER

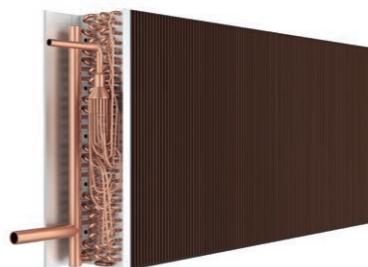
**Design and application**

- » Set of resistive heating elements made of CR-Ni-Fe alloy, 6 kW/400V each.
- » Coils mounted on hot-dip galvanized steel frame.
- » Heater is equipped with power terminals and thermostat protecting against overheating.
- » In case of AHU with complete controls, heater is equipped with integrated capacity control module.
- » Heating capacity can be modified by means of smooth regulation module (HE module, set of Solid State Relays as optional parts of AHU controls) or by means of automatic engaging of next heating sections.

Specification

- » Max permissible ambient temperature around heating elements: 65°C.

DIRECT EXPANSION COIL AS CONDENSER IN HEAT PUMP CIRCUIT

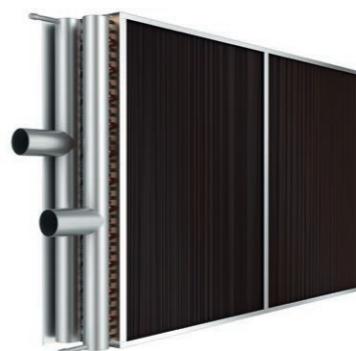
**Design and application**

- » Block of copper pipes integrated with another block of aluminum fins, creating expanded heat exchange surface. Pipes are bonded to the collectors, equipped with headers (for connecting entire coil to the cooling system circuit).
- » Heating of the air supplied to the handled spaces.
- » Re-heating of the air as a part of air dehumidifying process.

Specification

- » Max medium temperature: 60°C.
- » Max medium working pressure: 3,84MPa = 38,4bar (test: 50bar).
- » Heating capacity: parameter resulting from individual performance calculation of selected unit (CCOL).

WATER COOLER

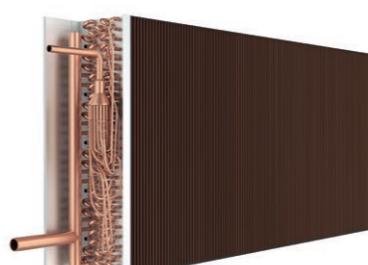
**Design and application**

- » Block of copper pipes integrated with another block of aluminum fins, creating expanded heat exchange surface. Pipes are bonded to the collectors, equipped with headers (for connecting entire coil to the medium supply system).
- » Cooling of the air supplied to handled spaces.
- » Cooling and dehumidifying of the air as a part of air complex dehumidifying process in summer season.
- » Coil can be applied in complex air conditioning systems consisting of few or over a dozen of units supplied from common chilling source (chiller) or in case of single unit of relatively high cooling capacity.

Specification

- » Max glycol concentration: 50%.
- » Min supplying medium temperature: +2°C.
- » max medium working pressure: 1,6MPa = 16bar (test: 21bar).
- » Cooling capacity: parameter resulting from individual parameters of selected unit (CCOL).
- » Medium pressure drop / flow rate: parameter resulting from individual performance calculation of selected unit (CCOL).
- » For reversed operation mode (heating) max medium working temperature: 140°C.

DX COOLING COIL

**Design and application**

- » Block of copper pipes integrated with another block of aluminum fins, creating expanded heat exchange surface. Pipes are bonded to the collectors, equipped with headers (for connecting entire coil to the cooling system circuit).
- » DX cooler is also available as heater execution (so called Condenser).
- » Cooling and dehumidifying of the air as a part of air complex dehumidifying process in summer season.
- » Coil usually applied for smaller cooling capacity systems vs water coolers or for individual air conditioning systems.

Specification

- » Min. Refrigerant evaporation temperature: +3°C.
- » Max refrigerant working pressure: 2,2MPa=22bar (test: 29 bar).
- » Cooling capacity - parameter resulting from individual performance calculation of selected unit (CCOL).



EVAPORATIVE HUMIDIFIER

**Design and application**

- » Humidifying process based on water adiabatic evaporation from the humidifier pad.
- » Humidifying pad made of CELDEK II material.
- » Humidifier housing made of stainless steel.
- » System of direct water dropping (VVS021-VVS055).
- » System of water recirculation aided by pump (VVS075-VVS650).
- » Droplet eliminator integrated with humidifier filling (VVS075-VVS650).
- » System is equipped with water drainage system preventing against high water level in the pan and floating valve controlling its refilling (VVS075-VVS 650).

Specification

- » Max air face velocity across the humidifier pad: 3,00 m/s (VS 21-VS 55); 4,00 m/s (VS 75-VS 650).
- » Water pressure range: 0,15 ÷ 0,75 MPa.
- » Requirements regarding water quality – standard tap water.

SOUND ATTENUATING SECTION

**Design and application**

- » Sound attenuator consists of noise attenuating bars installed in the AHU casing.
- » Attenuating bars of 140 mm width filled with sound-absorbing, inflammable mineral wool (density: 60 and 80 kg/m³).
- » Attenuating bar housing: frame made of hot-dip galvanized steel.
- » Bar outer surface: thin veil preventing against bar filling migration to the air.
- » Number of attenuating bars: 2÷13, depending on block size.

Specification

- » Max air face velocity: v=5m/s.
- » Working conditions: -40 ÷ +70°C..

INTERNAL LIGHT

**Design and application**

- » Energy saving lamp with securing shade.
- » Facilitation of AHU inspection actions: filter, fan and humidifier compartment.

Specification

- » Working conditions: -40 ÷ +70°C..

AIR DAMPER

**Design and application**

- » Blades made of aluminium with rubber gasket on the edges.
- » Aluminum frame.
- » Blades drive realized by means of gears made of composite material, installed on frame internal side.
- » Damper is equipped with square pivot, fitted for actuator (dampers of cross section greater than 4 m² have 2 linked pivots).

Specification

- » Air leakage at closed damper: 50 m³/h*m² - at 100 Pascals of pressure difference.
- » Working temperature range: -40 ÷ +70°C.

FLEXIBLE CONNECTION

**Design and application**

- » Flexible connection made of 1 mm thick and 30 mm wide hot-dip galvanized steel profiles and polyester fabric coated with PVC.
- » Flame resistance: UL94 - HB [ISO 1210].
- » Flexible connection resistant to UV radiation.
- » Working temperature range: -30°C do +70°C.
- » Max connection length (fully spread position): 110 mm.
- » Flexible connection installed on each AHU/Duct joint eliminates transfer of possible AHU vibrations to the ventilation ductwork.

Specification

- » Max air face velocity: 5m/s.
- » Working conditions: -40 ÷ +70°C..

AIR INTAKE AND DISCHARGE LOUVERS

**Design and application**

- » Air intake louver made of aluminum profile, blades made of ABS material.
- » Air outlet louver made of aluminum profile, blades made of ABS material.
- » Protection of air handling unit installed outdoor against meteorological conditions (precipitation, sand).

Specification

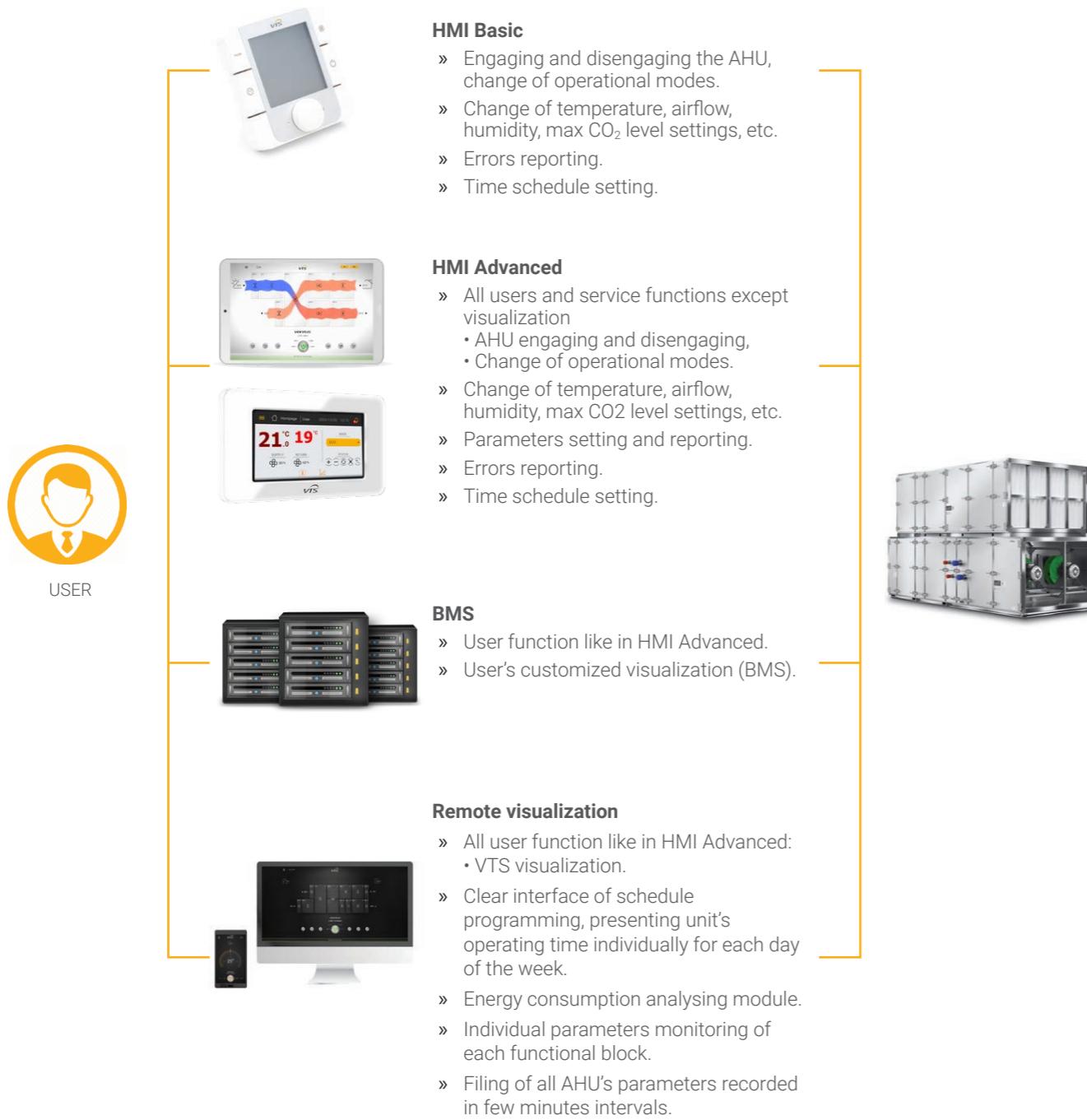
- » Max air face velocity: 5m/s.
- » Working conditions: -40 ÷ +70°C..

CONTROLS

All controls for VENTUS air handling units is available as optional equipment.

Range of controls is always fitted to configuration of the AHU selected in the CCOL4 tool. Controls is capable to regulate all user parameters: air temperature, its humidity, maximum permissible CO₂ concentration and the flow rate. Also, controls support preventive and securing functions like protection of the water heater against freezing or energy recovery system against icing, protection of motors against overloading, monitoring of air filters actual status of contamination and many other. Applied algorithms can optimize performance of all air treatment components in order to minimize consumption of all energy media supplied to the unit.

The system includes control and power supply circuit.



PAREMETERS REGULATION FUNCTIONS

Regulation of temperature and humidity

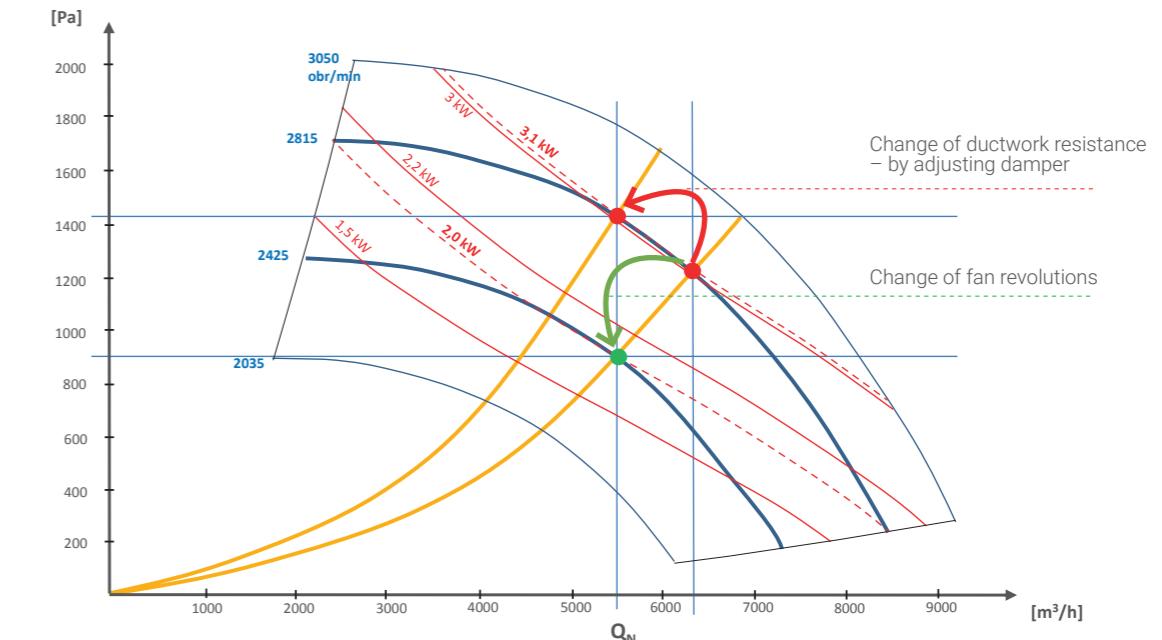
- » Regulation of supply, return air temperature and humidity in handled spaces.
- » Control of water coils valves (heater, cooler) and condensing unit.
- » Control of rotary heat wheel revolutions, by-pass damper and mixing box, depending on AHU type and configuration.

Airflow rate regulation

- » Constant Air Volume (CAV) available as standard.
- » Constant static pressure maintenance in trunk duct (Variable Air Volume – VAV) available as option.
- » Setting of constant revolutions for each fan individually – VFD setting for AC motors or constant revolutions percentage in case of EC motors.

CO₂ regulation

- » By means of mixing box – for units with air recirculation.
- » By means of airflow rate change – for all types of supply and exhaust units (function can be engaged together with mixing box control).



PROTECTION FUNCTIONS

- » Protection against rotary heat wheel icing, by means of wheel revolutions reduction.
- » Protection against hexagonal counterflow and cross-flow recuperator icing by means of by-pass damper opening. Functions realized as optional:
 - Optimizing of icing protection function by change of minimum return air temperature threshold downstream the energy recovery unit vs return air parameters.
 - Minimizing of recovery efficiency drop during defrosting
- » Anti-freezing protection of water heater
 - Antifreeze thermostat installed downstream the heater
 - Strap-on return water temperature sensor
- » Fans overload protection (functions realized by EC motors drives)
- » Fire alarm input – AHU immediate disengaging in case of lack of external start permission from overall fire protection system.



PREVENTIVE FUNCTIONS

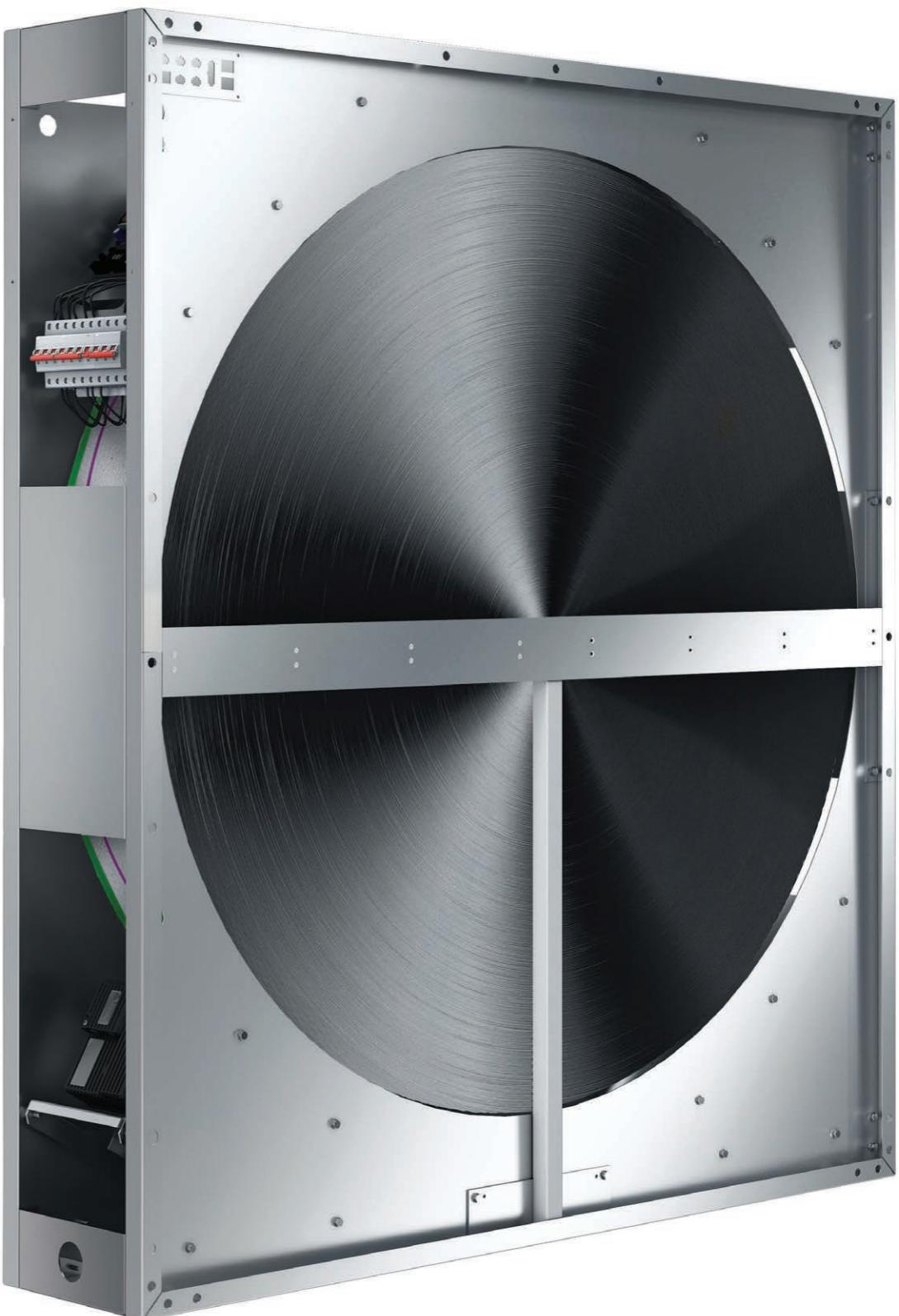
- » Constant filter contamination status control:
 - Constant monitoring of filter pressure drop by means of static pressure transducers,
 - Evaluation of filter contamination status for vs actual airflow rate.
- » Fans shutting-down delay – fan's run out for systems with electric heater
- » Water heater pre-heating before fan's start up.
- » Periodical heater pump engaging in summer – to prevent against limescale accumulation
- » Opening of water heater regulation valve before engaging the fans.

TIME SCHEDULE FUNCTIONS

- » Weekly schedule operational modes programming (HMI Advanced i Basic).
- » Clear visualization of schedule settings by means of web-browser (computers and mobile devices).

POWER SUPPLY AND CONTROL CIRCUITS

- » The mains component of the controls is the control box – with microprocessor controller installed inside. The control box is usually mounted on side wall of the AHU or in units direct vicinity.
- » Control box is equipped with controller, power protection circuits, terminal block enabling connecting of all control elements.
- » Electric protection of fans, rotary heat wheel drive, control elements and heater pump are installed inside the control box.
- » Control of fan-sets (variable frequency drives in case of AC motors or specialized drives for EC ones) is realized by means of digital communication based on ModBUS protocol. Fan control elements are set with individual address enabling them to be properly identified in the control system.
- » Communication with static pressure and CO₂ transducers also realized by ModBUS protocol.
- » For other control elements, digital or analogue signals are used.



CONTROL ELEMENTS

CONTROL ELEMENTS



ROOM AIR TEMPERATURE SENSOR


Functions and application

- » Regulation of temperature in handled space.

Operational parameters

- » Measurement range: -20°C do +70°C.
- » Measurement accuracy: ±0,5K.
- » Sensor type: NTC 10k.
- » Air humidity range: 5 ÷ 100%.
- » Protection degree: IP20.
- » Shielded cable length: max. 100 m.

STRAP-ON MEDIUM TEMPERATURE SENSOR


Functions and application

- » Protection of water heater against freezing by means of return medium temperature monitoring.

(Function supported by controller.
Sensor out of VTS offer.)

Operational parameters

- » Measurement range: -20°C do +70°C.
- » Measurement accuracy: ±0,5K.
- » Sensor type: NTC 10k.
- » Air humidity range: 5 ÷ 100%.
- » Protection degree: IP67.
- » Shielded cable length: max. 100 m.

ANTI-FREEZE THERMOSTATE


Functions and application

- » Protection of water heater against freezing by means of air off-coil temperature monitoring (recommended temperature threshold setting: +5°C).

Operational parameters

- » Measurement range: -18 ÷ +15°C.
- » Hysteresis: 1,7 ÷ 12K.
- » Nominal voltage: 30V DC or 230V AC.
- » Output signal: potential-free contact.
- » Protection degree: IP 44.

OVERHEAT PROTECTION THERMOSTATE FOR ELECTRIC HEATER


Functions and application

- » Protection of electric heater against overheating.

Operational parameters

- » Power cut-off temperature setpoint: 65°C.
- » Power re-switch on temperature setpoint: 45°C.
- » Nominal voltage: 20V DC or 230V AC.
- » Output signal: potential-free contact.

DIFFERENTIAL PRESSURE SWITCH


Functions and application

- » Monitoring of filter's contamination.
- » Control of the operation of a direct driven fan unit in case of cooperation with electric heater.

Operational parameters

- » Measurement range: 30 do 500 Pa.
- » Nominal operating voltage: 250V AC (Imax=3A).
- » Output signal: potential free contact.
- » Working temperature range: -20°C do 60°C.
- » Protection degree: IP 54.

FILTER CONTAMINATION INDICATOR


Functions and application

- » Measurement of air pressure drop on filters, activated manually (button).
- » Signal light (LED) informing about exceeding pressure drop thresholds.
- » Low battery warning light signal.

Operational parameters

- » Max. Pressure difference: 800 Pa.
- » Accuracy: 2,5% of the range.
- » Protection degree (interface side): IP 65.

DIFFERENTIAL PRESSURE TRANSDUCER


Functions and application

- » Regulation of supply and exhaust air (CAV function).
- » Regulation of static pressure in ventilation system trunk duct (VAV function).
- » Constant monitoring of filter pressure drop (control of filter contamination level).

Operational parameters

- » Measurement range: 6000 Pa.
- » Measurement accuracy: 0,25% of the range.
- » Communication: ModBus RTU.
- » Supply voltage: 21,5V to 30V DC or 21,5V do 26,5V AC.
- » Working temperature range: -20°C do 50°C.
- » Protection degree: IP 65.

AIR HUMIDITY TRANSDUCER



Functions and application

- » Regulation of supply and return air humidity in handled spaces (support for air humidifying and dehumidifying).
- » Measurement of return air humidity – automatic change of anti-freeze threshold temperature setting of cross-flow recuperator depending on return air parameters*.

* Also available as integrated with air temperature sensor

Operational parameters

- » Measurement range: 0-100%.
- » Tolerance: +/- 3%.
- » Communication: ModBus RTU.
- » Supply voltage: 24V DC.
- » Working temperature: -40°C to 80°C.
- » Protection degree: IP 65.

SET FOR WATER HEATER CAPACITY REGULATION (PUMP GROUP)



Functions and application

- » Smooth regulation of water heater capacity.

Operational parameters

- » Regulation mode: 0 to 100% (smooth).
- » Control signal: 0-10V.
- » Full open/close time: 90 s.
- » Valve supply voltage: 24V AC/DC.
- » Pump supply voltage: 230V AC.
- » Working temperature: +5°C do 50°C.
- » Medium temperature range: -10°C to 120°C.
- » Max glycol concentration: 50%.
- » Protection degree: IP 54.

CO₂ TRANSDUCER



Functions and application

- » Regulation of CO₂ concentration in handled spaces (control of mixing box or airflow rate).

Operational parameters

- » Measurement range: 0 do 2000 ppm.
- » Tolerance:
 - between 400 and 1250 ppm: +/-3%,
 - between 1250 and 2000 ppm: +/-5%.
- » Communication: ModBus RTU.
- » Supply voltage: 24V DC.
- » Working temperature: 0 do 50°C.
- » Protection degree: IP 54.

ON/OFF DAMPER ACTUATOR



Functions and application

- » Airflow opening or closing in the AHU (connectors of air intake and discharge) – for units with water heater actuators with return spring are applied.

Operational parameters

- » Regulation mode: ON/OFF (two-point).
- » Angle of rotation: 90°.
- » Torque: 16 Nm (max damper cross-section: 4 m²).
- » Full open/close time: 120 s (with spring: 10 s).
- » Supply voltage: 24V AC/DC.
- » Working temperature: -20°C do 50°C.
- » Protection degree: IP 54.

SMOOTH CONTROL DAMPER ACTUATOR



Functions and application

- » Smooth regulation of return and fresh air mixing (recirculation) – for units with water heater actuators with return spring are applied.
- » Protection of cross-plate or hexagonal recuperator against frosting – smooth regulation of bypass damper opening.

Operational parameters

- » Regulation mode: 0 do 100% (smooth).
- » Control signal: 0-10V.
- » Angle de rotation: 90°.
- » Torque: 16 Nm (max damper cross-section: 4 m²).
- » Full open/close time: 90s (with spring: 10 s).
- » Supply voltage: 24V AC/DC.
- » Working temperature: -20°C do 50°C.
- » Protection degree: IP 54.

THREE-WAY VALVE FOR WATER HEATER OR COOLER



Functions and application

- » Smooth regulation of water heater or cooler capacity.

Operational parameters

- » Regulation mode: 0 do 100% (smooth).
- » Control signal: 0-10V.
- » Full open/close time: 90 s.
- » Valve supply voltage: 24V AC/DC.
- » Working temperature: +5°C do 50°C.
- » Medium temperature range: -10°C do 120°C.
- » Max glycol concentration: 50%.
- » Protection degree: IP 54.

ELECTRIC HEATER CONTROL MODULE – MHE TYPE



Functions and application

- » Power supply, protection and smooth regulation of electric (heating) capacity of multi-stage electric heaters by means of PWM (Pulse Width Modulation).

Operational parameters

- » Regulation mode: 0 to 100% (smooth).
- » Nominal voltage: 3*400V/50Hz.
- » Control circuits supply voltage: 24V AC.
- » Binary input signal: 3 x 24V DC.
- » Binary output signal 6 x 24V DC.
- » PWM 1 x 24V DC.
- » Working temperature: 0°C do 50°C.

VARIABLE FREQUENCY DRIVE



Functions and application

- » Smooth regulation of fan-set capacity.
- » "Soft-start" of the fan without mechanical and electric shock.
- » Motor protection against overloading and sticking.

Operational parameters

- » Frequency regulation range: 10 ÷ 100 Hz.
- » Communication: ModBus RTU RS485.
- » Supply voltage:
 - single-phase 200 ÷ 240V AC,
 - three-phase 380 ÷ 480V AC.
- » Working temperature: 0°C to 40°C.
- » Protection degree: IP 20.



HMI BASIC USER INTERFACE

**Functions and application**

- » Maintenance of Air handling unit – temperatures setting and reading, change of operating modes, independent time schedule management, alarm codes displaying.
- » Configuration of controller's universal inputs and outputs.

Operational parameters

- » Power supply directly from the controller.
- » Communication with controller – RS485 serial port.
- » Max length of communication cable: max. 500 m.
- » Working temperature: -20°C to 60°C.
- » Humidity: <85% (no condensation).
- » Protection degree: IP 31.

HMI ADVANCED USER INTERFACE

**Functions and application**

- » Maintenance of Air handling Unit – parameters setting and reading (temperature, airflow, CO₂, humidity etc), change of operational modes.
- » Weekly schedule programming.
- » Service maintenance – configuration of all advanced AHU operating parameters, configuration controllers universal inputs and outputs.
- » Remote configuring of variable frequency drives.
- » AHU alarms and errors monitoring (full text description) and cancelling.

Operational parameters

- » Power supply directly from the controller
- » Communication with controller – RS485 serial port
- » Max length of communication cable: max. 1200 m,
- » Working temperature: -20°C to 60°C.
- » Humidity: <85% (no condensation).
- » Protection degree: IP 20.



SUPPLY AND CONTROL BOX

**Functions and application**

- » Control of all components and processes of Air Handling Unit, especially realization of regulation (temperature, airflow, CO₂, humidity) and protection functions (anti-freezing of energy recovery heat exchanger or water heater, fan-sets overloading etc).
- » Alarms handling, self-diagnostics.
- » Filling of all operating parameters history.
- » Communication with user interfaces (HMI).

Operational parameters

- » Supply voltage: 3x400 VAC or 1x230 V AC.
- » Supply frequency: 50 Hz, +/- 1 Hz.
- » Control circuits supply voltage: 24 V AC.
- » Water heater pump supply voltage: 230 V AC (max.10A).
- » Communication with internal controls circuits, VFD's or EC motors controller: ModBus RTU.
- » ModBus communication: TCP/IP.
- » Working temperature: 0 to 50°C.
- » Humidity: <85% (no condensation).
- » Protection degree: IP 54.



04

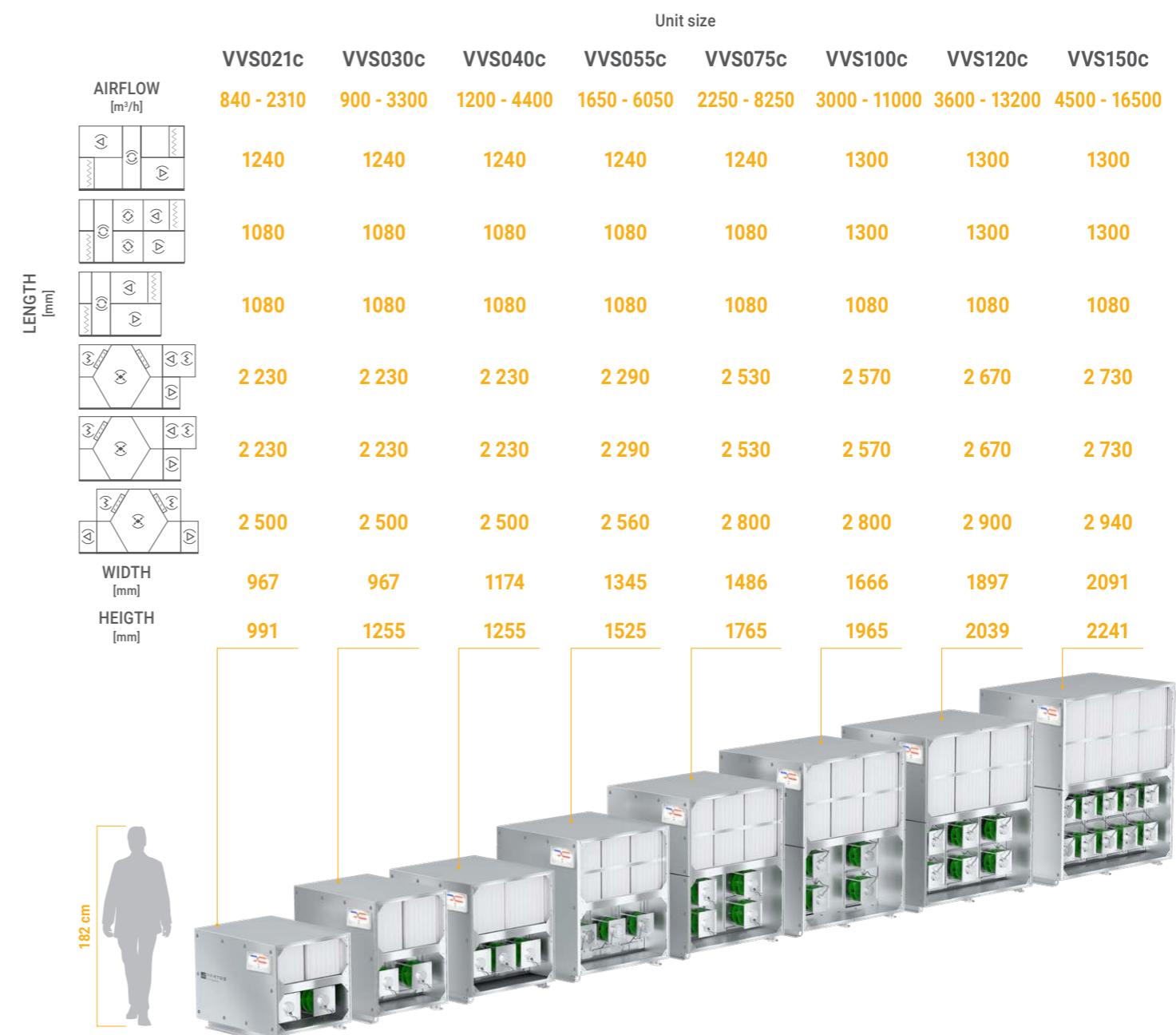
VENTUS Compact



SUSPENDED UNITS

	AIRFLOW [m³/h]	LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]
VVS030s	900 - 3 300	1 828	2 160	490
VVS020s	600 - 2 200	1 828	1 610	490
VVS015s	450 - 1 650	1 500	1 550	400
VVS010s	300 - 1 100	1 500	1 150	400
VVS005s	150 - 650	1 230	790	400

FLOOR-MOUNTED UNITS

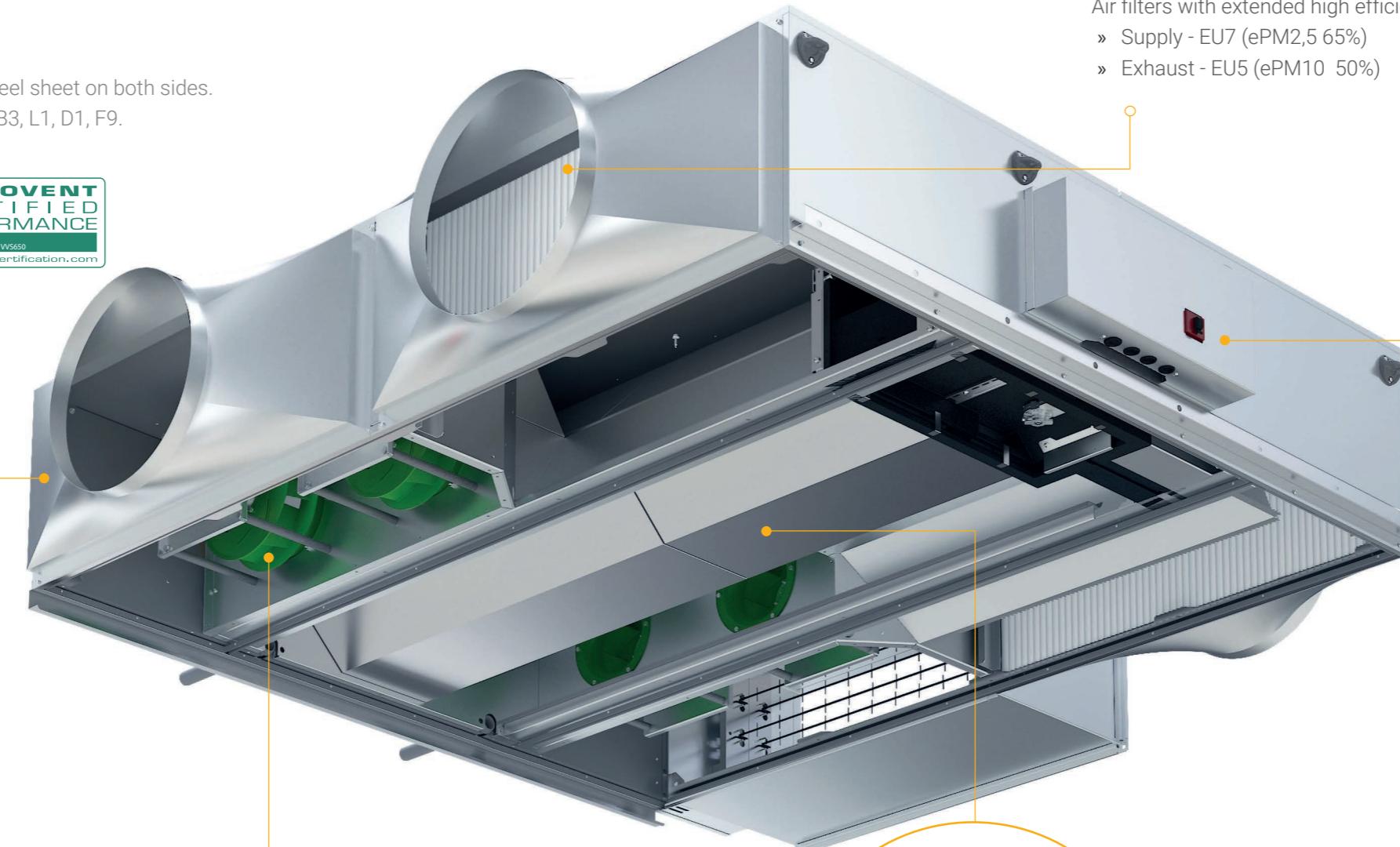


MINERAL WOOL INSULATION

SUSPENDED UNITS

CASING

- » Panels filled with mineral wool, enclosed with steel sheet on both sides.
- » Casing parameters according to EN 1886: T2, TB3, L1, D1, F9.



MINI-PLEAT FILTERS

Air filters with extended high efficiency filtration surface.

- » Supply - EU7 (ePM2,5 65%)
- » Exhaust - EU5 (ePM10 50%)



EC MOTORS

Efficient, silent and low vibrations fan with electronically commutated motor in a IE4 class.



up to **93%**
drive efficiency



ENERGY RECOVERY

- » Highly efficient counterflow hex recovery with by-pass.
- » Recovery efficiency reaching 93%



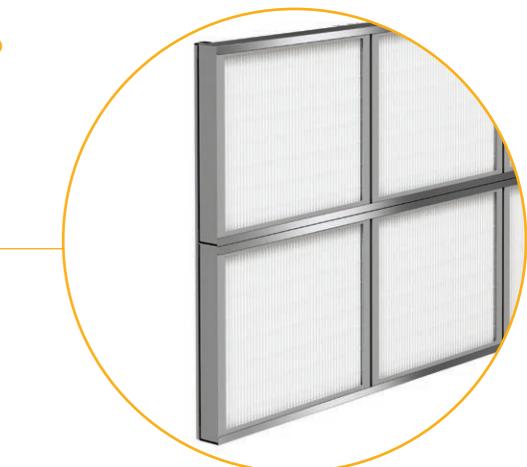
CONTROLS

Multifunctional controls, integrated with the unit – fully pre-configured and ready to run.

FLOOR-MOUNTED UNITS

CASING

- » Panels filled with mineral wool, closed with steel sheet on both sides.
- » Casing parameters according to EN 1886: T2, TB3, L1, D1, F9.



MINI-PLEAT FILTERS

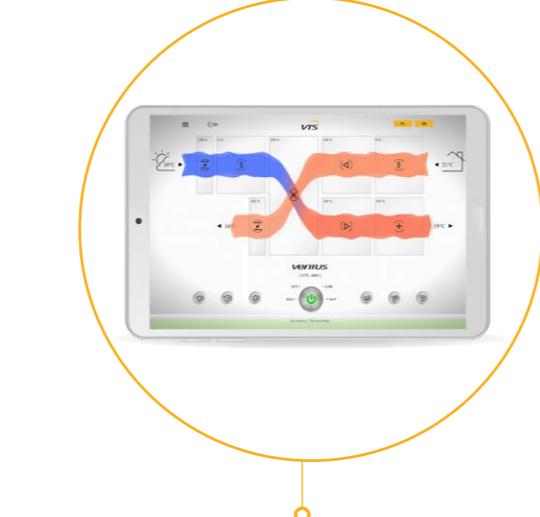
High performance filters with wide active filtration cross-section.

- » Supply - EU7 (ePM2,5 65%)
- » Exhaust - EU5 (ePM10 50%)



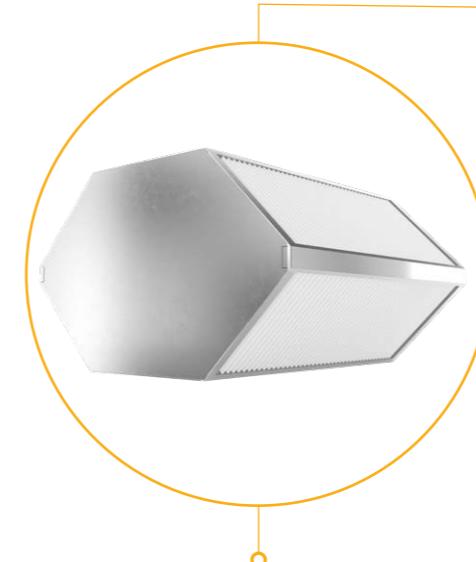
ENERGY RECOVERY

- » Highly efficient heat wheel driven by EC motor.
- » Recovery efficiency reaching 86%



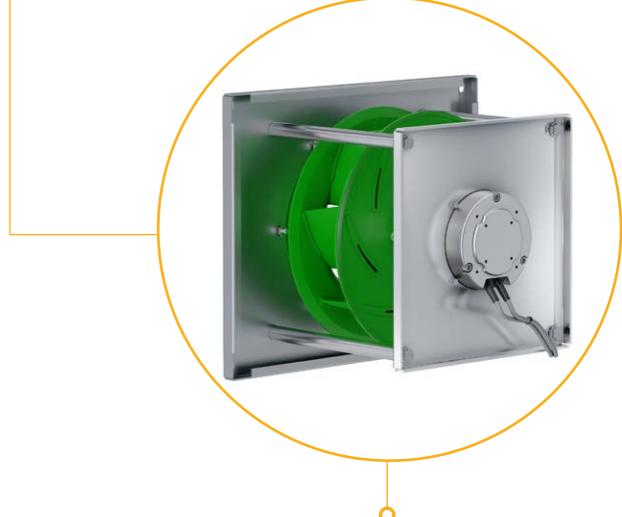
CONTROLS

- Multifunctional controls, integrated with the unit – fully pre-configured and ready to run.



ENERGY RECOVERY

- » Highly efficient counterflow hex recovery with by-pass.
- » Recovery efficiency reaching 93%



EC MOTORS

- Efficient, silent and low vibrations fan with electronically commutated motor in a IE4 class.



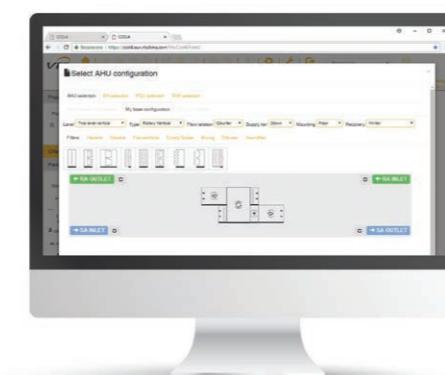
VVS 005s-030s - SUSPENDED COMPACT UNITS

Nominal parameters		Recommended airflow range				
Unit size		VVS005s	VVS010s	VVS015s	VVS020s	VVS030s
4 000	[m³/h]	~500	~1000	~1500	~2000	~3000
3 000						
2 000						
1 000						
0						
		Hex 005s	Hex 010s	Hex 015s	Hex 020s	Hex 030s
Min airflow		150	300	450	600	900
Max airflow		650	1 100	1 650	2 200	3 300
H		400	400	400	490	490
W		395	575	775	805	1080
H _i	[mm]	320	320	320	410	410
W _i		335	515	715	745	1020
W ₂		790	1150	1550	1610	2160
I		30	30	30	30	30
Dimension		Function version	Length of selected configurations			
	Lt	Counterflow hexagonal recuperator	1230	1500	1500	1828

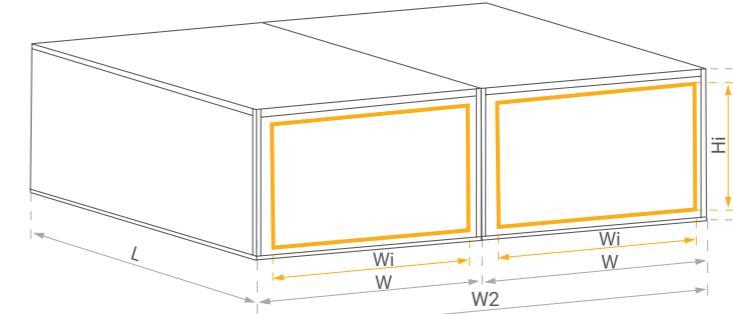
Selected configurations	Dimension	Function version	Length of supply and exhaust compact units			
	L	V	460	460	460	460
	L	FV	740	740	740	740
	L	FH(hw)V	740	740	740	740
	L	FH(el)V	1030	1030	1030	1030
	L	FCV	860	860	860	860
	L	FC(de)V	1030	1030	1030	1030
	L	FH(hw)CV	1030	1030	1030	1030
	L	FH(hw)C(de)V	1230	1230	1230	1230
	L	FH(el)CV	1030	1230	1230	1380
	L	FH(el)C(de)V	1230	1380	1380	1450

Entire range of configuration
in ClimaCAD OnLine 4 selection tool.

www.ccol4.com



DIMENSION - VVS 005s-030s - SUSPENDED COMPACT UNITS



Duct fittings

Dimension [mm] Wi x Hi / Di	VVS005s	VVS010s	VVS015s	VVS020s	VVS030s
Flexible connection	305x288	485x288	685x288	730x375	1005x375
Air damper	305x288	485x288	685x288	730x375	1005x375
Rectangular spigot	330x310/300x300	510x310/400x350	710x310/400x350	740x400/500x400	1015x400/800x400
Round spigot	330x310/355	510x310/355	710x310/355	740x400/450	1015x400/450
Air intakes and outlets	335x318	515x318	715x318	743x408	1018x408

Length of additional air treatment functions

Selected configurations	Function version	Length of selected configurations				
		VVS005s	VVS010s	VVS015s	VVS020s	VVS030s
	L	F9	180	180	180	180
	L	H(hw)(1R-2R)	180	180	180	180
	L	H(el)	370	370	370	370
	L	C(2R-6R)	370	370	370	370
	L	C(de)(2R-6R)	600	600	600	600
	L	H(hw)C	460	460	460	460
	L	H(el)C	740	740	740	740
	L	H(hw)C(de)	600	460	460	460
	L	H(el)C(de)	860	740	740	740
	L	E(e1)	370	460	460	460
	L	E(e2)	740	740	740	740



COMPONENTS

DIRECT DRIVE PLUG FAN SET



Design and application

- » Single inlet, radial, backward curved, free running fan.
- » Impeller made of SAN (styrene/acrylonitrile) construction material with 20% glass fiber.
- » Direct drive – fan impeller installed directly on motor shaft.
- » Fan section consisting of single or multiple fans (fan array) in order to ensure optimum working parameters.

Specification

- » Low and medium pressure ventilation systems with fan static pressure not exceeding 2000 Pascals.
- » Maximum fan set working temperature: 60°C.

> EC MOTORS



- » Set of fan and motor mounted on common rail, fixed to the AHU fan diaphragm.
- » EC motors are Permanent Magnet motor, characterised by much higher efficiency vs traditional inductive AC motors.
- » EC motors (Electronically Commutated) – where mechanical commutator switching the windings has been replaced with electronic one.
- » Change of revolutions is done by means of changing the frequency rate of windings switching (rate or magnetic field rotating).
- » Highly inductive permanent magnets have applied in EC motors used by VTS, which enabled to achieve high torque at relatively small dimensions, together with reaching IE4 efficiency class.

- » Available Energy classes: IE4.
- » Rated voltage: EC motors of nominal capacity exceeding 0,75kW - 3x400V AC.
- » Rated voltage: EC motors of nominal capacity equal or less 0,75kW - 1x230V AC.
- » Motor widing insulation class: F.
- » Protection degree: IP54.
- » Maximum working ambient temperature: 55°C.
- » Lifespan:
- 70 000 hours at load not exceeding 70% of nominal capacity at ambient temperature not exceeding 35°C,
- 30 000 hours at 100% capacity load at ambient temperature not exceeding 55°C.

CASING > SUSPENDED COMPACT UNITS



Design and application

- » Casing structure made of „sandwich” panels mounted to internal supporting structure.
- » Panel thickness: 40 mm.
- » Sheet thickness: Outer: 0.6 mm, Inner: 0.4 mm
- » "Sandwich" double skin panels made of mineral wool covered on both sides with sheet metal.
- » Indoor application
- » Inspection panels mounted on top and bottom of the unit (maintenance from bottom).
- » Casing designed to be suspended above false ceilings, equipped with elements facilitating its installation.

Specification

- » Working temperature: (-40)°C ÷ (+60)°C.
- » Panel thickness: 40mm.
- » Thermal conductivity PPU $\lambda = 0,039 \text{ W/mK}$.
- » Casing fire resistance: A1 (EN 13162:2012 + A1:2015 (EN 13501-1)
- » Moisture absorption:
- short term: WS, Wp: $\leq 1 \text{ kg/m}^2$ (EN 13162:2012 + A1:2015 (EN 1609)
- long term: WL(P), Wlp: $\leq 3 \text{ kg/m}^2$ (EN 13162:2012 + A1:2015 (EN 12087)
- » PPU density: $\rho = 80\text{kg/m}^3$.
- » Corrosion protection:
- Exterior: AZ150 (Aluzinc) coating, Coating thickness $\geq 150 \text{ g / m}^2$ with an additional organic coating.
- Inside side: Coating Z140 (zinc), Coating thickness $\geq 140 \text{ g / m}^2$
- » Certified by Eurovent

CASING > FLOOR MOUNTED COMPACT UNITS



Design and application

- » Casing structure made of „sandwich” panels mounted to internal supporting structure.
- » Casing supported on base ralis or blocks.
- » Panel thickness: 40 mm.
- » Sheet thickness:
Outer: 0.6 mm, Inner: 0.4 mm
- » "Sandwich" double skin panels made of mineral wool covered on both sides with sheet metal.
- » Indoor and outdoor application.
- » Inspection panels mounted on AHU side.

Specification

- » Working temperature: (-40)°C ÷ (+60)°C.
- » Panel thickness: 40mm.
- » Thermal conductivity PPU $\lambda = 0,039 \text{ W/mK}$.
- » Casing fire resistance: A1 (EN 13162:2012 + A1:2015 (EN 13501-1)
- » Moisture absorption:
- short term: WS, Wp: $\leq 1 \text{ kg/m}^2$ (EN 13162:2012 + A1:2015 (EN 1609)
- long term: WL(P), Wlp: $\leq 3 \text{ kg/m}^2$ (EN 13162:2012 + A1:2015 (EN 12087)
- » PPU density: $\rho = 80\text{kg/m}^3$.
- » Corrosion protection: - Exterior: AZ150 (Aluzinc) coating, Coating thickness $\geq 150 \text{ g / m}^2$ with an additional organic coating.- Inside side: Coating Z140 (zinc), Coating thickness $\geq 140 \text{ g / m}^2$
- » Certified by Eurovent

MINI PLEAT FILTERS



Design and application

- » Mini-pleat filters are special type of panel filters. They are design to provide many times larger active filtration surface followed by higher dust-holding capacity than typical panel ones, at the same outer filter cartridge dimensions. Filters consist of ultra-thin microfibers, coated with special, condensed binder. Mini-pleat are characterized by much longer life span the typical, commonly used ones.
- » Applied as initial or secondary stage of air filtration.

Specification

- » Max working temperature: (+70)°C, 100% RH.i.

Available filtration classes

- » ISO ePM10 50% (ISO 16890)
- M5 (EN779),
- » ISO ePM2,5 65% (ISO 16890)
- F7 (EN779),
- » ISO ePM1 70% (ISO 16890)
- F9 (EN779)."



ROTARY HEAT WHEEL

**Design and application**

- » Rotor made of aluminum with shaft suspended on bearings, installed in steel housing.
- » Rotor filling – two layers of alternately wound aluminium foil – one flat, the other – corrugated – making small ducts for the air.
- » Rotor drive system with smooth revolutions control enabling to maintain highest recovery efficiency and to adjust degree of recovery performance.
- » Purge zone reducing the cross-contamination effect of contaminated exhaust air to supply to absolute minimum.
- » Set of gaskets installed both on the wheel outer edge and bar separating supply from exhaust air being an additional protection against cross-contamination.
- » Rotary heat wheel recovers sensible heat from return air to supply, which passes the unit in opposite direction. The process enables heat recovery in winter time, same as cool recovery in summer.
- » Humidity recovery from return to supply in case the rotor pad temperature is lower than dew point of return air – typically during winter season.

Specification

- » Up to 86% of energy recovery, depending on airflow rate and its velocity in the heat wheel window.

MIXIN SECTION

**Design and application**

- » Section equipped with two air inlets/outlets aided with dampers, enabling regulation of fresh and recirculation air share (recirculation).

Specification

- » Direct Energy recovery (sensible and latent heat) resulting from partial mixing of fresh air with return one.
- » Control of fresh air share in entire airflow supplied to handled spaces.
- » Working temperature range: -40 ÷ +70°C."

COUNTERFLOW HEXAGONAL RECUPERATOR

**Design and application**

- » Hexagonal heat recovery recuperator made of crosswise stamped aluminum plates, between which supply and exhaust air passes alternately in counterflow arrangement.
- » As standard, the recuperator is equipped with by-pass damper, enabling its securing against frosting and heat recovery capacity regulation.
- » Optionally, the recuperator can be equipped with integrated mixing box.
- » The recuperator provides sensible heat recovery for warmer air to the colder one. For winter season – recovery of heat from return air to supply. For summer – recovery of chill from return air to supply.

Specification

- » Energy recovery at very high supply and exhaust air stream separation (reaching 99,9%).
- » Heat recovery reaching up to 93% depending on flow rate face velocity of the air passing the recuperator.

ELECTRIC HEATER

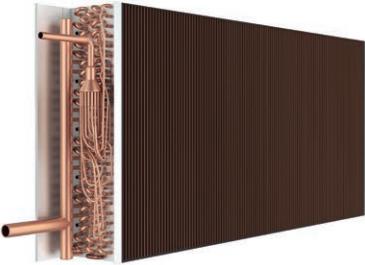
**Design and application**

- » Set of resistive heating elements made of CR-Ni-Fe alloy, 6 kW/400V each.
- » Coils mounted on hot-dip galvanized steel frame.
- » Heater is equipped with power terminals and thermostat protecting against overheating.
- » In case of AHU with complete controls, heater is equipped with integrated capacity control module.
- » Heating capacity can be modified by means of smooth regulation module (HE module, set of Solid State Relays as optional parts of AHU controls) or by means of automatic engaging of next heating sections.

Specification

- » Max permissible ambient temperature around heating elements: 65°C.
- » The heater is available in a version built in the air handling unit and in a duct heater version (without thermal insulation)

DIRECT EXPANSION COIL AS CONDENSER IN HEAT PUMP CIRCUIT



Design and application

- » Block of copper pipes integrated with another block of aluminum fins, creating expanded heat exchange surface. Pipes are bonded to the collectors, equipped with headers (for connecting entire coil to the cooling system circuit).
- » Heating of the air supplied to the handled spaces.
- » Re-heating of the air as a part of air dehumidifying process.

Specification

- » Max medium temperature: 60°C.
- » Max medium working pressure: 3,84MPa = 38,4bar (test: 50bar).
- » Heating capacity: parameter resulting from individual performance calculation of selected unit (CCOL).
- » Max. refrigerant working pressure: 3.84 MPa = 38.4 bar (test: 50 bar).
- » Thermal power: parameter available from technical data of the unit (CCOL).
- » Pressure loss / medium flow: parameters available from technical data (CCOL).
- » Heat exchanger suitable for operation as a cooler (evaporator) and as a heater (condenser) in a heat pump circuit.

WATER COOLER



Design and application

- » A pack of copper tubes integrated with a pack of fins forming the heat exchange surface extension. The heat exchanger tubes are connected respectively to collectors, to which the connection pipes of the medium system are routed.
- » The exchanger connecting pipes are equipped with a drain and a vent respectively.

Features

- » Maximum glycol content 50%.
- » Minimum temperature for chilled water +2°C.
- » Maximum heating medium temperature: 150°C.
- » Max. refrigerant working pressure: 1.6 MPa = 16 bar (test: 21 bar).
- » Thermal power: parameter available from technical data of the unit (CCOL).
- » Pressure losses on the medium side: available in technical data generated in the CCOL selection programme.
- » Connecting the exchanger supply in a parallel flow circuit reduces the heater power by up to several %.

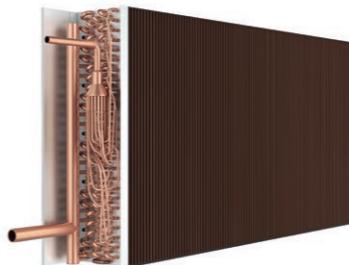
Cooling function

- » Cooling of the ventilation air supplied to the room.
- » Dehumidification of the ventilation air in summer.
- » The exchanger is mostly used for smaller cooling capacities compared to water coolers and in "single" air-conditioning systems.

Heating function

- » Heating or cooling of ventilation air supplied to the room.
- » Heating of the ventilation air after a drying process.
- » Cooling of the ventilation air supplied to the room.
- » Dehumidification of the ventilation air in summer.
- » The exchanger is mostly used for smaller cooling capacities compared to water coolers and in "single" air-conditioning systems.

DX COOLING COIL



Design and application

- » Block of copper pipes integrated with another block of aluminum fins, creating expanded heat exchange surface. Pipes are bonded to the collectors, equipped with headers (for connecting entire coil to the cooling system circuit).
- » DX cooler is also available as heater execution (so called Condenser).
- » Cooling and dehumidifying of the air as a part of air complex dehumidifying process in summer season.
- » Coil usually applied for smaller cooling capacity systems vs water coolers or for individual air conditioning systems.

AIR DAMPER



Design and application

- » Blades made of aluminium with rubber gasket on the edges.
- » Aluminum frame.
- » Blades drive realized by means of gears made of composite material, installed on frame internal side.
- » Damper is equipped with square pivot, fitted for actuator (dampers of cross section greater than 4 m² have 2 linked pivots).

FLEXIBLE CONNECTION



Design and application

- » Flexible connection made of 1 mm thick and 30 mm wide hot-dip galvanized steel profiles and polyester fabric coated with PVC.
- » Flame resistance: UL94 - HB [ISO 1210].
- » Flexible connection resistant to UV radiation
- » Working temperature range: -30°C do +70°C.
- » Max connection length (fully spread position): 110 mm.
- » Flexible connection installed on each AHU/Duct joint eliminates transfer of possible AHU vibrations to the ventilation ductwork.

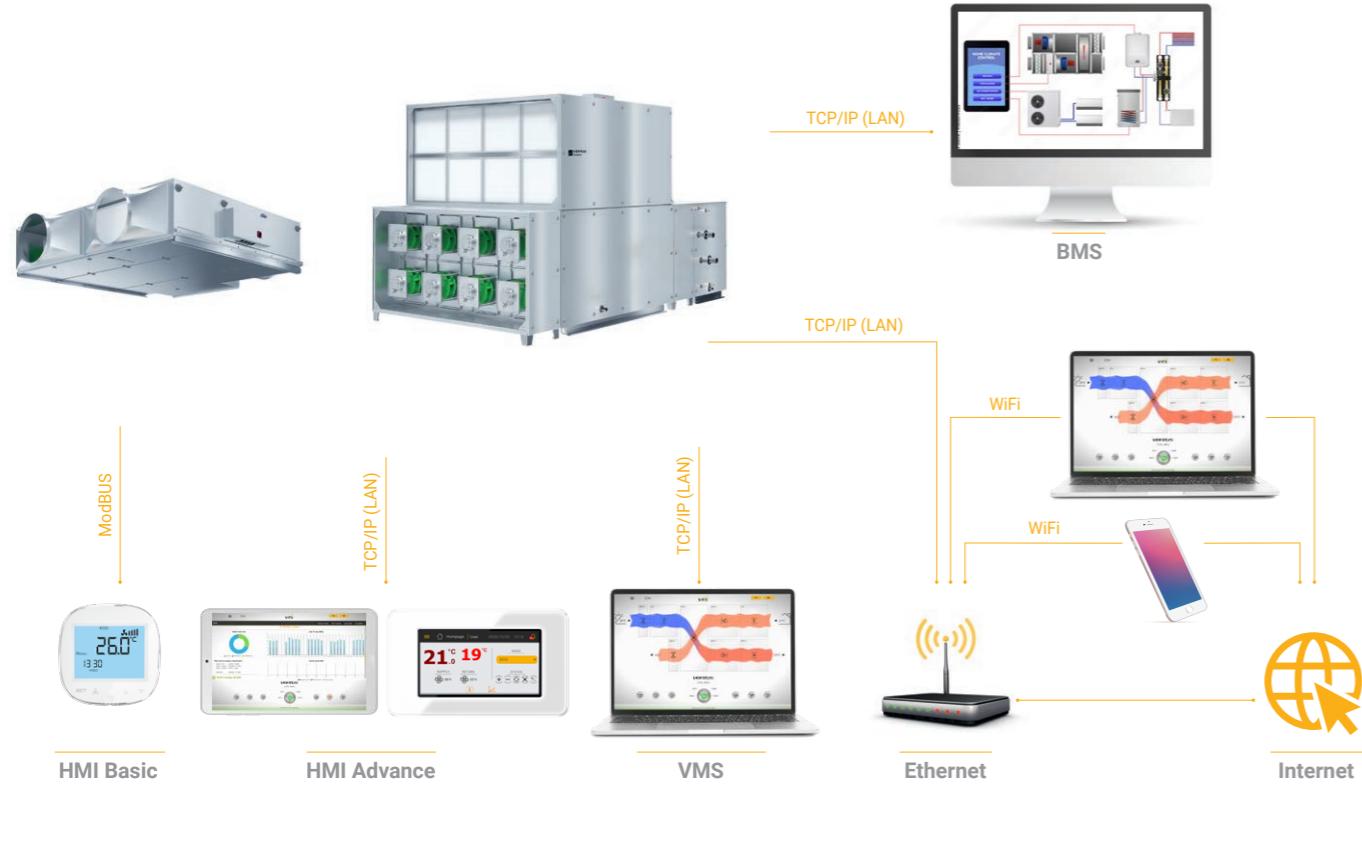
Specification

- » Min. Refrigerant evaporation temperature: +3°C.
- » Max refrigerant working pressure: 2,2MPa=22bar (test: 29 bar).
- » Cooling capacity - parameter resulting from individual performance calculation of selected unit (CCOL).

Specification

- » Air leakage at closed damper: 50m³/h*m² - at 100 Pascals of pressure difference.
- » Working temperature range: -40 ÷ +70°C.

ADVANCED CONTROL



Advanced control algorithms - cost minimization

VTS algorithms apply cascading regulation of room temperature, which ensures minimum consumption of heat and process cold. Moreover, control algorithms ensure precise maintenance of the preset room temperature with zero hysteresis

Economic adaptation of fan capacity parameters to the needs of the building

Algorithms of fan efficiency control were applied through electronic measurement and automatic regulation of air efficiency expressed in m³/h - so called CAV and VAV system.

HMI Basic

The AHU is operated from a control panel with a simple service interface, which prevents any unauthorized change of the advanced operating settings of the AHU. HMI Basic is also a combination of a temperature and humidity sensor with a control panel, all in one housing.

HMI Advanced

Dedicated tablet, with Android system and Chrome browser, ensuring convenience in management and configuration of device parameters. The user receives a device for configuring and parametrizing the VENTUS air handling unit, a compilation of documents, a set of information about the product, and access to the monitoring and visualization of operating parameters of devices in the same network.

Automatic air quality control function

VTS offers the optimization of energy consumption, based on step-less, automatic adaptation of air efficiency to the needs of heating, cooling and ventilation. This adaptation is based on ensuring proper air quality - temperature, CO₂, humidity.

Three different operating modes

The user can choose one of three individual operating modes: Eco, Optimum and Comfort. Each of these modes offers individual performance parameters: main adjustment setting, e.g. temperature in the room, humidity, CO₂ level or air flow value, etc.

AHU operation calendar

VTS automation offers the possibility of programming a weekly AHU operating schedule, taking into account special days (official celebrations, holidays, days off, etc.). For each time interval, it is possible to program one of three operating modes. A graphic presentation of the user-configured schedule using visual tools is also available.

Simulation of air handling unit operation

A function is available to simulate the savings due to the application of specific functionalities, and function of simulation of working parameters of particular components.



REMOTE MONITORING AND MANAGEMENT OF THE OPERATING PARAMETERS OF THE UNIT IN REAL TIME

VTS provides a standard automation functionality in the form of a factory-implemented **VMS (Ventus Management System)** application for remote monitoring, with visualization and management of the operating parameters of the units in real time via a web browser on any device.

VISUALIZATION - presentation in the form of charts for all operating parameters of all ventilation units operating within a common network.

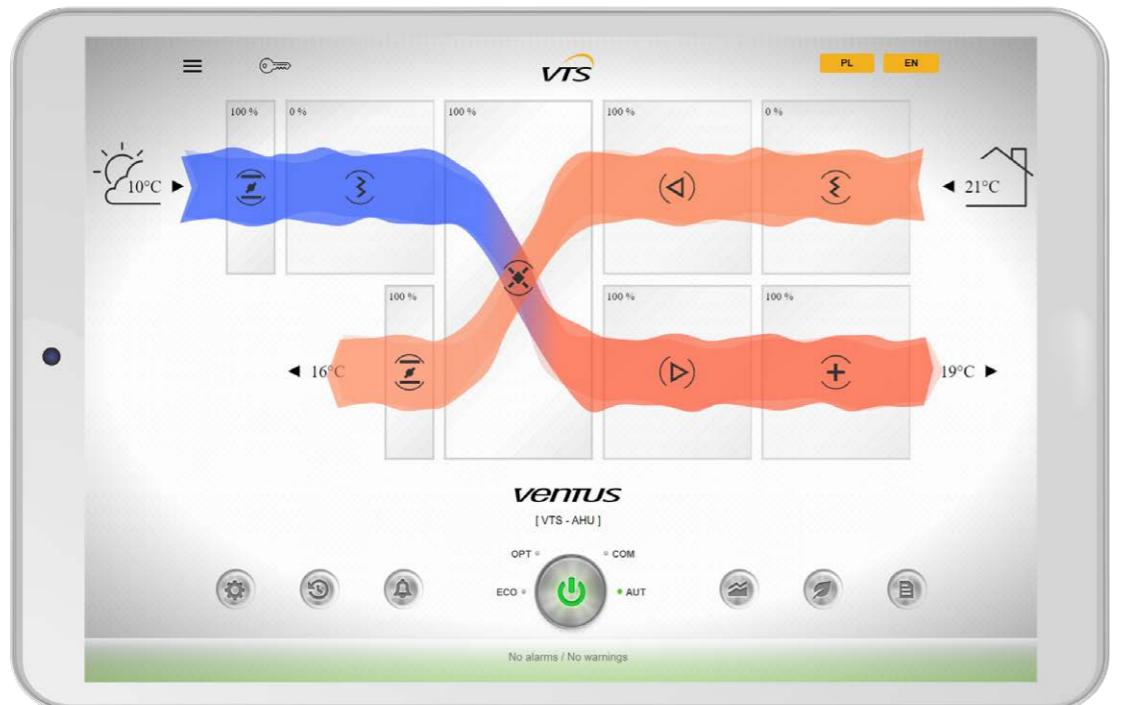
DIAGNOSTICS - this function facilitates remote diagnostics and remote support by the service personnel.

CONVENIENCE - possibility of starting the unit via a web browser on any device, remote access and remote change of parameters via a local area network or the Internet.

OPTIMIZATION - the operating parameters for each functional unit can be optimized.

ECONOMY - measurement and recording of current operating costs. Possibility of defining currencies and utility prices.

RECORDING - recording of all AHU operating parameters and alarms and warnings, including a legible description.



MAIN SCREEN

The main screen includes a graphic diagram of the air handling unit, with clearly marked air conditioning functions and current settings and parameters.

The window also includes a set of buttons offering a wide spectrum of AHU management functions. The complete window can be treated as a main navigation panel of the AHU management window. From this panels, the user can monitor the status of the AHU, switch operating modes or navigate to any of the additional functions.

The AHU diagram combines a series of functions, such as displaying the status of each function in your unit - informing the user about possible alarms directly on the applicable AHU block. The user can also monitor the parameters of air flowing into the unit and conditioned by the unit.



SCHEDULE

An air handling unit operating according to a predefined schedule is a known solution for control applications.

However, what is new is the ease, with which the user can manage schedule settings directly on the diagram - using both standard computer screen and a mouse and a touch screen on a tablet.

The schedule is designed as a series of scroll bars for individual operating modes.

All display items are displayed on a time diagram. Using the scroll bars, the user can change the schedule of their AHU, improve the economics of the ventilation system, all within seconds.

CHARTS

Charts are a tool used for recording all operating parameters of the AHU, saving them and displaying historical AHU operating data in the form of a time chart. This tool was created to help the user to develop the best AHU operation schedule, ideally suited to the specific nature of a given ventilation system, as well as to improve the economics of operation of the system and fulfill the user's preferences.

ECO

The ECO function is used for calculating the savings generated through heat recovery, the application of high-performance EC fans and management of the complete device applying state-of-the-art algorithms developed by VTS.

All the user needs to do is spend a few minutes to inform the application about the cost of each energy carrier used - expressed in any currency. In return, the application will report all savings expressed in kW and money.

Depending on the preference, the user can monitor the common savings generated through heat recovery, the application of high-performance EC fans and advanced VTS control algorithms, or display a report on a separate, very detailed diagram.



CONTROLS

VENTUS COMPACT AIR HANDLING UNITS IN PLUG&PLAY STANDARD



Savings

Ventus Compact – range of floor-mounted units with rotary heat wheel and suspended with hexagonal recuperator. Equipped with complete, factory mounted controls, pre-configured in accordance to actual selection and ready to run just after connecting to mains.



Comfort



Safety

Controls is capable to regulate all user parameters: air temperature, its humidity, maximum permissible CO₂ concentration and the flow rate. Also, controls support preventive and securing functions like protection of the water heater against freezing or energy recovery system against icing, protection of motors against overloading, monitoring of air filters actual status of contamination and many other. Applied algorithms can optimize performance of all air treatment components in order to minimize consumption of all energy media supplied to the unit. The system includes control and power supply circuits:



USER



HMI Basic

- » Engaging and disengaging the AHU, change of operational modes.
- » Change of temperature, airflow, humidity, max CO₂ level settings, etc.
- » Errors reporting.
- » Time schedule setting.



HMI Advanced

- » All users and service functions except visualization
 - AHU engaging and disengaging,
 - Change of operational modes.
- » Change of temperature, airflow, humidity, max CO₂ level settings, etc.
- » Parameters setting and reporting.
- » Errors reporting.
- » Time schedule setting.



BMS

- » User function like in HMI Advanced.
- » User's customized visualization (BMS).



Remote visualization

- » All user function like in HMI Advanced:
 - VTS visualization.
- » Clear interface of schedule programming, presenting unit's operating time individually for each day of the week.
- » Energy consumption analysing module.
- » Individual parameters monitoring of each functional block.
- » Filing of all AHU's parameters recorded in few minutes intervals.



PAREMETERS REGULATION FUNCTIONS

Temperature and humidity regulation

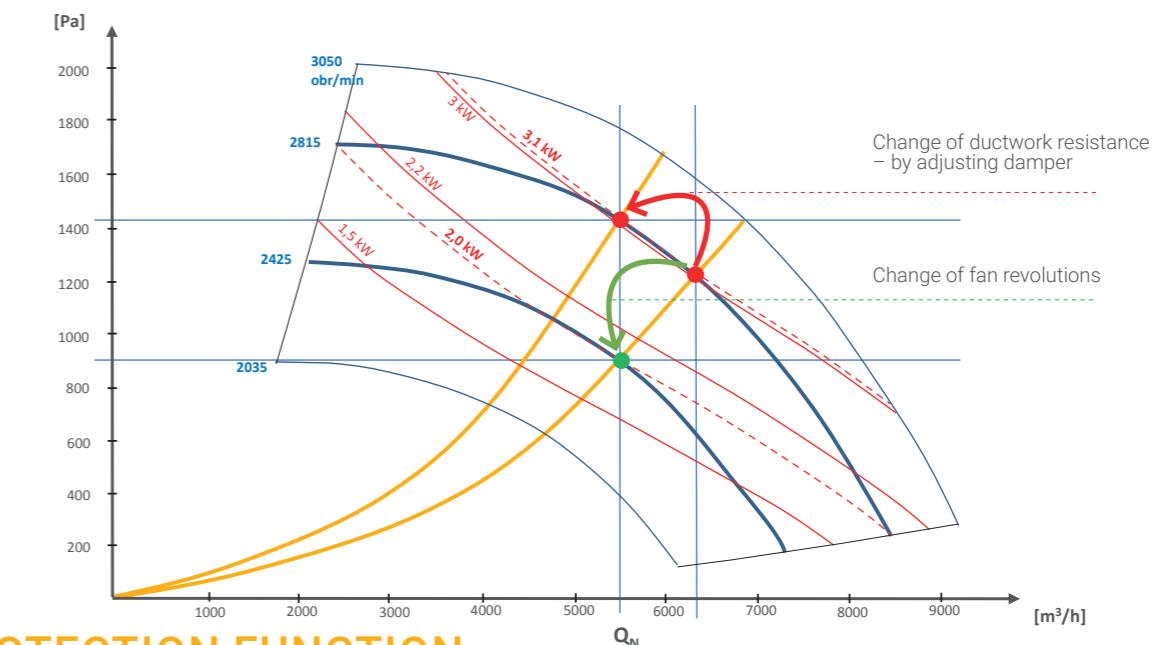
- » Regulation of supply, return air temperature and humidity in handled spaces.
- » Control of water coils valves (heater, cooler) and condensing unit.
- » Control of rotary heat wheel revolutions and mixing box (Ventus floor-mounted Compact units), bypass-damper of hexagonal counterflow energy recovery system (suspended VENTUS Compact units).

Airflow rate regulation

- » Constant Air Volume (CAV) available as standard
- » Constant static pressure maintenance in trunk duct (Variable Air Volume – VAV) available as option.
- » Getting of constant revolutions for each fan individually – VFD setting for AC motors or constant revolutions percentage in case of EC motors.

CO₂ regulation

- » By means of mixing box – for units with air recirculation.
- » By means of airflow rate change – for all types of supply and exhaust units (function can be engaged together with mixing box control).



PROTECTION FUNCTION

- » Protection against rotary heat wheel icing (VENTUS Compact floor mounted units), by means of wheel revolutions reduction.
- » Protection against hexagonal counterflow recuperator icing (VENTUS Compact suspended units) by means of by-pass damper opening:
 - optimizing of icing protection function by change of minimum return air temperature threshold downstream the energy recovery unit vs return air parameters,
 - minimizing of recovery efficiency drop during defrosting.
- » Anti-freezing protection of water heater:
 - antifreeze thermostat installed downstream the heater,
 - strap-on return water temperature sensor
- » Fans overload protection (functions realized by EC motors drives)
- » Fire alarm input – AHU immediate disengaging in case of lack of external start permission from overall fire protection system.

TIME SCHEDULE FUNCTIONS

- » Weekly schedule operational modes programming.
- » Clear visualization of schedule settings by means of web-browser (computers and mobile devices).

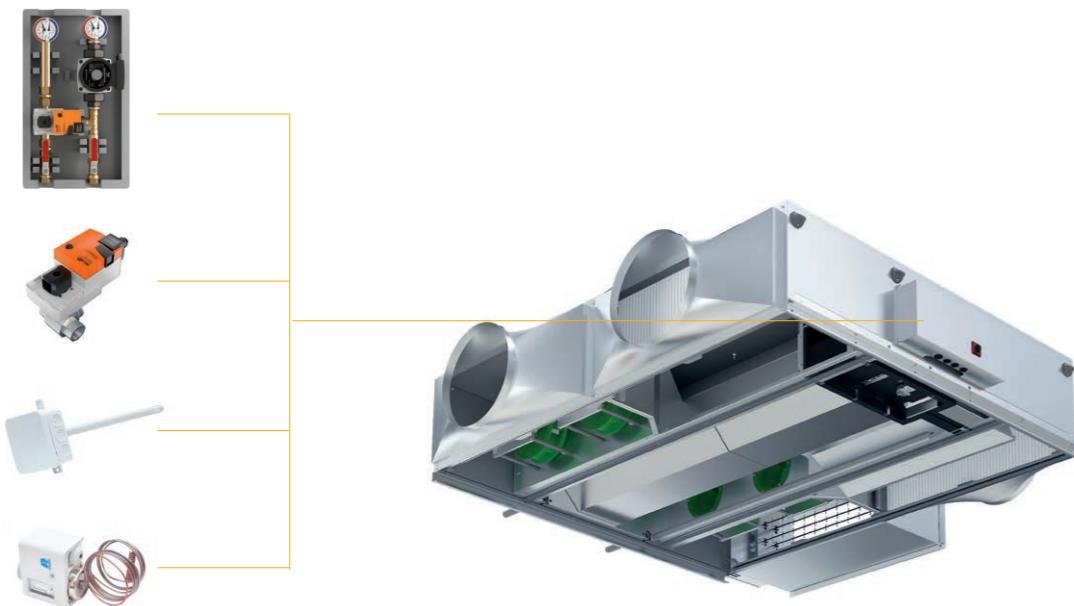


PREVENTIVE FUNCTIONS

- » Constant filter contamination status control:
 - constant monitoring of filter pressure drop by means of static pressure transducers,
 - evaluation of filter contamination status for vs actual airflow rate.
- » Fans shutting-down delay – fan's run out for systems with electric heater.
- » Water heater pre-heating before fan's start up.
- » Periodical heater pump engaging in summer – to prevent against limescale accumulation.

CONTROL CIRCUITS

- » All control circuits installed inside the base unit are fully wired and configured in accordance to its technical selection.
- » Control of fans operation is done by means of digital communication based using ModBUS protocol. Each of the fan is adequately programmed with individual address enabling its recognition by the control system (fans should never be swapped).
- » Control elements handling external modules (antifreeze thermostat of the water heater, valves for heater and cooler, supply air temperature sensor) should be connected to terminal block.
- » Clear and easy to ready description of terminal block facilitates correct connecting of control peripheral components.



POWER SUPPLY AND PROTECTION CIRCUITS

- » Fan's power supply, rotary heat wheel and control circuits are fully wired.
- » All electrical protection circuits of fans, rotary heat wheel drive, control circuits and water heater pump are installed inside the AHU.
- » The only to be by the user is connecting the AHU to mains (to the main switch located in the connecting box) and optionally – crossing the power supply to the pump of the water heater.
- » Water heater power supply terminals are crossed to the terminal block located on AHU outer wall.



CONTROL ELEMENTS

CONTROL ELEMENTS



ROOM AIR TEMPERATURE SENSOR



ANTI-FREEZE THERMOSTATE



OVERHEAT PROTECTION THERMOSTATE FOR ELECTRIC HEATER



Functions and application

- » Regulation of supply and exhaust air temperature.
- » Protection of the energy recovery unit against freezing.
- » Outdoor air temperature measurement in order to identify need of heat/chill recovery and engagement protecting function for water heater.

Operational parameters

- » Measurement range: -50°C to +90°C.
- » Measurement accuracy: ±0,5K.
- » Sensor type: NTC 10k.
- » Air humidity range: 5 ÷ 100%.
- » Protection degree: IP67.
- » Shielded cable length: max. 100 m.

Functions and application

- » Regulation of temperature in handled space.

Operational parameters

- » Measurement range: -20°C do +70°C.
- » Measurement accuracy: ±0,5K.
- » Sensor type: NTC 10k.
- » Air humidity range: 5 ÷ 95% no condensation.
- » Protection degree: IP20.
- » Shielded cable length: max. 100 m.

Functions and application

- » Protection of water heater against freezing by means of air off-coil temperature monitoring (recommended temperature threshold setting: +5°C).

Operational parameters

- » Measurement range: -18 ÷ +15°C.
- » Hysteresis: 1,7 ÷ 12K.
- » Nominal voltage: 30V DC or 230V AC.
- » Output signal: potential-free contact.
- » Protection degree: IP 44.

DIFFERENTIAL PRESSURE SWITCH



Functions and application

- » Monitoring of filter's contamination.
- » Control of the operation of a direct driven fan unit in case of cooperation with electric heater.

Operational parameters

- » Measurement range: 30 do 500 Pa.
- » Nominal operating voltage: 250V AC (Imax=3A).
- » Output signal: potential free contact.
- » Working temperature range: -20°C do 60°C.
- » Protection degree: IP 54.

DIFFERENTIAL PRESSURE TRANSDUCER



Functions and application

- » Regulation of supply and exhaust air (CAV function).
- » Regulation of static pressure in ventilation system trunk duct (VAV function).
- » Constant monitoring of filter pressure drop (control of filter contamination level).

Operational parameters

- » Measurement range: 6000 Pa.
- » Measurement accuracy: 0,25% of the range.
- » Communication: ModBus RTU.
- » Supply voltage: 21,5V to 30V DC or 21,5V do 26,5V AC.
- » Working temperature range: -20°C do 50°C.
- » Protection degree: IP 65.

ON/OFF DAMPER ACTUATOR



Functions and application

- » Airflow opening or closing in the AHU (connectors of air intake and discharge) – for units with water heater actuators with return spring are applied.

Operational parameters

- » Regulation mode: ON/OFF (two-point).
- » Angle of rotation: 90°.
- » Torque: 16 Nm (max damper cross-section: 4 m²).
- » Full open/close time: 120 s (with spring: 10 s).
- » Supply voltage: 24V AC/DC.
- » Working temperature: -20°C do 50°C.
- » Protection degree: IP 54.

SET FOR WATER HEATER CAPACITY REGULATION (PUMP GROUP)



Functions and application

- » Smooth regulation of water heater capacity.

Operational parameters

- » Regulation mode: 0 to 100% (smooth).
- » Control signal: 0-10V.
- » Full open/close time: 90 s.
- » Valve supply voltage: 24V AC/DC.
- » Pump supply voltage: 230V AC.
- » Working temperature: +5°C do 50°C.
- » Medium temperature range: -10°C to 120°C.
- » Max glycol concentration: 50%.
- » Protection degree: IP 54.

THREE-WAY VALVE FOR WATER HEATER OR COOLER



Functions and application

- » Smooth regulation of water heater or cooler capacity.

Operational parameters

- » Regulation mode: 0 do 100% (smooth).
- » Control signal: 0-10V.
- » Full open/close time: 90 s.
- » Valve supply voltage: 24V AC/DC.
- » Working temperature: +5°C do 50°C.
- » Medium temperature range: -10°C do 120°C.
- » Max glycol concentration: 50%.
- » Protection degree: IP 54.

HMI BASIC USER INTERFACE



Functions and application

- » Maintenance of Air handling unit – temperatures setting and reading, change of operating modes, independent time schedule management, alarm codes displaying.
- » Configuration of controller's universal inputs and outputs.

Operational parameters

- » Power supply directly from the controller.
- » Communication with controller – RS485 serial port.
- » Max length of communication cable: max. 500 m.
- » Working temperature: -20°C to 60°C.
- » Humidity: <85% (no condensation).
- » Protection degree: IP 31.

HMI ADVANCED USER INTERFACE



Functions and application

- » Maintenance of Air handling Unit – parameters setting and reading (temperature, airflow, CO₂, humidity etc), change of operational modes.
- » Weekly schedule programming.
- » Service maintenance – configuration of all advanced AHU operating parameters, configuration controllers universal inputs and outputs.
- » Remote configuring of variable frequency drives.
- » AHU alarms and errors monitoring (full text description) and cancelling.

Operational parameters

- » Power supply directly from the controller.
- » Communication with controller – RS485 serial port.
- » Max length of communication cable: max. 1200 m,
- » Working temperature: -20°C to 60°C.
- » Humidity: <85% (no condensation).
- » Protection degree: IP 20.

HMI ADVANCED OPERATOR PANEL



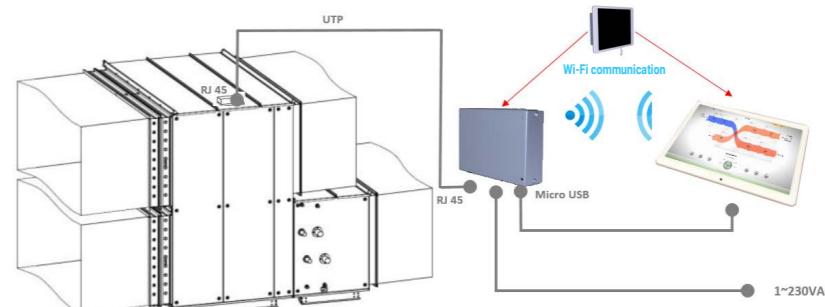
Function and application

- » HMI Advanced is a dedicated tablet with the Android system and the Chrome browser, which provides comfort in managing and configuring the parameters of the device.
- » The user receives a device for configuring and parametrizing the VENTUS air handling unit, a compilation of documents, a set of information about the product, and access to the monitoring and visualization of operating parameters of devices in the same network. The 10-inch high resolution display provides comfort of reading all data.
- » The HMI Advanced tablet comes with a communication box.
- » The tablet is mounted to the box using a set of magnets for easy attaching and detaching.
- » The communication box includes a WiFi router for wireless communication with the tablet, and a power supply unit for connecting the tablet. This solution allows the remote use of the tablet within WiFi range.

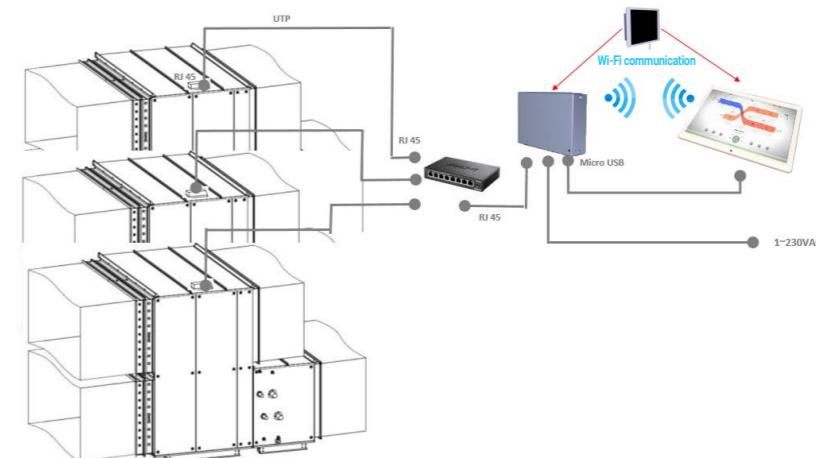
Operational parameters

- » Micro USB connector
- » Power supply input: 100-240V 50-60 Hz
- » Tablet input: 5.0V - 2.0A
- » Operation temperature: 0°C to 40°C.
- » Humidity: <85% (non-condensing).
- » OS: Android 9
- » Screen: 10.1"
- » WiFi: 802.11a/c/b/g/n
- » 2G: GPRS class 12/EDGE
- » 3G: HSPA+, EVDO, GPRS EDGE;
- » 4G: TDD LTE FDD LTE, VoLTE
- » Bluetooth: 4.2, VoLTE
- » Battery: 8000 mAh
- » GSM: B2/3/5/8
- » CDMA1X: BC0
- » WCDMA: B1/2/5/8

Single AHU
connected to tablet

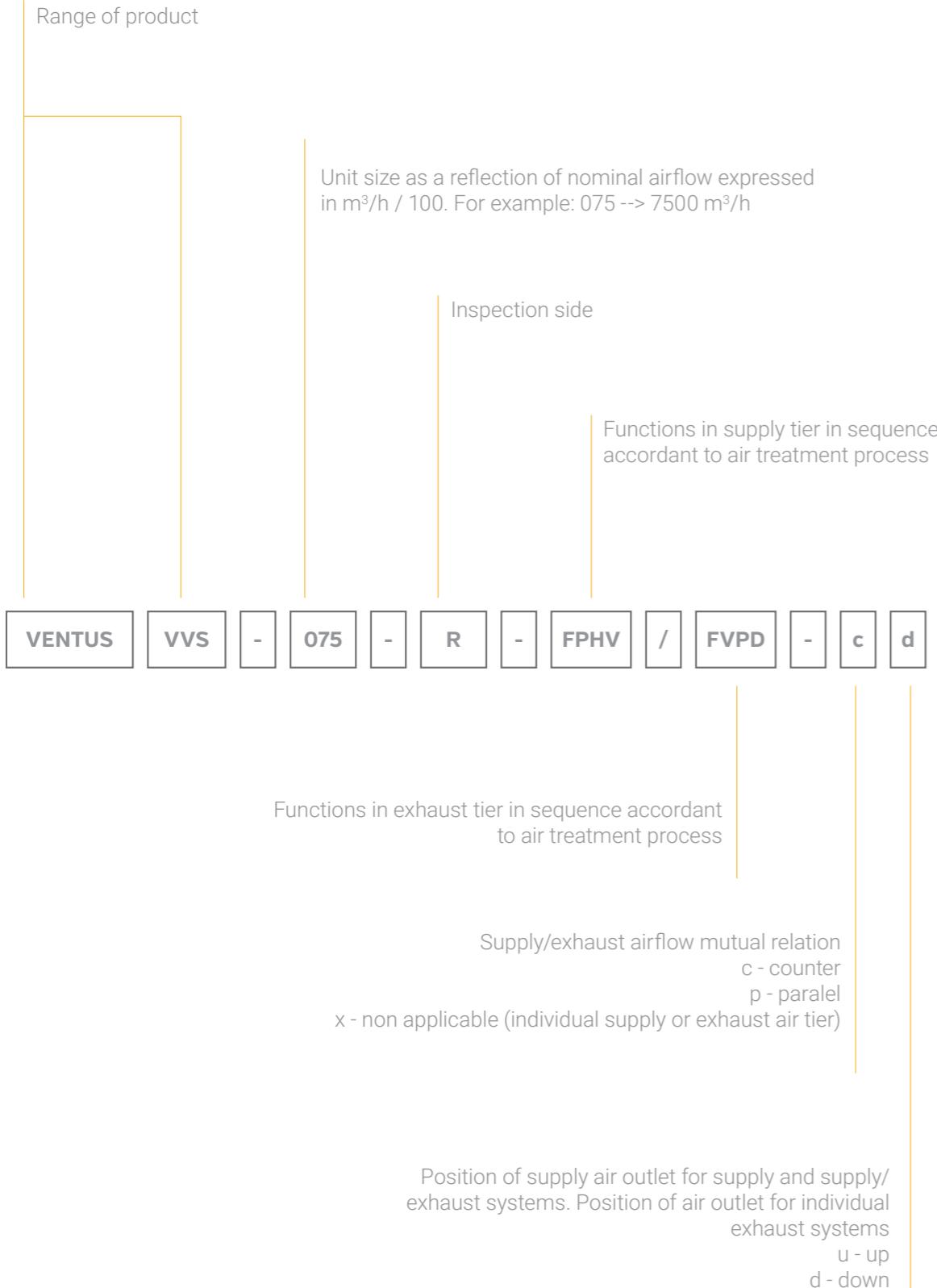


Multiple AHUs
connected
to single tablet





CODING



VVS075-R-FPHV/VVS075-L-FVPD_CD

CODES & SYMBOLS

CODE	SYMBOL	NAME
F	∅	Air filter
V	▷	Fan
C	⊖	Cooler
H	⊕	Heater
M	Ⓜ	Mixing box
P	☒	Plate cross-flow recuperator
R	⟳	Rotary heat wheel
G	Ⓖ	Run-around coil
D	{lng}	Droplet eliminator
W	Ѻ	Humidifier
E	□	Additional empty space
S		Sound attenuator

Auxiliary codes

- (cw) water cooler
- (dx) direct expansion cooler
- (xR) coil number of rows
- (hw) water heater
- (el) electric heater
- (sx) sound attenuator version



06

VOLCANO
WING
WING PRO

WING PRO

Product range



WING PRO WR2

DOUBLE ROW COIL

HEATING POWER RANGE:
17 - 88 kW

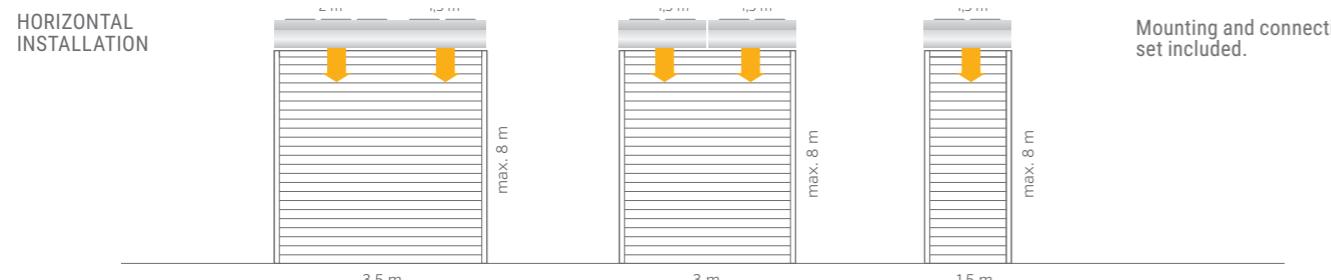
EXHAUST FLOW RATE:
7 300 - 10 700 m³/h

MAXIMUM AIR STREAM RANGE:
7 m

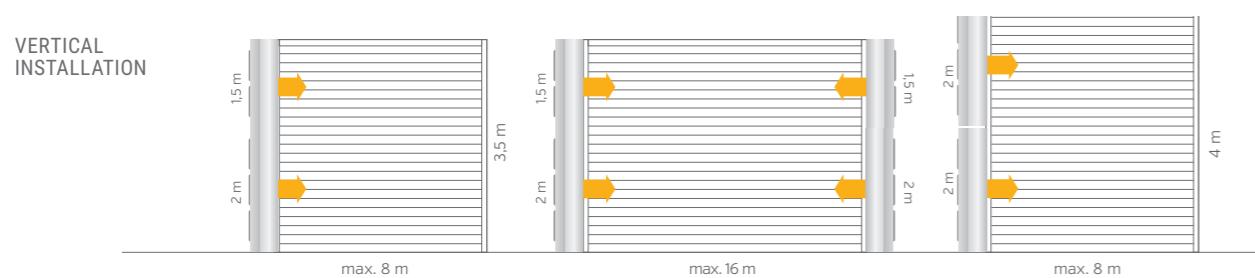
WING PRO 200



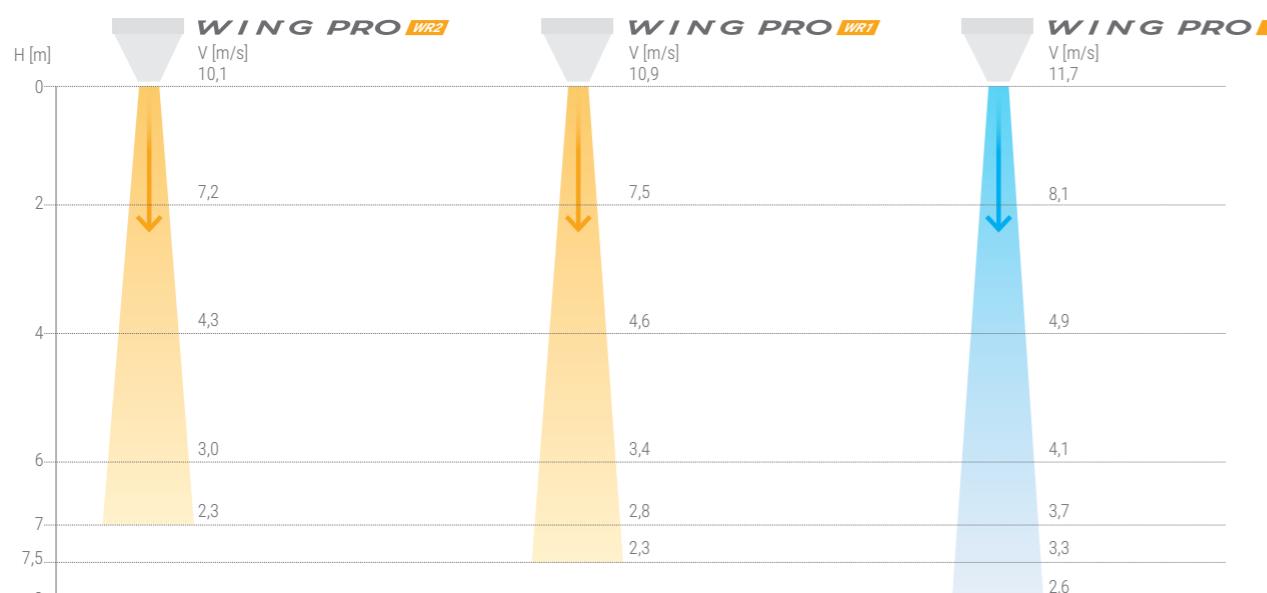
HORIZONTAL INSTALLATION



VERTICAL INSTALLATION



Stream range



Technical parameters

PARAMETERS	WING PRO DOUBLE ROW COIL		WING PRO SINGLE ROW COIL		WITHOUT HEATING (AMBIENT)	
	W150 EC	W200 EC	W150 EC	W200 EC	C150 EC	C200 EC
VTS article No.	1-4-2801-0349	1-4-2801-0355	1-4-2801-0348	1-4-2801-0354	1-4-2801-0347	1-4-2801-0353
Max. height of door	m	1,5	2	1,5	2	1,5
Max. air stream range	m	7	7,5	8		
Max. flow rate	m³/h	7 300	10 700	7 900	11 900	8 500
Heating power range	kW	17-58	28-88	3-32	15-48	-
Max. temperature of heating medium	°C		130			-
Max. Working pressure	MPa		1,6			-
Diameter of stub pipe connectors	"		3/4			-
Supply voltage	V/ph/Hz			~230/1/50		
EC motor power	kW	2 x 0,25	3 x 0,25	2 x 0,25	3 x 0,25	2 x 0,25
Rated current (EC motor)	A	2 x 1,3	3 x 1,3	2 x 1,3	3 x 1,3	2 x 1,3
Weight AC/EC (without water)	kg	53,6	69,6	50,5	66,1	43,4
IP protection rating	IP			54		

Accessories

HMI WING EC controller	Controller WING EC WIFI	Door sensor (reed switch)	Valve with actuator	Flex. connection hoses (set)
VTS article No. 1-4-2801-0155	VTS article No. 1-4-2801-0156	VTS article No. 1-4-0101-0454	VTS article No. 1-2-1204-2019	VTS article No. 1-2-2702-0076
Motor support - EC	Motor support - EC	Contact configuration - NO	Power supply V/ph/Hz ~230/1/50	Lenght m 0,6-0,9
Power supply voltage V/ph/Hz ~230/1/50	Power supply voltage V/ph/Hz ~230/1/50	Switching current mA 500	Opening min 3/3	Connection type GW 3/4"
Permissible load A 1A for 230VAC 0,02A for 0-10V	Permissible load A 1A for 230VAC 0,02A for 0-10V	Switching voltage V max 200 V	Kvs 4,5	Max. fluid pressure MPa 1,6
Setting range °C 5-40	Setting range °C 5-40	Connection °C screw	Protection rating IP 54	Min. working temperature for water °C 5
Protection rating IP 20	Protection rating IP 20			Min. working temperature for glycol °C -20
				Max. working temperature °C 130
				Set includes hose (2 pcs) gasket (4 pcs)

Noise level

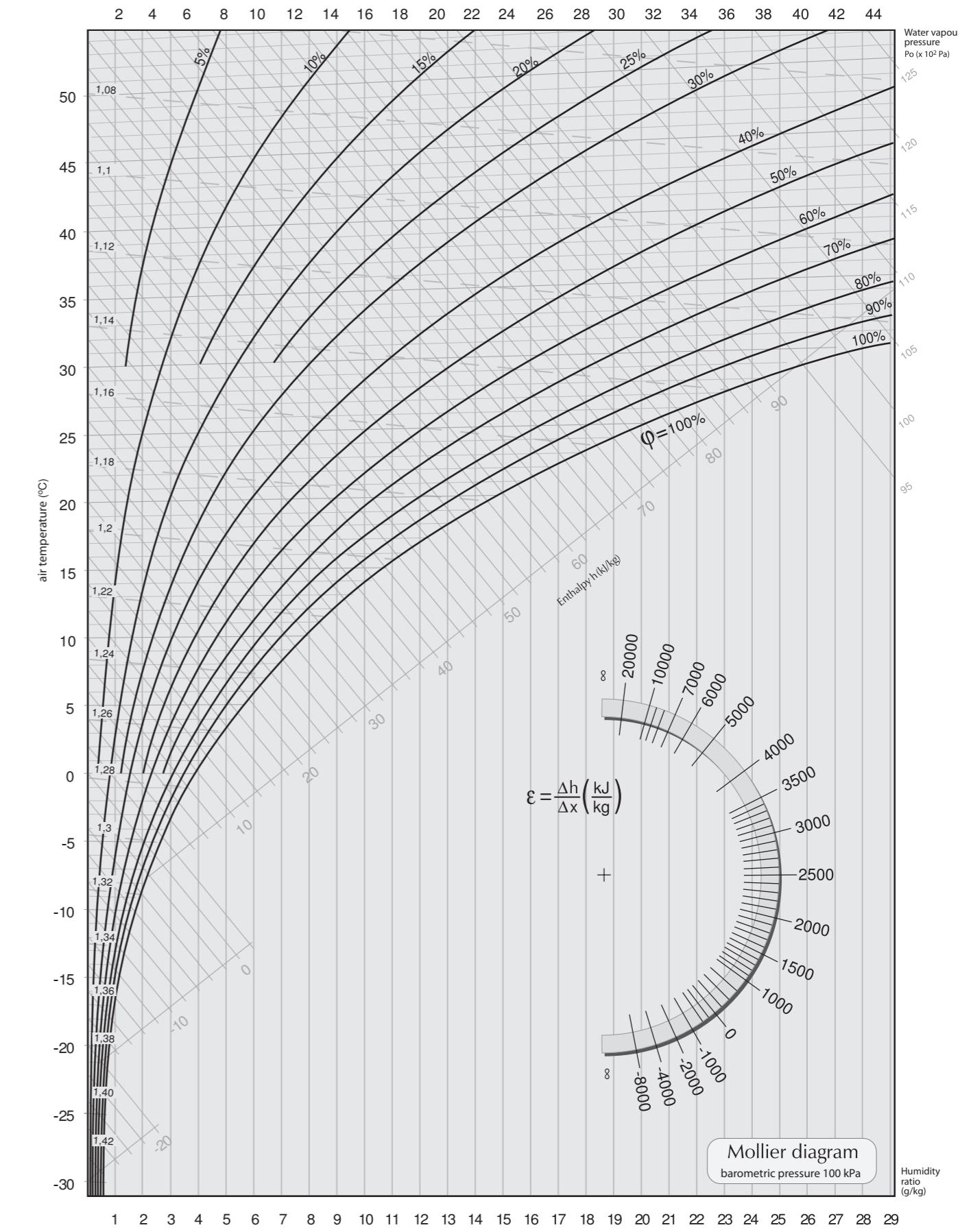
Fan speed	Noise level	WING PRO W R1		WING PRO W R2		WING PRO C	
		1,5m	2m	1,5m	2m	1,5m	2m
I	dB(A)*	45	46	45	45	47	48
II		55	57	54	55	57	58
III		64	65	62	63	65	66

* speed measurement conditions: semi-open space, horizontal installation on the wall, measurement performed 5 m away from the device





PSYCHROMETRIC CHART





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Before placing the order, please, confirm all technical specification with VTS sales representative.