

Our international
references



ventus

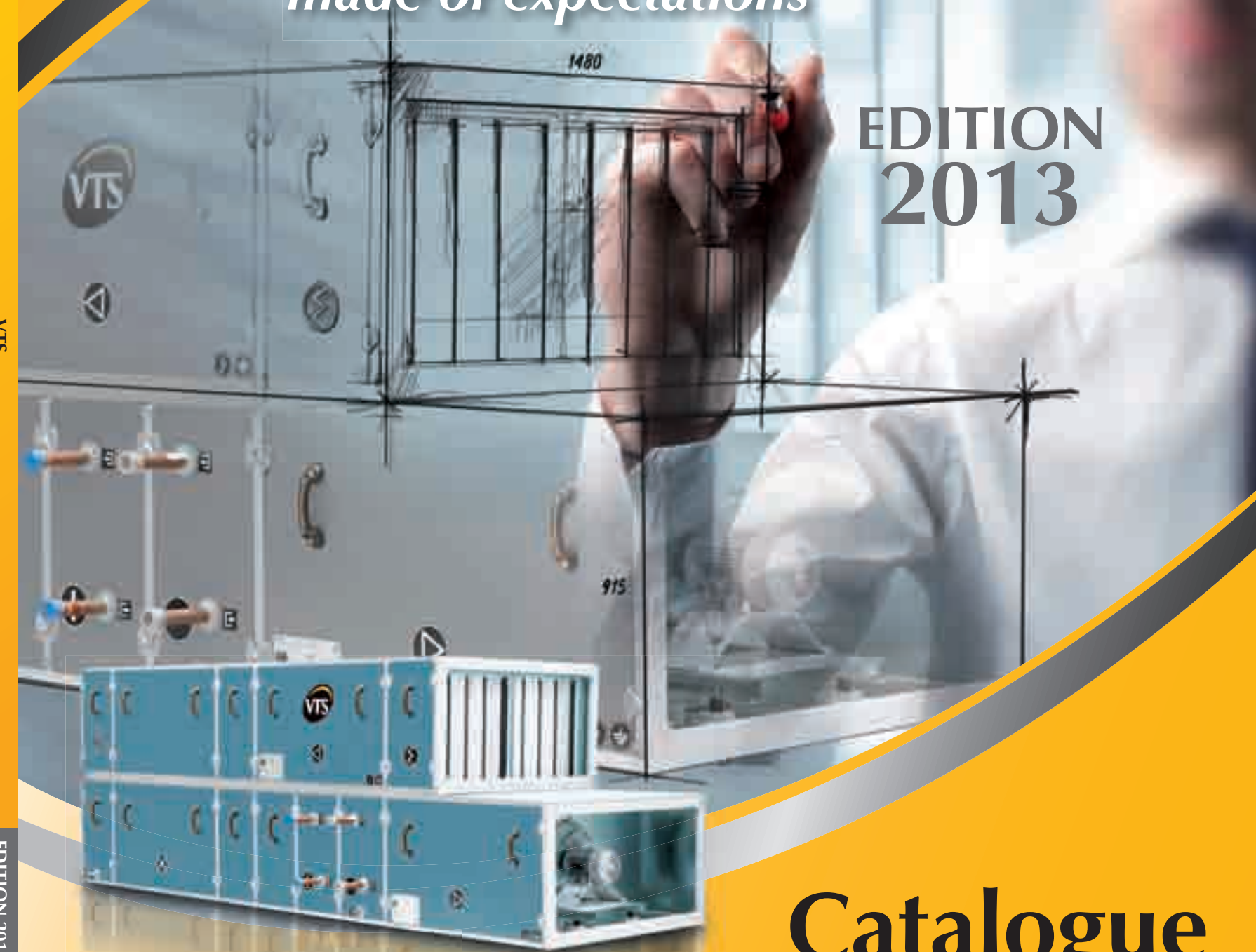


VTS

EDITION 2013 EN

ventus
made of expectations

EDITION
2013



Catalogue
Air Handling Units



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Climate parameters

Country	Town	Above sea level [m]	Pressure [kPa]	Summer			Winter		
				Temperature [°C]	Enthalpy [kJ/kg]	Relative humidity [%]*	Temperature [°C]	Enthalpy [kJ/kg]	Relative humidity [%]*
CHINA	Peking Shanghai	55 7	100.67 101.24	34.2	64	34	-10.4	-	90
				34.4	87.3	59	-3.7	-	90
CZECH REPUBLIC	Prague Brno Ostrava	366	97	30	54.1	34	-12	-	95
		246	98.4	29	56.2	37	-12	-	95
		256	98.29	29	53.2	37	-15	-	95
ESTONIA	Tallin	44	100.8	23.5	51.1	59	-22	-20.7	100
KAZAKHSTAN	Alma-ata Astana	847	91.56	31.2	54.4	30	-25	-24.4	100
		348	97.33	31	51.1	26	-35	-35.2	100
LITHUANIA	Vilnius Klaipeda	156	99.46	26.1	53.2	48	-23	-21.9	100
		10	101.2	23.8	52.2	60	-20	-18.2	100
LATVIA	Riga	3	101.29	24.3	51.1	56	-20	-18.8	100
GERMANY	Berlin Frankfurt Hamburg Munich	49	100.74	32	62.9	40	-14	-	90
		113	99.97	33	65.8	40	-12	-	90
		16	101.13	31	60.4	40	-12	-	90
		529	95.13	32	64.5	40	-16	-	90
POLAND	Warsaw Gdansk Krakow Przemysl Suwalki	107	100.05	30	60	45	-20	-18.4	100
		38	99.68	28	59.9	52	-16	-13.4	100
		237	98.51	30	60	45	-20	-18.4	100
		280	98.01	30	60	45	-20	-18.4	100
		186	99.11	30	60	45	-24	-22.6	100
RUSSIA	Moscow St. Petersburg Samara Kazan Jekaterynburg Krasnodar Rostov Nizni Novogrod Krasnoïarsk Irkutsk Vladivostok Omsk Perm Novosybirsk Murmansk	156	99.46	28.5	54	40	-26	-25.3	100
		4	101.28	24.8	51.5	52	-26	-25.3	100
		44	100.8	29.7	55.3	38	-30	-29	100
		116	99.94	27.3	54.8	46	-32	-31.7	100
		237	97	28.7	51.1	34	-35	-34.6	100
		33	100.93	30.8	63.6	46	-19	-17.6	100
		77	100.4	31.9	60.7	38	-32	-20.9	100
		82	100.34	26.8	54.9	49	-30	29.7	100
		277	98.04	25.9	51.9	46	-40	-40.2	100
		513	95.31	26.9	53.6	45	-37	-37.1	100
		184	99.13	23.4	61.5	81	-24	25.3	100
		123	99.86	27.7	53.6	42	-37	-36.8	100
		172	99.28	26.3	53.2	48	-35	-34.9	100
		177	99.22	28.4	54.8	41	-39	-38.9	100
		51	100.71	22	42.7	49	-27	-26.6	100
SLOVAKIA	Bratislava Kosice	130	99.7	32	58.2	34	-12	-	95
		232	98.57	31	59.8	39	-12	-	95
UKRAINE	Kiev Doneck Odessa Dnepropietrovsk Lvov	168	99.32	28.7	56.1	43	-22	-20.7	100
		226	98.64	31.8	58.6	34	-25	-24.3	100
		35	100.91	28.6	62	53	-18	-18.3	100
		142	99.63	31	57.4	36	-23	-22	100
		366	97	26.4	57.4	54	-19	-17.6	100
HUNGARY	Budapest	185	99.12	32	63.9	40	-15	-	90
UNITED ARAB EMIRATES	Abu-Dhabi Dubai	27	101	46	96.6	30	12	27	70
		5	101.26	46	96.6	30	13	27	70
EUROPE	Bucharest Paris Amsterdam Minsk Vienna London	91	100.24	33	64.5	38	-13.5	-	90
		109	100.02	29.8	60.4	45	-7.8	-	90
		-2	101.35	28	58.5	50	-7	-	90
		234	98.55	25.9	53.6	51	-25	-24.3	70
		200	98.95	32	63.6	40	-16	-	90
		24	101.04	27.4	53.4	44	-5.6	-	90
WORLD	Amman Riyadh Muscat Kuwait Bombay Delhi Washington Montreal Doha	773	92.38	42	97.7	40	2	-	70
		612	94.19	47	80.7	18	8	-	50
		15	101.14	54	130.8	30	17	-	30
		55	100.67	47	100.6	30	5	-	30
		14	101.16	35	67.7	35	19	-	70
		216	98.75	41.7	65	17	8	-	63
		20	101.08	34.8	75.2	44	-9.3	-	90
		82	100.34	28.8	62.6	52	-26.9	-	90
		42	101.26	46	96.6	30	13	-	70

* Relative humidity has been accepted for winter period conventionally



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VTS GROUP - THE EUROPEAN LEADER IN HVAC TECHNOLOGIES



**VTS - ALWAYS
A STEP AHEAD**

4 continents
27 countries
84 offices
350 sales representatives
and technical advisors

A global corporation with a European origin

- VTS Group, a European company established in 1989, is a leading supplier of heating, ventilation and air conditioning units – over 500 000 units sold to date.
- The VTS Capital Group comprises several regional companies worldwide, employing over 350 sales representatives and technical advisors.
- VENTUS air handling units are delivered to 27 countries in Europe, Middle East and the Asia Pacific Region. Our units operate failure-free in different climates in temperatures from -40°C to +70°C.
- Our product range also includes high quality VOLCANO air heaters and DEFENDER air curtains.

Top quality, competitive pricing

- All the manufacturing processes are carried out in three Production-Logistics Centres purpose-built by the Company, located in Poland, China and India. The manufacture of our units conforms to the strict, up-to-date standards developed by VTS Group.
- Development of all the components and semi-finished products delivered to the Centers is based on the company's own patents and standards.
- On-going monitoring of quality at all stages: design, manufacturing and assembly.
- Out consistently high quality is confirmed by certificates from independent bodies. The process of selection of VTS units is certified by Eurovent.

The Ventus Knowledge Centre, situated in the Production-Logistics Centre, is a combination of a modern conference center and a show room where our Customers can see the entire VTS offering with their own eyes.



RELIABLE BRAND

The design and operating specifications of VTS products meet the requirements set out by European standards, which is certified by Eurovent and TÜV.



Eurovent

Certifies the conformity of the parameters of the Ventus VS10-VS650 units selected, calculated using the ClimaCAD On-Line tool with the actual operating parameters.



EN 1886
EN 13053

PN-EN 1886 standard PN-EN 13053 standard

The two key European standards for ventilation and air conditioning quality and parameters.



ISO 9001, ISO 14001

ISO 9001 ISO 14001

ISO 9001 ensures fully consistent quality of all VTS units. ISO 14001 ensures effectiveness of the environmental management system.



CE

VTS units conform to the safety standards set out by the European Union.

A WIDE CHOICE OF UNITS

AIR HANDLING UNITS



Freestanding units
VENTUS VS 21 ÷ 650



Suspended units
VENTUS VS 10 ÷ 15



VENTUS N-TYPE – a family of ducted air handling units

- Competitive pricing.
- Immediate availability.
- Easy configuration of function sequence.
- Highly efficient and silent plug-fans with direct drive.
- Compliance with ERP 2015 requirements.
- N-CAD selection tool available on-line.

VTS is the supplier of suspended, ducted and freestanding VENTUS air handling units and manufacturer of high quality DEFENDER air curtains and VOLCANO heaters offered under the VTS EUROHEAT brand.

DEFENDER *air curtains*



A cutting-edge air curtain with outstanding build quality, acting as a protective barrier at an open doorway.

- Keeps cold air, wind, pollutants and insects out of an open doorway.
- Unique design and cutting-edge technology,
- Comes in three sizes (1m, 1,5m and 2m) and two versions: a water or electric heater.
- Safe and maintenance-free.
- European quality for a competitive price.
- On-line availability.
- 5 year warranty – a new unit offered within the warranty period!

VOLCANO *heaters*



A unique water heater constituting an integral part of modern heating systems.

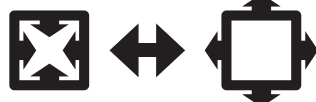
- Ensures comfort in medium and big spaces.
- Attractive design adopted for operation in high temperatures.
- Quick and easy installation and an optimal range of the air stream.
- European quality for a competitive price.
- Versatile.
- Low unit weight.
- On-line availability.
- 5 year warranty – a new unit offered within the warranty period!

* Lifetime warranty on the casing of all VTS EUROHEAT products.

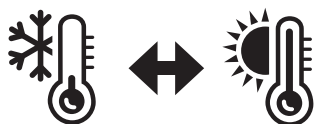
DIFFERENT CLIMATES SAME COMFORT

An office in a desert in Dubai, a manufacturing plant in subarctic Siberia or a shopping mall in temperate climate in Budapest – our units work flawlessly ensuring comfort at home and in the workplace - no matter what the climate is.

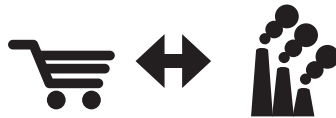
OUR AIR HANDLING UNITS ARE PERFECTLY TAILORED TO MEET ANY NEEDS:



the cubic capacity of a building
small restaurants and large shopping centres



the climate conditions
from subarctic to tropical do
tropicalnych



the intended use of a building
residential, commercial and industrial
premises

ventus
made of expectations

The VENTUS air handling unit was developed using the latest technology and advanced materials engineering. The design solutions, drawing on the company's knowledge and experience, fully meet the expectations of our Customers and respond to the market demand. As a result, VTS offers versatile, reliable and energy-efficient units.



VENTUS - A WIDE RANGE OF POSSIBILITIES

VERSATILE UNITS

- Operation in different climate conditions (-40 to +70°C).
- Durability – Sandwich panels with polyurethane foam.
- Reliable parameters certified by Eurovent and tested in a TÜV laboratory.
- Option of delivery in sections.

ENERGY EFFICIENCY

- PLUG FAN with backward-curved blades.
- Direct drive.
- Adjustment of working point parameters of the fan through fan speed adjustment (power line frequency).
- Optimal selection of functional elements – for minimum air and medium flow resistance.
- Optimal algorithms controlling unit efficiency.

SMALL UNIT SIZE

- Low-height units: suspended units from 36 cm, freestanding units from 53cm.
- Adapted for technical spaces and ventilation ducts.



ventus
made of expectations

PROVEN AUTOMATIC CONTROL APPLICATIONS

- Remote control of unit operation.
- Complete slimmed-down and advanced solutions that guarantee energy efficient and safe operation.
- Clear and simple user interface (HMI).
- Automatic control open to bus mastering systems.

NON-SKELETON CASING

Unit casing made from Sandwich panels with polyurethane foam ensures:

- Excellent mechanical and insulation parameters.
- The highest air tightness class.
- Elimination of thermal bridges.

OPTIMAL UNIT SIZE MATCHING THE CUBIC CAPACITY OF A BUILDING

- Units come in 16 sizes.
- Optimal selection of coils and fan-sets.

LOW NOISE OPERATION

- LOW NOISE fans ensuring perfectly quiet operation of units.
- Low dynamic pressure (fan air speed).
- Excellent casing noise attenuation.
- Low air face velocities.

ENERGY RECOVERY

- Energy recovery systems optimized for all types of climate conditions.
- Energy recovery efficiency up to 85%.
- Effective separation between exhaust and supply air streams.
- Sensible and latent heat recovery.





ClimacAD On-Line

Log on www.vtsgroup.com

it only takes **60** seconds
to select a unit

calculations made
by our selection tool
are certified by
Eurovent



WHAT'S NEW IN THE VTS OFFERING

The VENTUS product family has been augmented with **PAD AIR HUMIDIFIER** which uses the adiabatic humidification process.

- You will find a detailed description of the application, design and operating parameters of the humidifiers on pages 68 and 69.
- In addition to implementation of humidifiers, we have also updated the Clima CAD On-Line selection tool, which now supports humidifying performance calculation.



VENTUS

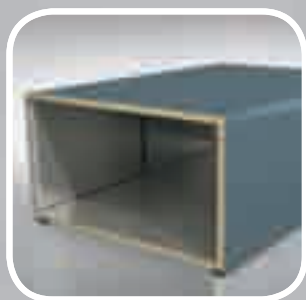
made of expectations



VENTUS - AIR HANDLING UNITS



- High efficiency
- Low noise level
- Compact dimensions



- Low weight
- Optimal dimensions
- High rigidity of construction
- Easy assembly

Due to continuous improvement of the product VTS reserves its rights to implement modifications. Some technical specification as well as descriptions may differ from the actual state. Before placing an order technical specification and operation parameters of particular devices should be confirmed with a VTS representative.

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Supply units AHUs

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Cooling	22
Heating, Cooling	23
Heating, Cooling, Heating	24

Exhaust AHUs

Ventilation	25
Filtration, Ventilation	26

Supply and Exhaust AHUs: Plate Cross-flow Recuperator

Ventilation	27
Heating	29
Cooling	32
Heating, Cooling	35
Heating, Cooling, Heating	38

Supply and Exhaust AHUs: Rotary Regenerator

Ventilation	41
Heating	42
Cooling	44
Heating, Cooling	46
Heating, Cooling, Heating	48

Supply and Exhaust AHUs: Run-Around Coil

Heating	50
Heating, Cooling	51

Optional Functions and Elements

Components

Automation elements

Control applications



VS 21 ÷ 650



VS 10 ÷ 15

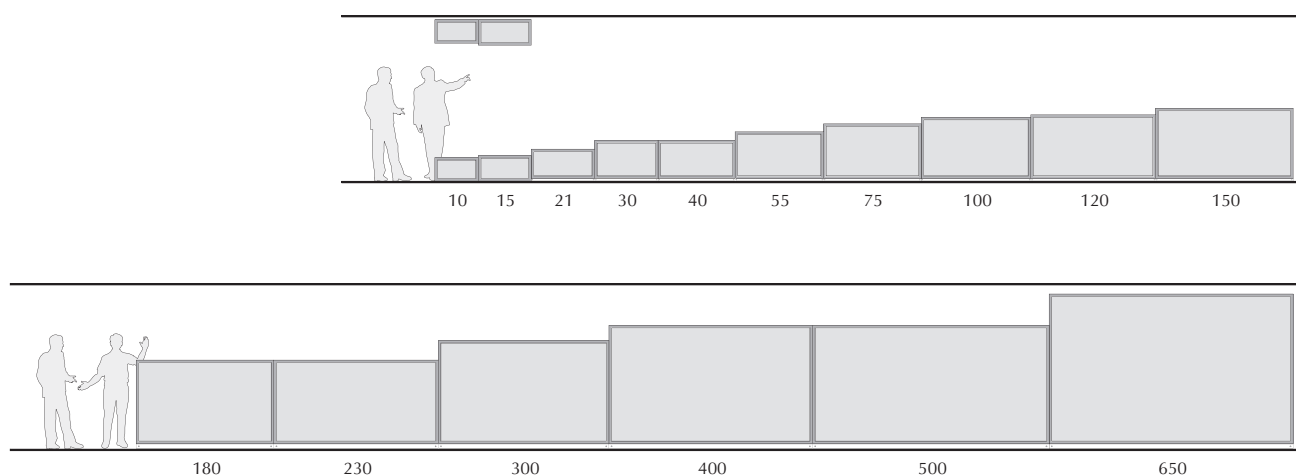
Capacity:

400 ÷ 100 000 [m³/h]

Functions:



Sizes:

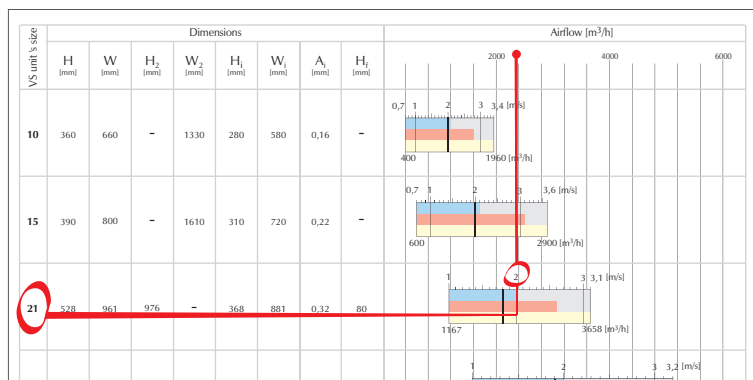


How to select an AHU?

1

Start with the „Quick selection“ page (p. 16-19):

- choose a type and a size of an AHU;
- check which AHUs provide a capacity you are interested in;
- choose the optimal one on the basis of air flow speed through the unit's window, taking the most important function into consideration;
- read the size of the unit , e.g. VS 21.



2

On the „Navigation“ page (p. 20):

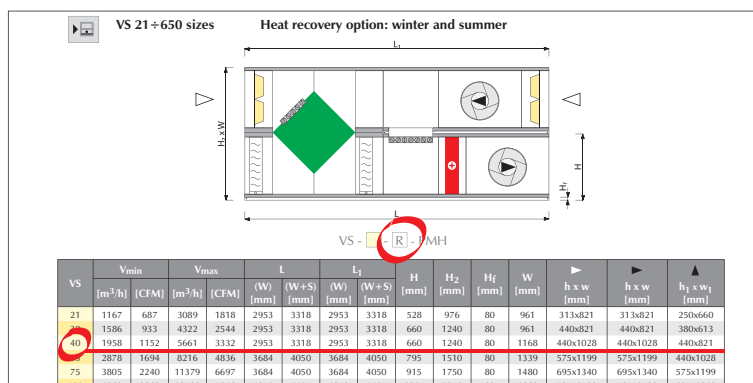
- find a base unit which is equipped with functions you are interested in and the corresponding automatics;
- move to an appropriate page.

AHU TYPE	FUNCTION							PAGE NUMBER			
	▶	◀	+	-	⊗	⊙	⊕	AHUs		AUTOMATICS	
								VS 10÷15	VS 21÷650	VS 10÷15	VS 21÷650
SUPPLY AHUs											
Heating	●	●	●	●	●	●	●	21	21	81	
Cooling	●	●	●	●	●	●	●		22		82
Heating, Cooling	●	●	●	●	●	●	●		23		83
Heating, Cooling, Heating	●	●	●	●	●	●	●		24		
EXHAUST AHUs											
Ventilation	●	●	●	●	●	●	●	25	25		84
	●	●	●	●	●	●	●	26	26		84
SUPPLY - EXHAUST AHUs											
	●	●	●	●	●	●	●	27	27	86	88

3

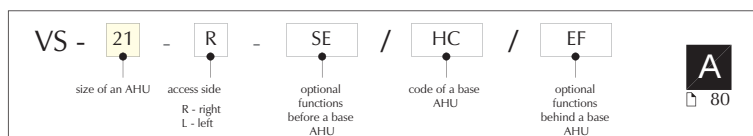
On the page with a description of an AHU:

- choose the access side;
- choose optional functions and accessories;
- read the parameters for the chosen size of a base AHU as well as optional functions (tables for optional functions are presented on page 53).



4

Write down the code of an AHU down and check the information concerning a recommended control application.

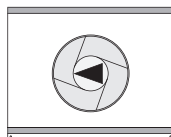


- ! Detailed technical specification is available in ClimaCAD On-Line application at www.vtsgroup.com. If you want to order a selected unit, get in touch with our Sales and technical adviser.

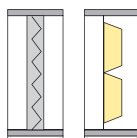
Basic functions of a base AHU



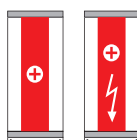
V - Ventilator



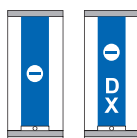
F - pre-Filter



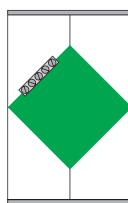
H - Heater: water, electric



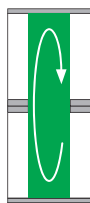
C - Cooler: water, with direct expansion



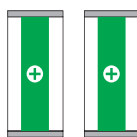
P - Plate cross-flow recuperator



R - Rotary regenerator



G - Glycol system (Run-around coil)



View of an AHU



from a side: VS 10÷650



from the top: VS 10÷15

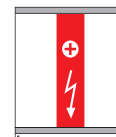


from a side: VS 21÷650
(a dominating function in a lower module)

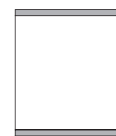
Optional functions



N - Electric pre-heater



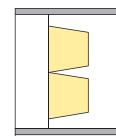
E - Empty section



S - Silencer



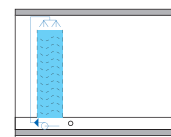
F - Secondary Filter



M - Mixing box



W - Humidifying
(Water)



Accessories



FC - Flexible Connection



AD - Air Damper



Miscellaneous

CCOL - ClimaCAD On-Line



order of exchangers in a unit
(heater, cooler)



order of exchangers in a unit
(cooler, heater)



80 page symbol



Automatics



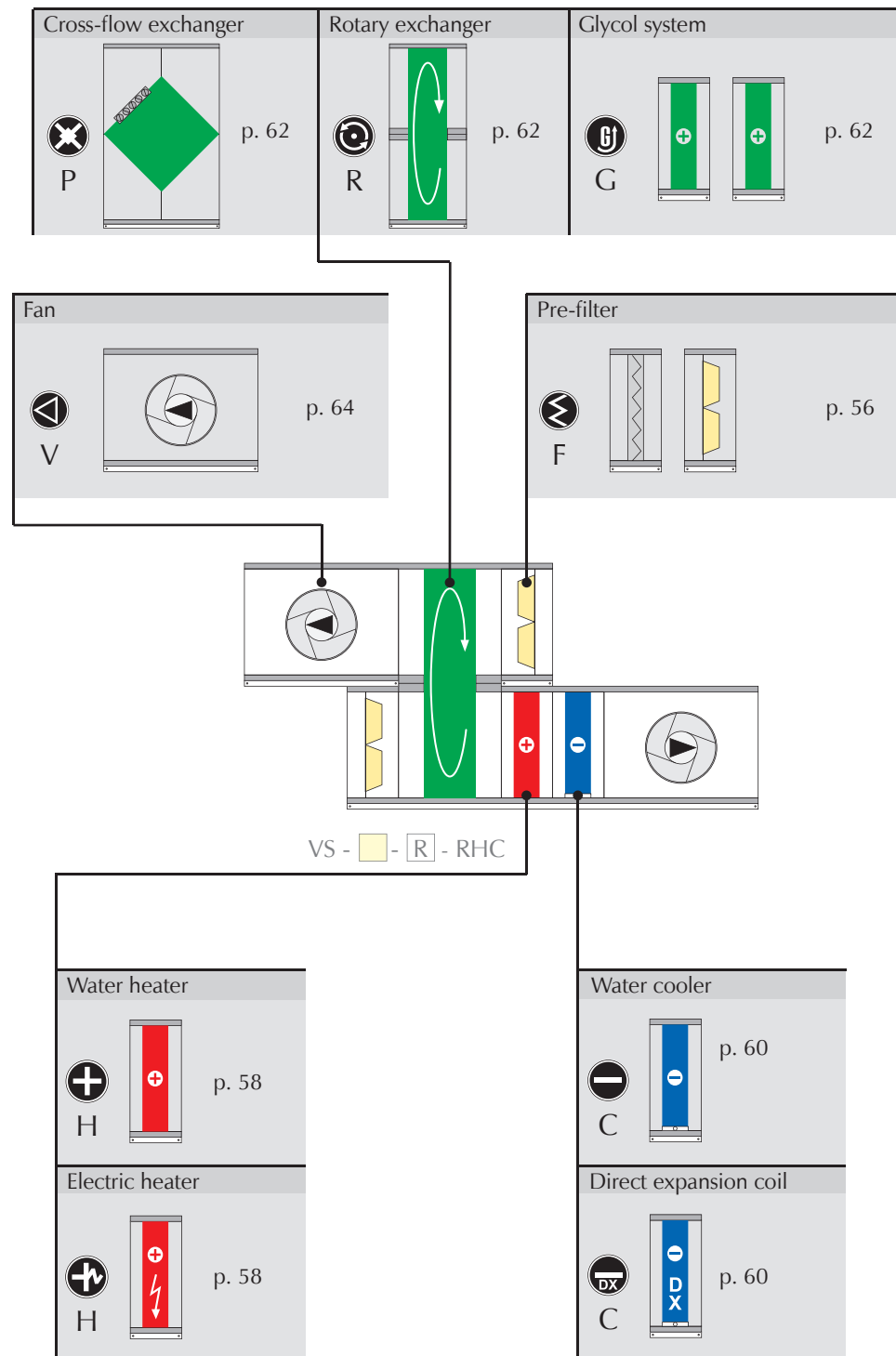
unit's inlet



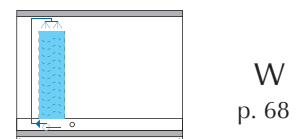
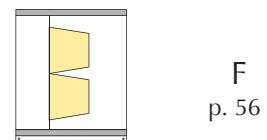
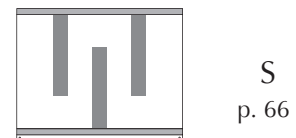
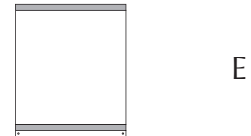
unit's outlet

Base AHUs and optional functions

Base AHU



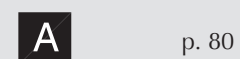
Optional functions



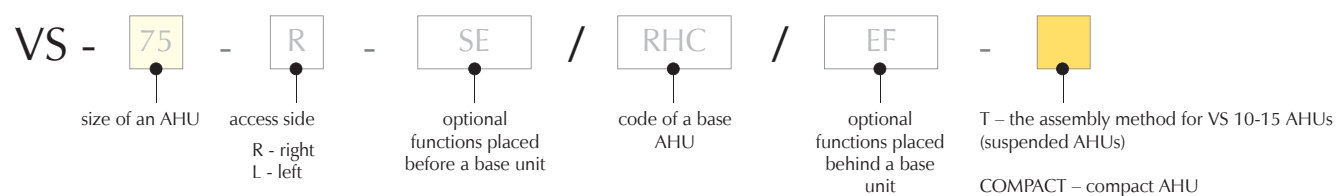
Accessories



Automation



Coding system



Recommended scope of device operation

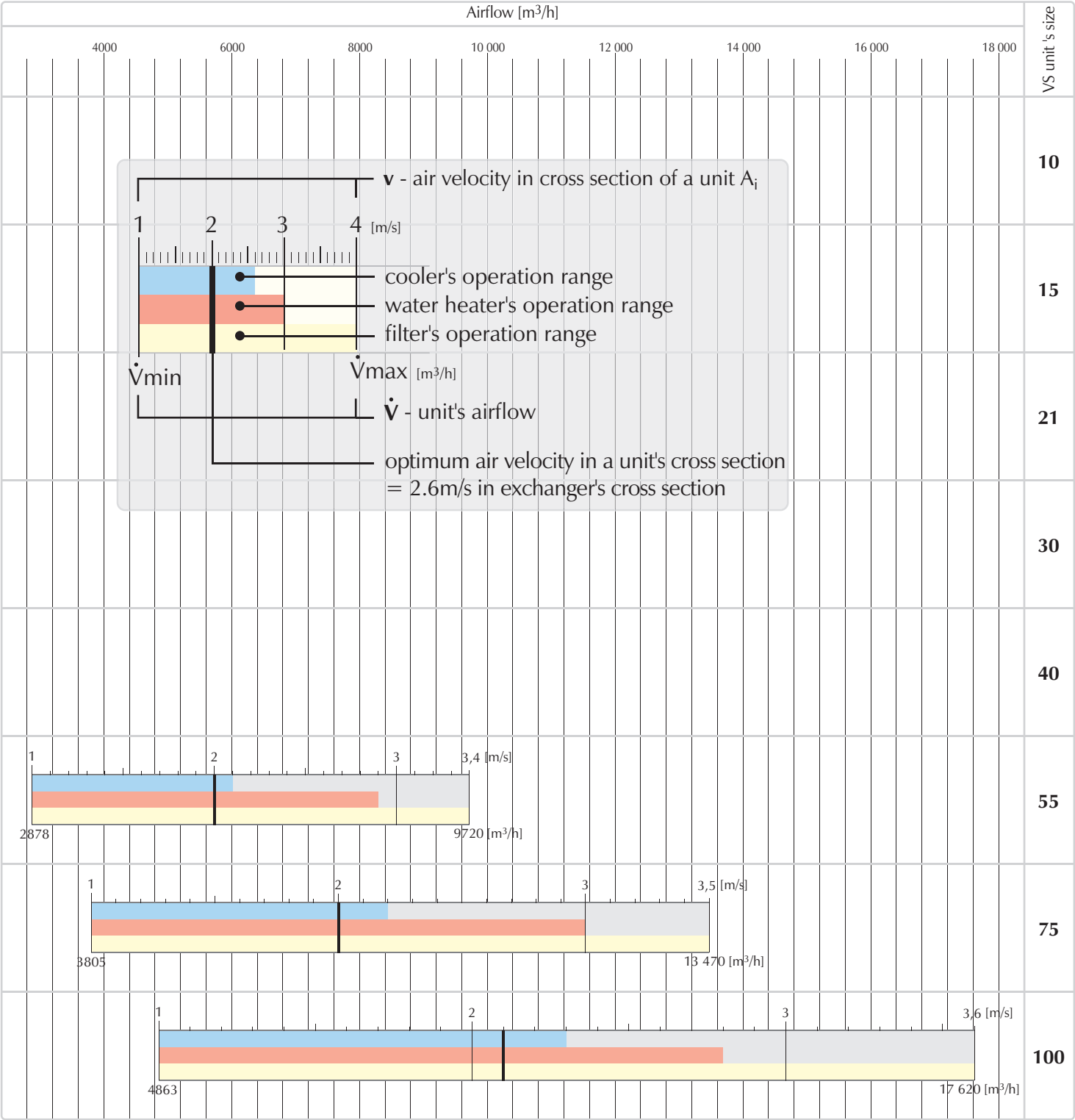
VS unit's size	Dimensions								Airflow [m³/h]									
	H [mm]	W [mm]	H ₂ [mm]	W ₂ [mm]	H _i [mm]	W _i [mm]	A _i [mm²]	H _f [mm]										
10	360	660	-	1330	280	580	0,16	-										
15	390	800	-	1610	310	720	0,22	-										
21	528	961	967	-	368	881	0,32	80										
30	660	961	1240	-	500	881	0,44	80										
40	660	1168	1240	-	500	1088	0,54	80										
55	795	1339	1510	-	635	1259	0,80	80										
75	915	1480	1750	-	755	1400	1,06	80										
100	1015	1660	1950	-	855	1580	1,35	80										

Legend:

H - unit height
 H₂ - integrated unit height
 W - unit width
 W₂ - integrated unit width
 W_i - unit internal cross-section width
 H_i - unit internal cross-section height
 A_i - unit internal cross-section area
 H_f - height of support (transport-foundation frame, supporting blocks)

Dimensions of a unit

VS 10÷15	VS 21÷650	VS 10÷15	VS 21÷650



Maximum air velocity $v_{\max}$ [m/s]

functions									
velocity in a units cross section	3,6	3,0	3,5	3,6	3,0	3,0	3,6	3,6	3,0
velocity in a component's cross section	4,3	3,5	4,4	4,5	3,5	3,5	4,5	5,2	4,0

Recommended scope of device operation

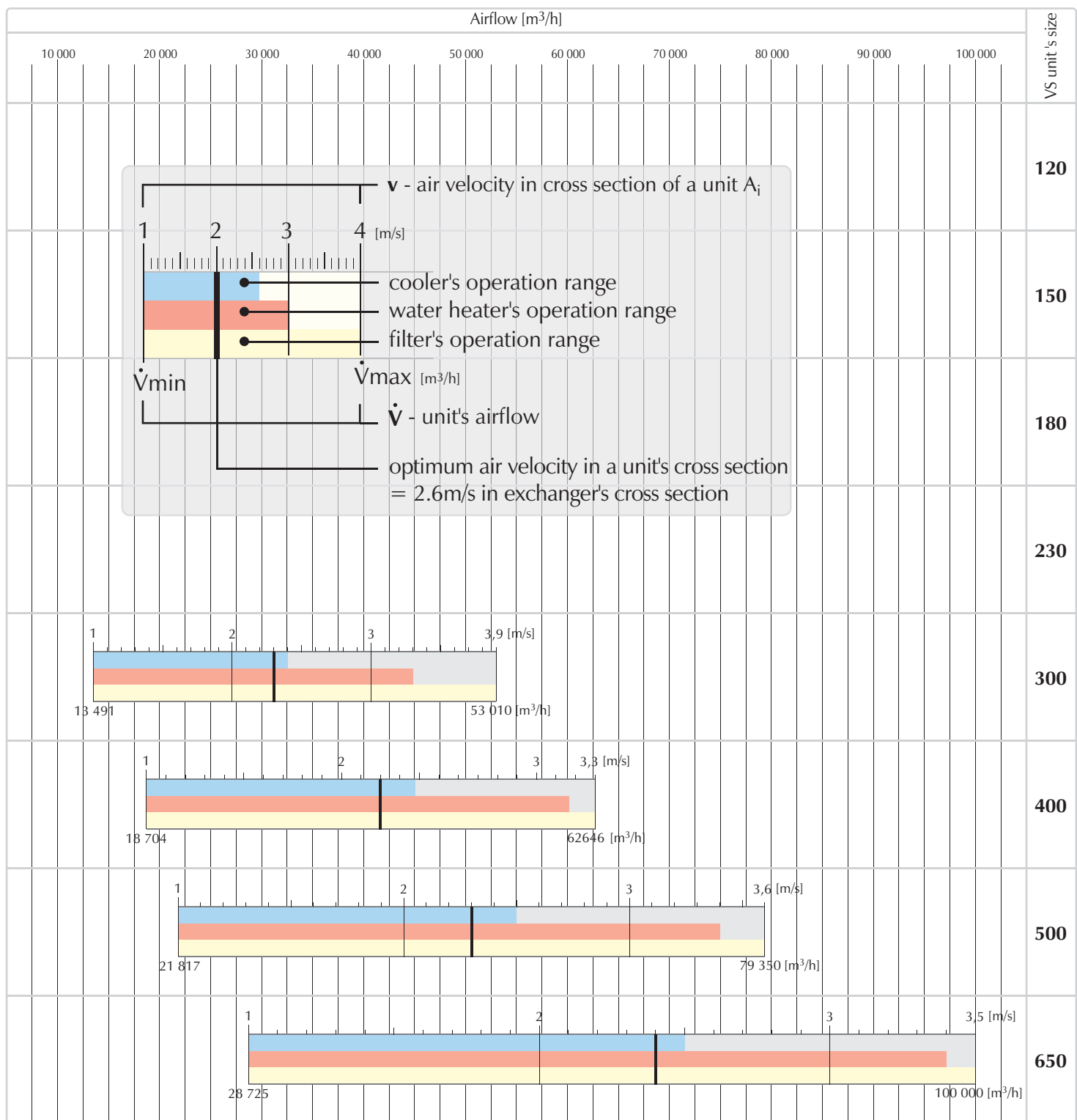
VS unit's size	Dimensions								Airflow [m³/h]									
	H [mm]	W [mm]	H ₂ [mm]	W ₂ [mm]	H _i [mm]	W _i [mm]	A _i [mm]	H _f [mm]	5000 10 000 15 000 20 000 25 000 30 000 35 000 40 000 45 000									
120	1052	1891	2024	-	892	1811	1,62	80										
150	1153	2085	2226	-	993	2005	1,99	80										
180	1397	2085	2714	-	1197	2005	2,40	80										
230	1397	2493	2714	-	1197	2413	2,89	80										
300	1696	2585	3312	-	1496	2505	3,75	80										
400	1929	3085	3778	-	1729	3005	5,20	80										
500	1929	3585	3778	-	1729	3505	6,06	80										
650	2406	3697	4732	-	2206	3617	7,98	80										

Legend:

H - unit height
 H₂ - integrated unit height
 W - unit width
 W₂ - integrated unit width
 W_i - unit internal cross-section width
 H_i - unit internal cross-section height
 A_i - unit internal cross-section area
 H_f - height of support (transport-foundation frame, supporting blocks)

Dimensions of a unit

VS 10÷15	VS 21÷650	VS 10÷15	VS 21÷650



Maximum air velocity v_{max} [m/s]

functions									
velocity in a units cross section	3,6	3,0	3,5	3,6	3,0	3,0	3,6	3,6	3,0
velocity in a component's cross section	4,3	3,5	4,4	4,5	3,5	3,5	4,5	5,2	4,0

AHU TYPE	FUNCTION							PAGE NUMBER			
								AHUs		AUTOMATICS	
								VS 10÷15	VS 21÷650	VS 10÷15	VS 21÷650
SUPPLY AHUs											
Heating								21	21	81	
Cooling									22	82	
Heating, Cooling								23	23	83	
Heating, Cooling, Heating									24		
EXHAUST AHUs											
Ventilation								25	25	84	
								26	26	84	
SUPPLY – EXHAUST AHUs											
Ventilation								27	27	86	88
									41	91	
									52	93	
Heating								29, 31	29, 30, 31	86	88
									42, 43	91	
									50	93	
Cooling									32, 33, 34	87	89
									44, 45	92	
Heating, Cooling								35, 37	35, 36, 37	87	89
									46, 47	92	
									51		
Heating, Cooling, Heating									38, 39, 40		
									48, 49		

OPTIONAL FUNCTIONS:

* VS 10÷15 AHUs are available as indoor units only.

** Optional functions are available for VS 21÷650 AHUs only.

*** Optional function is available for VS 10÷650 AHUs (VS 10÷15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

Inlet/Outlet configurations of E empty section are presented on page 53.

Inlet/Outlet configurations of M mixing box are presented on page 53.

Dimensions of optional functions are presented on page 53.

V_{MAX} parameters are specified for the following:

VS 10 – equipped with the fan set and a motor with the following parameters n= 2790 rpm, P=0,55 kW,

VS 15 – equipped with the fan set and a motor with the following parameters n=2850 rpm, P=0,75 kW,

VS 21÷VS 150 – equipped with fan sets with direct drive,

VS 180÷VS 300 – equipped with double fan sets (direct driven),

VS 400÷VS 500 – equipped with triple fan sets (direct driven),

VS 650 - equipped with fourfold fan sets (direct driven).

VTS reserves the right to make a changes in product.

Detailed specification is available in the CLIMA-CAD on-line selection application at www.vtsgroup.com

Supply AHUs

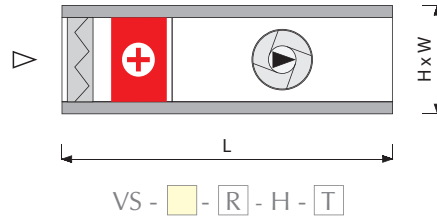
Heating

Base AHU

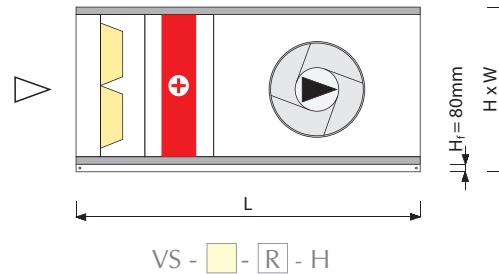
A
81



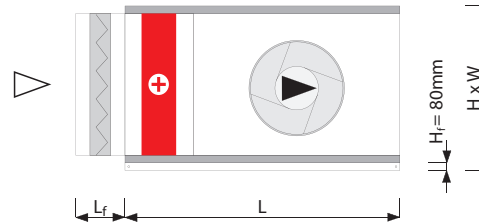
VS 10 ÷ 15 sizes (suspended)*



VS 21 ÷ 650 sizes



VS 21 ÷ 150 sizes **COMPACT**

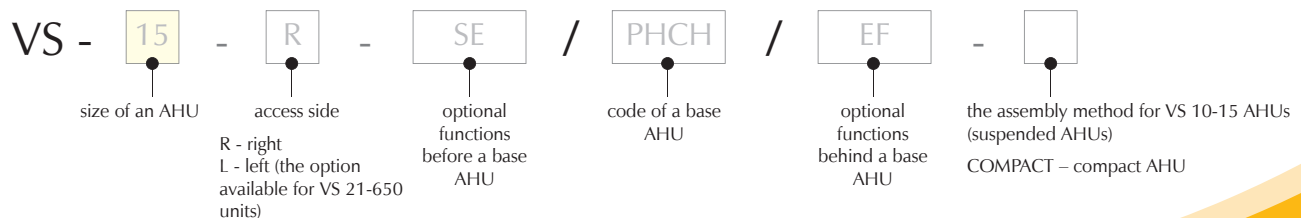


VS	V _{min}		V _{max}		L [mm]	H [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]	VS COMPACT	L _{2R} [mm]	L _{4R} [mm]	L _f [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]									
10	436	257	1655	974	758 / 1124*	360	660	220x500	-	10	-	-	-
15	648	381	2462	1449	758 / 1124*	390	800	250x660	-	15	-	-	-
21	1167	687	3080	1813	1490	528	961	313x821	250x660	21	1124	1124	96
30	1586	933	4322	2544	1490	660	961	440x821	380x613	30	1124	1124	96
40	1958	1152	5661	3332	1490	660	1168	440x1028	440x821	40	1124	1124	96
55	2878	1694	8216	4836	1856	795	1339	575x1199	440x1028	55	1124	1490	96
75	3805	2240	11379	6697	1856	915	1480	695x1340	575x1199	75	1490	1490	96
100	4863	2862	13550	7975	2221	1015	1660	795x1520	695x1340	100	1490	1856	96
120	5815	3423	18079	10641	2221	1052	1891	832x1751	795x1520	120	1490	1856	96
150	7167	4218	22420	13196	2221	1153	2085	933x1945	795x1520	150	1490	1856	96
180	8640	5085	27220	16021	2221	1357	2085	1137x1945	795x1520	180	1856	1856	-
230	10398	6120	33460	19694	2221	1357	2493	1137x2353	740x1913	230	1856	1856	-
300	13491	7941	44760	26345	2587	1656	2585	1436x2445	933x1945	300	1856	1856	-
400	18704	11009	60501	35610	2587	1889	3085	1669x2945	933x2650	400	1856	1856	-
500	21817	12841	74350	43761	2587	1889	3585	1669x3445	933x3150	500	1856	1856	-
650	28725	16907	98500	57975	2587	2366	3697	2146x3557	933x3250	650	1856	1856	-

* - for VS-10, VS-15 with water heater L= 758 mm, with electric heater L=1124 mm

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



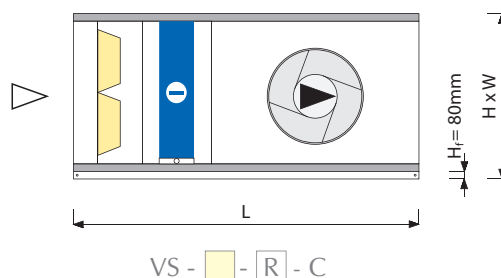
A

82

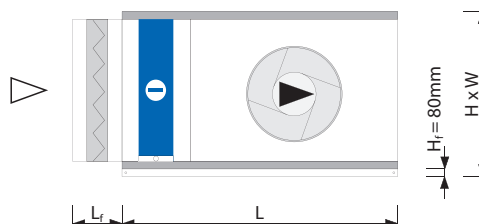
Base AHU



VS 21 ÷ 650 sizes



VS 21 ÷ 150 sizes COMPACT



VS	V _{min}		V _{max}		L [mm]	L* [mm]	H [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]	VS COMPACT	L [mm]	L* [mm]	L _f [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]										
21	1167	687	2200	1295	1490	1856	528	961	313x821	250x660	21	1124	1490	96
30	1586	933	3100	1825	1490	1856	660	961	440x821	380x613	30	1124	1490	96
40	1958	1152	4100	2413	1490	1856	660	1168	440x1028	440x821	40	1124	1490	96
55	2878	1694	6054	3563	1856	2221	795	1339	575x1199	440x1028	55	1490	1856	96
75	3805	2240	8150	4797	1856	2221	915	1480	695x1340	575x1199	75	1490	1856	96
100	4863	2862	10700	6298	2221	2587	1015	1660	795x1520	695x1340	100	1856	2221	96
120	5815	3423	13300	7828	2221	2587	1052	1891	832x1751	795x1520	120	1856	2221	96
150	7167	4218	16400	9653	2221	2587	1153	2085	933x1945	795x1520	150	1490	2221	96
180	8640	5085	19900	11713	2221	2221	1357	2085	1137x1945	795x1520	180	1856	1856	-
230	10398	6120	24600	14479	2221	2221	1357	2493	1137x2353	740x1913	230	1856	1856	-
300	13491	7941	32900	19364	2587	2587	1656	2585	1436x2445	933x1945	300	2221	2221	-
400	18704	11009	44500	26192	2587	2587	1889	3085	1669x2945	933x2650	400	2221	2221	-
500	21817	12841	54000	31783	2587	2587	1889	3585	1669x3445	933x3150	500	2221	2221	-
650	28725	16907	71400	42025	2587	2587	2366	3697	2146x3557	933x3250	650	2221	2221	-

L* - air supply side length in configuration with a liquid trap behind a cooler

Vmax - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

* VS 10 ÷ 15 AHUs are available as indoor units only.

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

⚙ Inlet/Outlet configurations of E empty section are presented on page 53.

⚙ Inlet/Outlet configurations of M mixing box are presented on page 53.

⚙ Dimensions of optional functions are presented on page 53.

🔄 Change of interrelated settings of a heater and a cooler results in changing the code of a specific AHU.

Supply AHUs

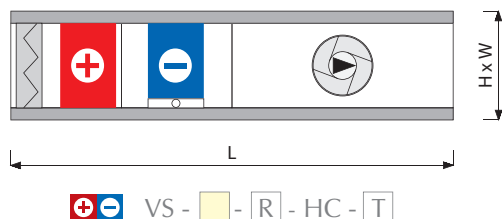
Heating, Cooling

A
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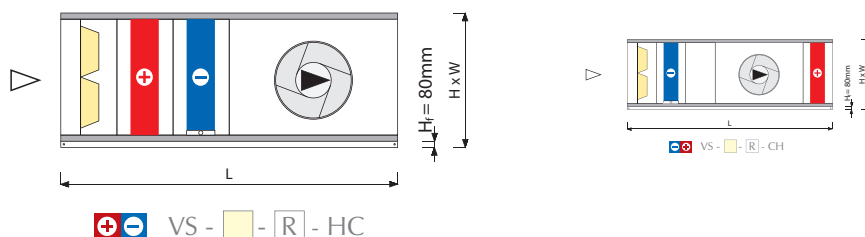
Base AHU



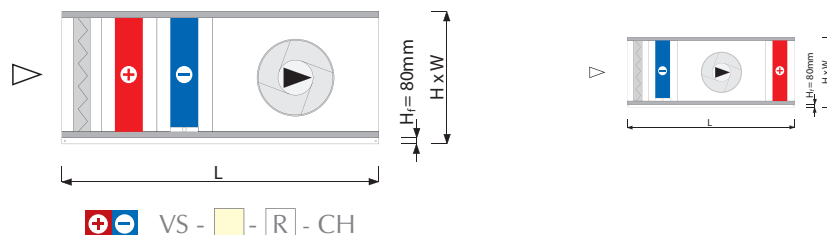
VS 10 ÷ 15 sizes (suspended)*



VS 21 ÷ 650 sizes



VS 21 ÷ 150 sizes COMPACT



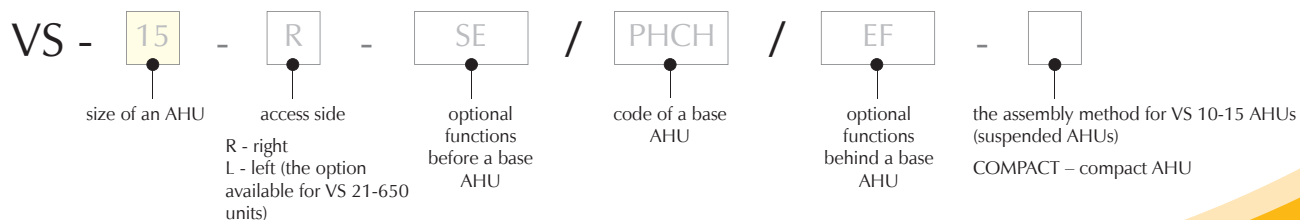
VS	V _{min}		V _{max}		L [mm]	L* [mm]	H [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]	VS COMPACT	L [mm]	L* [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]									
10	436	257	1160	683	1124 / 1490*	-	360	660	220x500	-	10	-	-
15	648	381	1740	1024	1124 / 1490*	-	390	800	250x660	-	15	-	-
21	1167	687	2200	1295	1856	2221	528	961	313x821	250x660	21	1490	1490
30	1586	933	3100	1825	1856	2221	660	961	440x821	380x613	30	1490	1490
40	1958	1152	4100	2413	1856	2221	660	1168	440x1028	440x821	40	1490	1490
55	2878	1694	6054	3563	2221	2587	795	1339	575x1199	440x1028	55	1856	1856
75	3805	2240	8150	4797	2221	2587	915	1480	695x1340	575x1199	75	1856	1856
100	4863	2862	10700	6298	2587	2953	1015	1660	795x1520	695x1340	100	2221	2221
120	5815	3423	13300	7828	2587	2953	1052	1891	832x1751	795x1520	120	2221	2221
150	7167	4218	16400	9653	2587	2953	1153	2085	933x1945	795x1520	150	2221	2221
180	8640	5085	19900	11713	2587	2587	1357	2085	1137x1945	795x1520	180	2221	2221
230	10398	6120	24600	14479	2587	2587	1357	2493	1137x2353	740x1913	230	2221	2221
300	13491	7941	32900	19364	2953	2953	1656	2585	1436x2445	933x1945	300	2587	2587
400	18704	11009	44500	26192	2953	2953	1889	3085	1669x2945	933x2650	400	2587	2587
500	21817	12841	54000	31783	2953	2953	1889	3585	1669x3445	933x3150	500	2587	2587
650	28725	16907	71400	42025	2953	2953	2366	3697	2146x3557	933x3250	650	2587	2587

L* - air supply side length in configuration with a liquid trap behind a cooler

1124/1490* - L for VS-10 with water heater equals 1124mm, with electric heater - 1490mm

V_{max} - parametres description on page 20

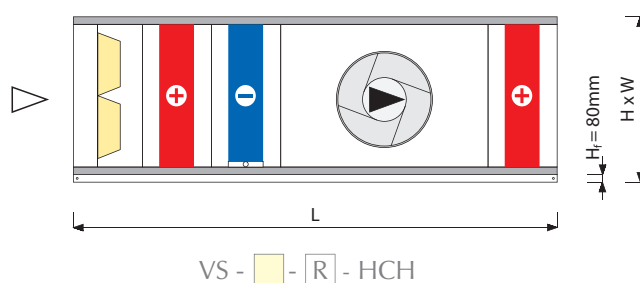
Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



Base AHU



VS 21 ÷ 650 sizes



VS	V _{min}		V _{max}		L [mm]	L* [mm]	H [mm]	W [mm]	h x w [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]					
21	1167	687	2200	1295	2221	2587	528	961	313x821
30	1586	933	3100	1825	2221	2587	660	961	440x821
40	1958	1152	4100	2413	2221	2587	660	1168	440x1028
55	2878	1694	6054	3563	2587	2953	795	1339	575x1199
75	3805	2240	8150	4797	2587	2953	915	1480	695x1340
100	4863	2862	10700	6298	2953	3318	1015	1660	795x1520
120	5815	3423	13300	7828	2953	3318	1052	1891	832x1751
150	7167	4218	16400	9653	2953	3318	1153	2085	933x1945
180	8640	5085	19900	11713	2953	2953	1357	2085	1137x1945
230	10398	6120	24600	14479	2953	2953	1357	2493	1137x2353
300	13491	7941	32900	19364	3318	3318	1656	2585	1436x2445
400	18704	11009	44500	26192	3318	3318	1889	3085	1669x2945
500	21817	12841	54000	31783	3318	3318	1889	3585	1669x3445
650	28725	16907	71400	42025	3318	3318	2366	3697	2146x3557

L* - air supply side length in configuration with a liquid trap behind a cooler

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

* VS 10 ÷ 15 AHUs are available as indoor units only.

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

① Inlet/Outlet configurations of E empty section are presented on page 53.

② Inlet/Outlet configurations of M mixing box are presented on page 53.

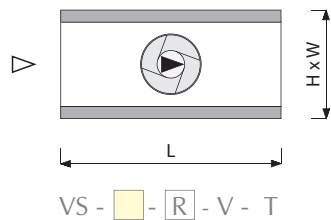
③ Dimensions of optional functions are presented on page 53.

Exhaust AHUs
Ventilation

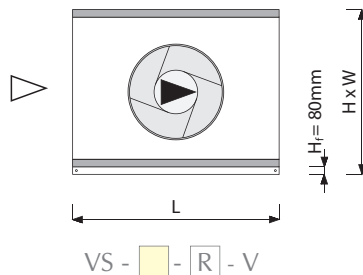
Base AHU

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VS 10÷15 sizes (suspended)*



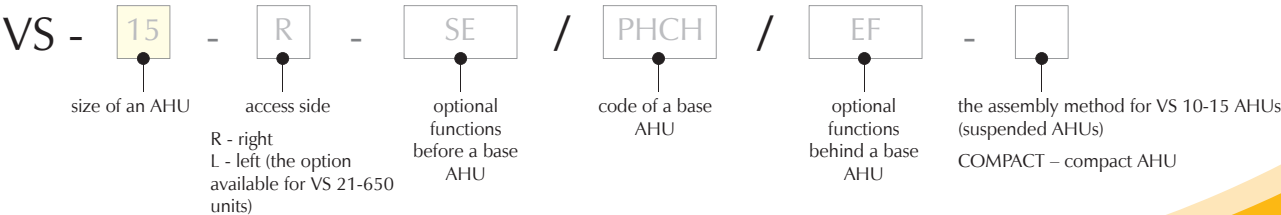
VS 21 ÷ 650 sizes



VS	V _{min}		V _{max}		L [mm]	H [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]					
10	400	235	1960	1154	758	360	660	220x500	-
15	600	353	2840	1672	758	390	800	250x660	-
21	1167	687	4814	2833	758	528	961	313x821	250x660
30	1586	933	6580	3873	758	660	961	440x821	380x613
40	1958	1152	8140	4791	758	660	1168	440x1028	440x821
55	2878	1694	12017	7073	1124	795	1339	575x1199	440x1028
75	3805	2240	15884	9349	1124	915	1480	695x1340	575x1199
100	4863	2862	20346	11975	1490	1015	1660	795x1520	695x1340
120	5815	3423	24295	14300	1490	1052	1891	832x1751	795x1520
150	7167	4218	30014	17666	1490	1153	2085	933x1945	795x1520
180	8640	5085	36231	21325	1490	1357	2085	1137x1945	795x1520
230	10398	6120	43589	25656	1490	1357	2493	1137x2353	740x1913
300	13491	7941	56764	33410	1856	1656	2585	1436x2445	933x1945
400	18704	11009	62646	37068	1856	1889	3085	1669x2945	933x2650
500	21817	12841	91861	54068	1856	1889	3585	1669x3445	933x3150
650	28725	16907	100000	58858	1856	2366	3697	2146x3557	933x3250

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



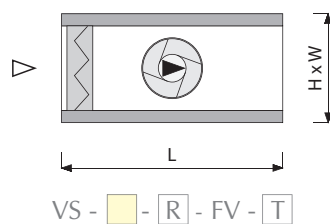
A

84

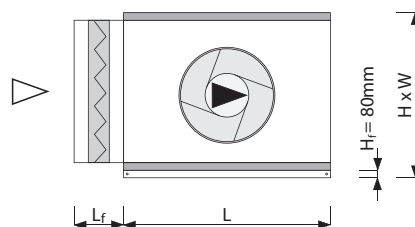
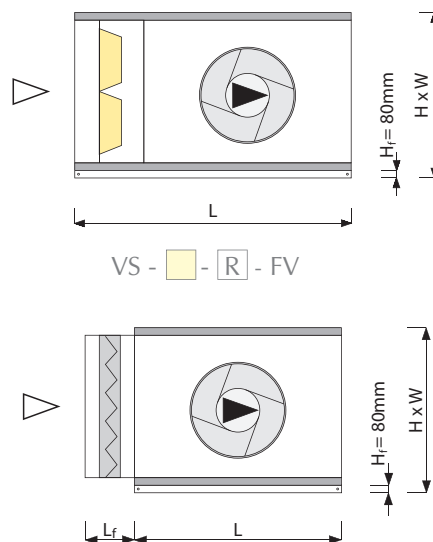
Base AHU



VS 10÷15 sizes (suspended)*



VS 21÷650 sizes



VS	V _{min}		V _{max}		L [mm]	H [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]	VS COMPACT	L [mm]	L _f [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]								
10	400	235	1960	1154	758	360	660	220x500	-	10	-	-
15	600	353	2840	1672	758	390	800	250x660	-	15	-	-
21	1167	687	3658	2153	1124	528	961	313x821	250x660	21	758	96
30	1586	933	5118	3012	1124	660	961	440x821	380x613	30	758	96
40	1958	1152	6700	3943	1124	660	1168	440x1028	440x821	40	758	96
55	2878	1694	9720	5721	1490	795	1339	575x1199	440x1028	55	1124	96
75	3805	2240	13470	7928	1490	915	1480	695x1340	575x1199	75	1124	96
100	4863	2862	17620	10371	1856	1015	1660	795x1520	695x1340	100	1490	96
120	5815	3423	21410	12601	1856	1052	1891	832x1751	795x1520	120	1490	96
150	7167	4218	26558	15632	1856	1153	2085	933x1945	795x1520	150	1490	96
180	8640	5085	32246	18979	1856	1357	2085	1137x1945	795x1520	180	1490	-
230	10398	6120	39630	23325	1856	1357	2493	1137x2353	740x1913	230	1490	-
300	13491	7941	53010	31201	2221	1656	2585	1436x2445	933x1945	300	1490	-
400	18704	11009	62646	36872	2221	1889	3085	1669x2945	933x2650	400	1490	-
500	21817	12841	79350	46704	2221	1889	3585	1669x3445	933x3150	500	1490	-
650	28725	16907	100000	58858	2221	2366	3697	2146x3557	933x3250	650	1490	-

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21÷650 delivered in sections).

* VS 10÷15 AHUs are available as indoor units only.

** Optional functions are available for VS 21÷650 AHUs only.

*** Optional function is available for VS 10÷650 AHUs (VS 10÷15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

🔊 Inlet/Outlet configurations of E empty section are presented on page 53.

🔊 Inlet/Outlet configurations of M mixing box are presented on page 53.

🔊 Dimensions of optional functions are presented on page 53.

🔊 Applying a priority air treatment function.

Supply-exhaust AHUs: cross-flow exchanger

Ventilation

Base AHU

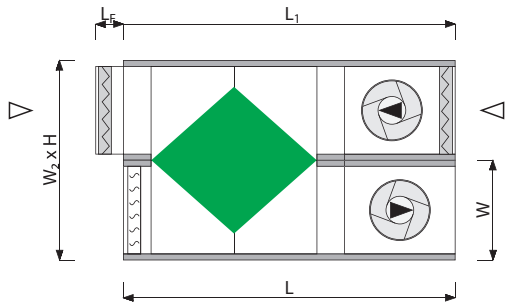


VS 10÷15 sizes (suspended)*

A

86

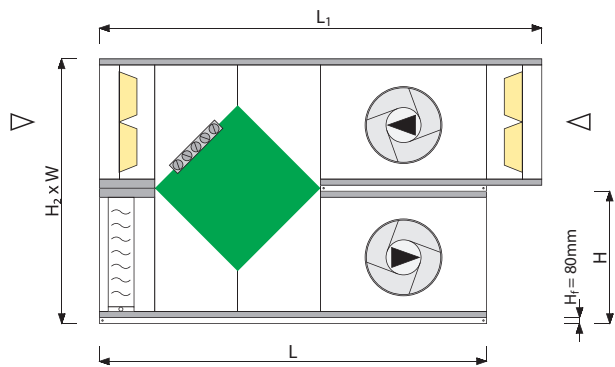
88



VS - - R - P - T

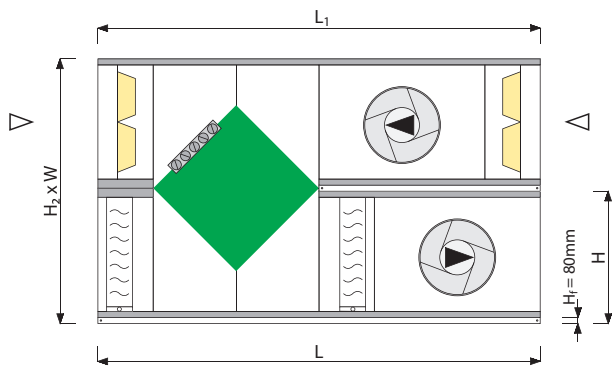


VS 21 ÷ 650 sizes
Heat recovery option: only winter



VS - - R - P

Heat recovery option: winter and summer



VS - - R - P

VS	V _{min}		V _{max}		L		L ₁ [mm]	H [mm]	H ₂ [mm]	W [mm]	W ₂ [mm]	h x w [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]						
10	436	257	1655	974	1883	1883	1883	360	-	660	1330	220x500
15	648	381	2462	1449	2248	2248	2614	390	-	800	1610	250x660
21	1167	687	3089	1818	1856	2221	2221	528	976	961	-	313x821
30	1586	933	4322	2544	1856	2221	2221	660	1240	961	-	440x821
40	1958	1152	5661	3332	1856	2221	2221	660	1240	1168	-	440x1028
55	2878	1694	8216	4836	2587	2953	2953	795	1510	1339	-	575x1199
75	3805	2240	11379	6697	2587	2953	2953	915	1750	1480	-	695x1340
100	4863	2862	13500	7946	2953	3318	3318	1015	1950	1660	-	795x1520
120	5815	3423	18079	10641	2953	3318	3318	1052	2024	1891	-	832x1751
150	7167	4218	22427	13200	3318	3684	3684	1153	2226	2085	-	933x1945
180	8640	5085	27230	16027	3318	3684	3684	1357	2714	2085	-	1137x1945
230	10398	6120	33467	19698	3318	3684	3684	1357	2714	2493	-	1137x2353
300	13491	7941	44767	26349	4415	4781	4781	1656	3312	2585	-	1436x2445
400	18704	11009	60500	35609	4415	4781	4781	1889	3778	3085	-	1669x2945
500	21817	12841	67600	39788	4415	4781	4781	1889	3778	3585	-	1669x3445
650	28725	16907	97200	57210	5147	5513	5513	2366	4732	3697	-	2146x3557

L – unit length

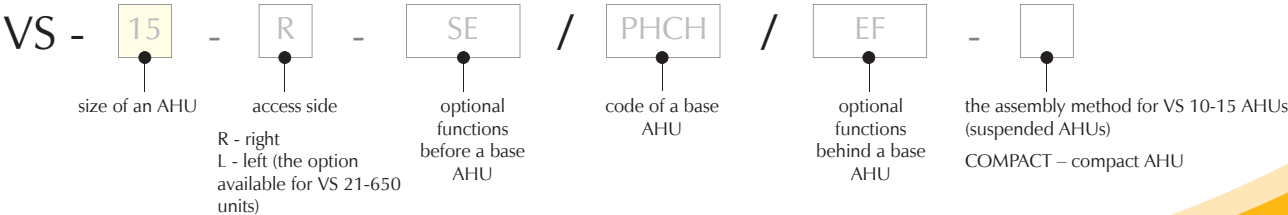
(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

L_F = 95mm

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



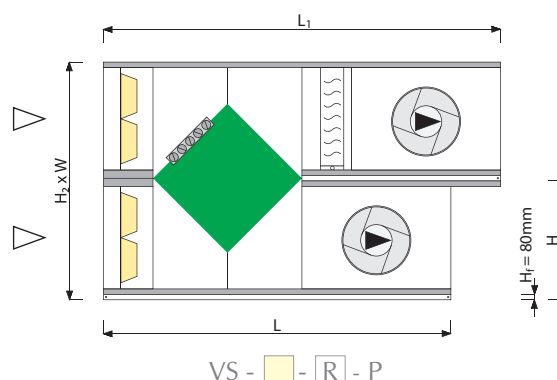
A

Base AHU

86
88

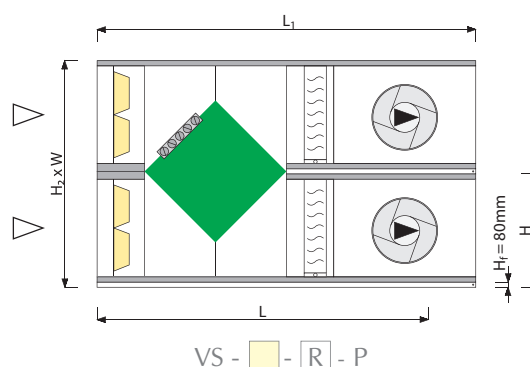

VS 21 ÷ 650 sizes

Heat recovery option: only winter



VS 21 ÷ 650 sizes

Heat recovery option: winter and summer



VS	V _{min}		V _{max}		L		L ₁ [mm]	H [mm]	H ₂ [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]						
21	1167	687	3089	1818	1856	2221	2221	528	976	961	313x821	250x660
30	1586	933	4322	2544	1856	2221	2221	660	1240	961	440x821	380x613
40	1958	1152	5661	3332	1856	2221	2221	660	1240	1168	440x1028	440x821
55	2878	1694	8216	4836	2587	2953	2953	795	1510	1339	575x1199	440x1028
75	3805	2240	11379	6697	2587	2953	2953	915	1750	1480	695x1340	575x1199
100	4863	2862	13500	7946	2953	3318	3318	1015	1950	1660	795x1520	695x1340
120	5815	3423	18079	10641	2953	3318	3318	1052	2024	1891	832x1751	795x1520
150	7167	4218	22427	13200	3318	3684	3684	1153	2226	2085	933x1945	795x1520
180	8640	5085	27230	16027	3318	3684	3684	1357	2714	2085	1137x1945	795x1520
230	10398	6120	33467	19698	3318	3684	3684	1357	2714	2493	1137x2353	740x1913
300	13491	7941	44767	26349	4415	4781	4781	1656	3312	2585	1436x2445	933x1945
400	18704	11009	60500	35609	4415	4781	4781	1889	3778	3085	1669x2945	933x2650
500	21817	12841	67600	39788	4415	4781	4781	1889	3778	3585	1669x3445	933x3150
650	28725	16907	97200	57210	5147	5513	5513	2366	4732	3697	2146x3557	933x3250

L – unit length

(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

* VS 10 ÷ 15 AHUs are available as indoor units only.

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

Inlet/Outlet configurations of E empty section are presented on page 53.

Inlet/Outlet configurations of M mixing box are presented on page 53.

Dimensions of optional functions are presented on page 53.

Applying a priority air treatment function.

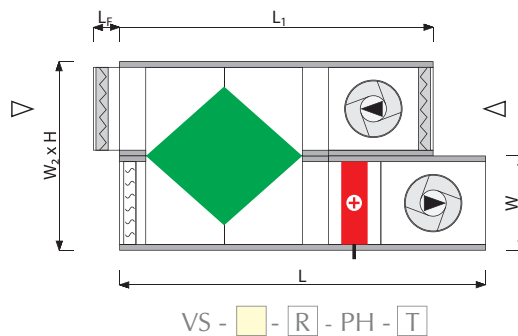
Supply-exhaust AHUs: cross-flow exchanger Heating

Base AHU



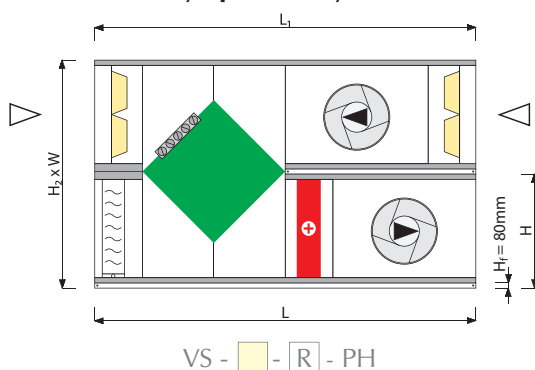
VS 10÷15 sizes (suspended)*

A
86
88

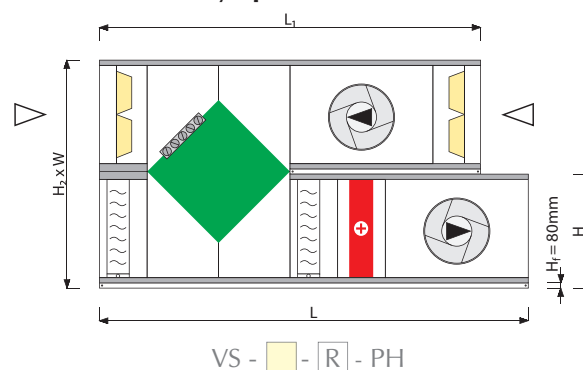


VS 21÷650 sizes

Heat recovery option: only winter



Heat recovery option: winter and summer



VS	V _{min}		V _{max}		L		L ₁ [mm]	H [mm]	H ₂ [mm]	W [mm]	W ₂ [mm]	h x w [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]						
10	436	257	1655	974	1883/2248*	1883/2248*	1883	360	-	660	1330	220x500
15	648	381	2462	1449	2248/2614*	2248/2614*	2614	390	-	800	1610	250x660
21	1167	687	3089	1818	2221	2587	2221	528	976	961	-	313x821
30	1586	933	4322	2544	2221	2587	2221	660	1240	961	-	440x821
40	1958	1152	5661	3332	2221	2587	2221	660	1240	1168	-	440x1028
55	2878	1694	8216	4836	2953	3318	2953	795	1510	1339	-	575x1199
75	3805	2240	11379	6697	2953	3318	2953	915	1750	1480	-	695x1340
100	4863	2862	13500	7946	3318	3684	3318	1015	1950	1660	-	795x1520
120	5815	3423	18079	10641	3318	3684	3318	1052	2024	1891	-	832x1751
150	7167	4218	22427	13200	3684	4050	3684	1153	2226	2085	-	933x1945
180	8640	5085	27230	16027	3684	4050	3684	1357	2714	2085	-	1137x1945
230	10398	6120	33467	19698	3684	4050	3684	1357	2714	2493	-	1137x2353
300	13491	7941	44767	26349	4781	5147	4781	1656	3312	2585	-	1436x2445
400	18704	11009	60500	35609	4781	5147	4781	1889	3778	3085	-	1669x2945
500	21817	12841	67600	39788	4781	5147	4781	1889	3778	3585	-	1669x3445
650	28725	16907	97200	57210	5513	5878	5513	2366	4732	3697	-	2146x3557

1883/2248* - for water heater L= 1883 mm, for electric heater L=2248 mm
2248/2614* - for water heater L=2248, for electric heater L= 2614

L – unit length

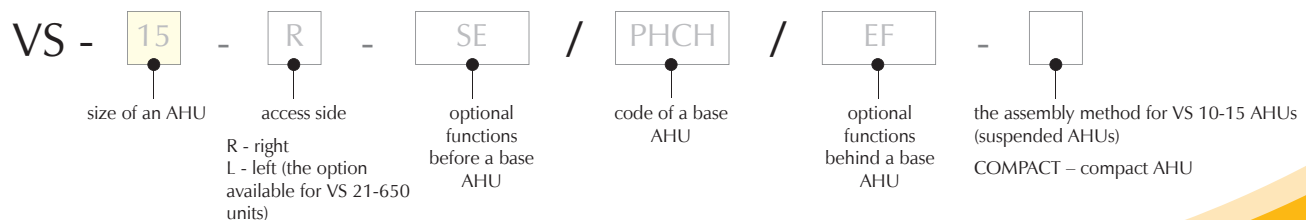
(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

L_F = 95mm

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21÷650 delivered in sections).



Supply-exhaust AHUs: cross-flow exchanger

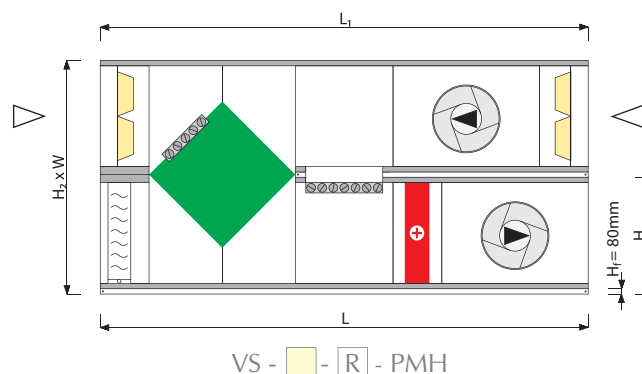
Mixing box, Heating

Base AHU



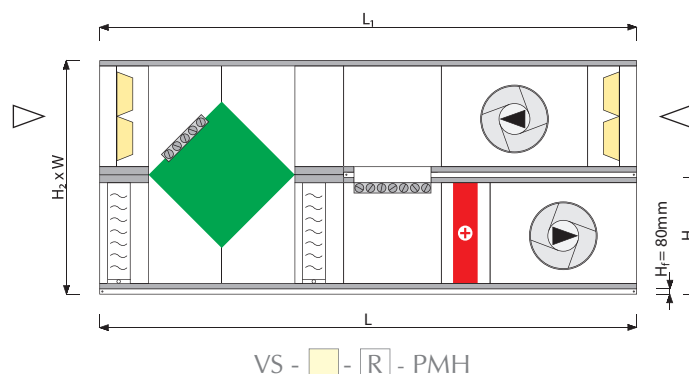
VS 21 ÷ 650 sizes

Heat recovery option: only winter



VS 21 ÷ 650 sizes

Heat recovery option: winter and summer



VS	Vmin		Vmax		L		L1		H	H2	W	h x w [mm]
	[m³/h]	[CFM]	[m³/h]	[CFM]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]				
21	1167	687	3089	1818	2953	3318	2953	3318	528	976	961	313x821
30	1586	933	4322	2544	2953	3318	2953	3318	660	1240	961	440x821
40	1958	1152	5661	3332	2953	3318	2953	3318	660	1240	1168	440x1028
55	2878	1694	8216	4836	3684	4050	3684	4050	795	1510	1339	575x1199
75	3805	2240	11379	6697	3684	4050	3684	4050	915	1750	1480	695x1340
100	4863	2862	13500	7946	4050	4415	4050	4415	1015	1950	1660	795x1520
120	5815	3423	18079	10641	4050	4415	4050	4415	1052	2024	1891	832x1751
150	7167	4218	22427	13200	4781	5147	4781	5147	1153	2226	2085	933x1945
180	8640	5085	27230	16027	4781	5147	4781	5147	1357	2714	2085	1137x1945
230	10398	6120	33467	19698	4781	5147	4781	5147	1357	2714	2493	1137x2353
300	13491	7941	44767	26349	5878	6244	5878	6244	1656	3312	2585	1436x2445
400	18704	11009	60500	35609	5878	6244	5878	6244	1889	3778	3085	1669x2945
500	21817	12841	67600	39788	5878	6244	5878	6244	1889	3778	3585	1669x3445
650	28725	16907	97200	57210	6610	6975	6610	6975	2366	4732	3697	2146x3557

L1 – unit length

(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

Vmax - Parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

* VS 10 ÷ 15 AHUs are available as indoor units only.

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

🌀 Inlet/Outlet configurations of E empty section are presented on page 53.

🌀 Inlet/Outlet configurations of M mixing box are presented on page 53.

🌀 Dimensions of optional functions are presented on page 53.

🌀 Applying a priority air treatment function.

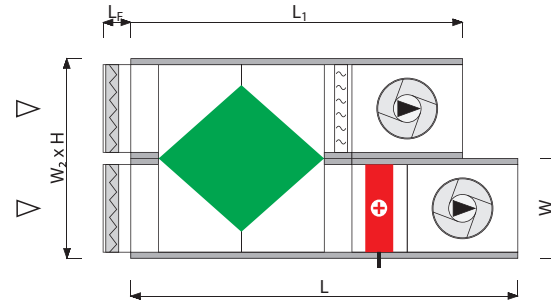
Supply-exhaust AHUs: cross-flow exchanger Heating

Base AHU



VS 10÷15 sizes (suspended)*

A
86
88

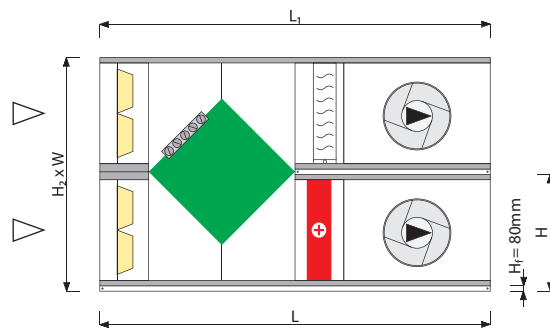


VS - [] - R - PH - []



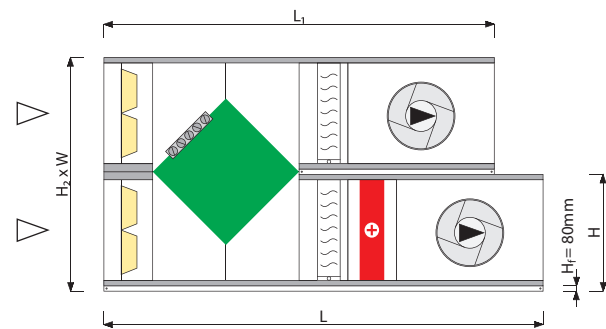
VS 21 ÷ 650 sizes

Heat recovery option: only winter



VS - [] - R - PH

Heat recovery option: winter and summer



VS - [] - R - PH

VS	V _{min}		V _{max}		L		L ₁		H	H ₂	W	W ₂	h x w	h ₁ x w ₁
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]						
10	436	257	1655	974	1883/2248*	1883/2248*	1883	1883	360	-	660	1330	220x500	-
15	648	381	2462	1449	2248/2614*	2248/2614*	2248	2248	390	-	800	1610	250x660	-
21	1167	687	3089	1818	2221	2587	2221	2221	528	976	961	-	313x821	250x660
30	1586	933	4322	2544	2221	2587	2221	2221	660	1240	961	-	440x821	380x613
40	1958	1152	5661	3332	2221	2587	2221	2221	660	1240	1168	-	440x1028	440x821
55	2878	1694	8216	4836	2953	3318	2953	2953	795	1510	1339	-	575x1199	440x1028
75	3805	2240	11379	6697	2953	3318	2953	2953	915	1750	1480	-	695x1340	575x1199
100	4863	2862	13500	7946	3318	3684	3318	3318	1015	1950	1660	-	795x1520	695x1340
120	5815	3423	18079	10641	3318	3684	3318	3318	1052	2024	1891	-	832x1751	795x1520
150	7167	4218	22427	13200	3684	4050	3684	3684	1153	2226	2085	-	933x1945	795x1520
180	8640	5085	27230	16027	3684	4050	3684	3684	1357	2714	2085	-	1137x1945	795x1520
230	10398	6120	33467	19698	3684	4050	3684	3684	1357	2714	2493	-	1137x2353	740x1913
300	13491	7941	44767	26349	4781	5147	4781	4781	1656	3312	2585	-	1436x2445	933x1945
400	18704	11009	60500	35609	4781	5147	4781	4781	1889	3778	3085	-	1669x2945	933x2650
500	21817	12841	67600	39788	4781	5147	4781	4781	1889	3778	3585	-	1669x3445	933x3150
650	28725	16907	97200	57210	5513	5878	5513	5513	2366	4732	3697	-	2146x3557	933x3250

1883/2248* - for water heater L= 1883 mm, for electric heater L=2248 mm
2248/2614* - for water heater L=2248, for electric heater L= 2614

L₁ – unit length

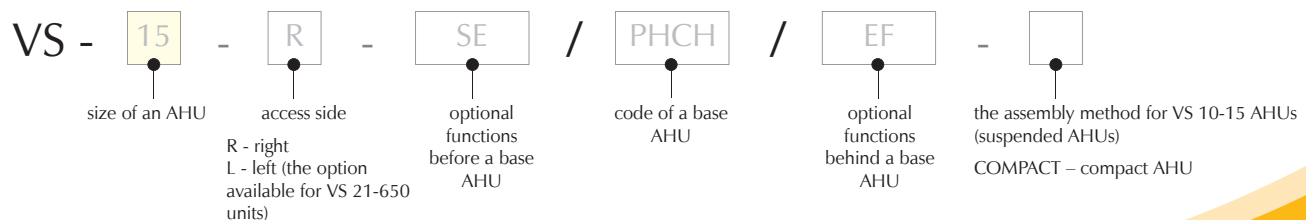
(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

L_F = 95mm

V_{max} - Parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



Supply-exhaust AHUs: cross-flow exchanger Cooling

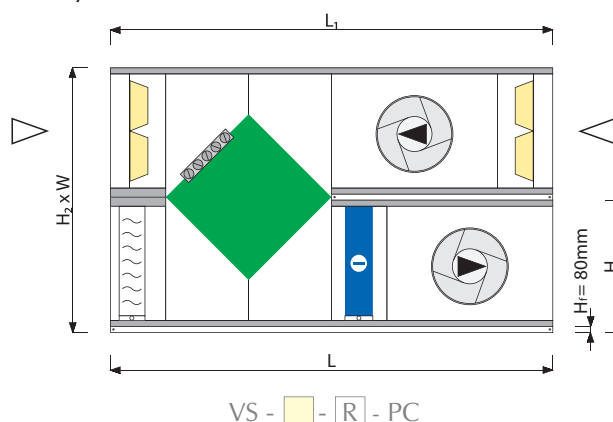
A

Base AHU

87
89

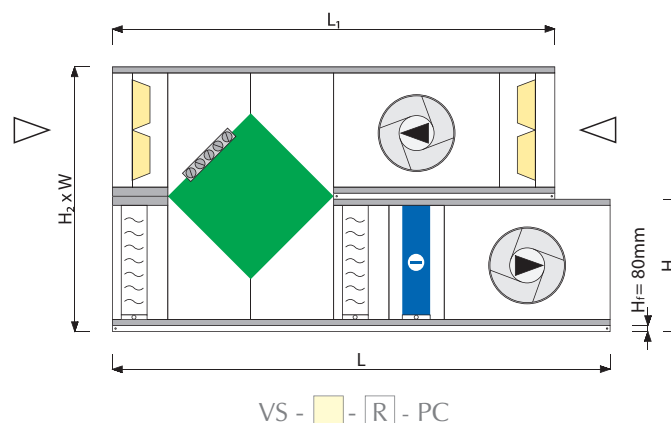

VS 21 ÷ 650 sizes

Heat recovery option: only winter



VS 21 ÷ 650 sizes

Heat recovery option: winter and summer



VS	V _{min}		V _{max}		L		L*		L ₁		H [mm]	H ₂ [mm]	W [mm]	h x w [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]				
21	1167	687	2200	1295	2221	2587	2587	2953	2221	2221	528	976	961	313x821
30	1586	933	3100	1825	2221	2587	2587	2953	2221	2221	660	1240	961	440x821
40	1958	1152	4100	2413	2221	2587	2587	2953	2221	2221	660	1240	1168	440x1028
55	2878	1694	6054	3563	2953	3318	3318	3684	2953	2953	795	1510	1339	575x1199
75	3805	2240	8150	4797	2953	3318	3318	3684	2953	2953	915	1750	1480	695x1340
100	4863	2862	10700	6298	3318	3684	3684	4050	3318	3318	1015	1950	1660	795x1520
120	5815	3423	13300	7828	3318	3684	3684	4050	3318	3318	1052	2024	1891	832x1751
150	7167	4218	16400	9653	3684	4050	4050	4415	3684	3684	1153	2226	2085	933x1945
180	8640	5085	19900	11713	3684	4050	3684	4050	3684	3684	1357	2714	2085	1137x1945
230	10398	6120	24600	14479	3684	4050	3684	4050	3684	3684	1357	2714	2493	1137x2353
300	13491	7941	32900	19364	4781	5147	4781	5147	4781	4781	1656	3312	2585	1436x2445
400	18704	11009	44500	26192	4781	5147	4781	5147	4781	4781	1889	3778	3085	1669x2945
500	21817	12841	54000	31783	4781	5147	4781	5147	4781	4781	1889	3778	3585	1669x3445
650	28725	16907	71400	42025	5513	5878	5513	5878	5513	5513	2366	4732	3697	2146x3557

L₁ – unit length

(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

L* – air supply side length in configuration with a liquid trap behind a cooler

V_{max} – parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

* VS 10 ÷ 15 AHUs are available as indoor units only.

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

● Inlet/Outlet configurations of E empty section are presented on page 53.

● Inlet/Outlet configurations of M mixing box are presented on page 53.

● Dimensions of optional functions are presented on page 53.

■ Applying a priority air treatment function.

Supply-exhaust AHUs: cross-flow exchanger

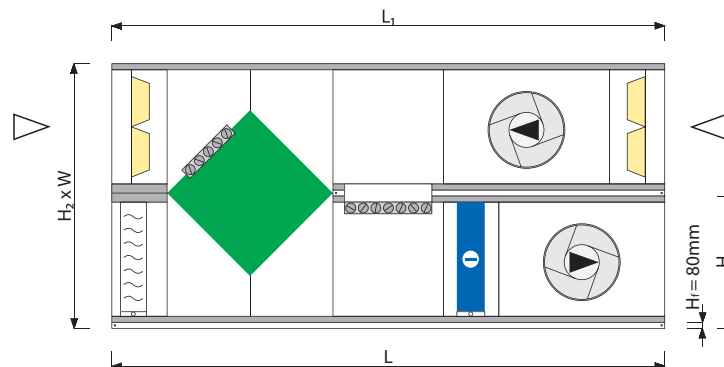
Mixing box, cooling

Base AHU



VS 21 ÷ 650 sizes

Heat recovery option: only winter

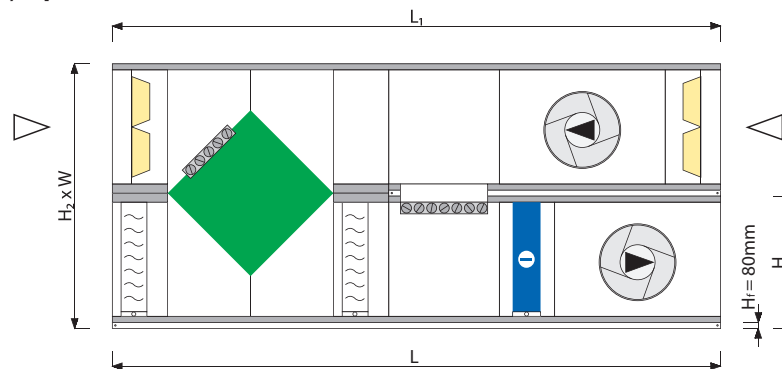


VS - [] - [R] - PMC



VS 21 ÷ 650 sizes

Heat recovery option: winter and summer



VS - [] - [R] - PMC

VS	V _{min}		V _{max}		L		L*		L ₁		H	H ₂	W	h x w
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]				
21	1167	687	2200	1295	2953	3318	3318	3684	2953	3318	528	976	961	313x821
30	1586	933	3100	1825	2953	3318	3318	3684	2953	3318	660	1240	961	440x821
40	1958	1152	4100	2413	2953	3318	3318	3684	2953	3318	660	1240	1168	440x1028
55	2878	1694	6054	3563	3684	4050	4050	4415	3684	4050	795	1510	1339	575x1199
75	3805	2240	8150	4797	3684	4050	4050	4415	3684	4050	915	1750	1480	695x1340
100	4863	2862	10700	6298	4050	4415	4415	4781	4050	4415	1015	1950	1660	795x1520
120	5815	3423	13300	7828	4050	4415	4415	4781	4050	4415	1052	2024	1891	832x1751
150	7167	4218	16400	9653	4781	5147	5147	5513	4781	5147	1153	2226	2085	933x1945
180	8640	5085	19900	11713	4781	5147	4781	5147	4781	5147	1357	2714	2085	1137x1945
230	10398	6120	24600	14479	4781	5147	4781	5147	4781	5147	1357	2714	2493	1137x2353
300	13491	7941	32900	19364	5878	6244	5878	6244	5878	6244	1656	3312	2585	1436x2445
400	18704	11009	44500	26192	5878	6244	5878	6244	5878	6244	1889	3778	3085	1669x2945
500	21817	12841	54000	31783	5878	6244	5878	6244	5878	6244	1889	3778	3585	1669x3445
650	28725	16907	71400	42025	6610	6975	6610	6975	6610	6975	2366	4732	3697	2146x3557

L₁ – unit length

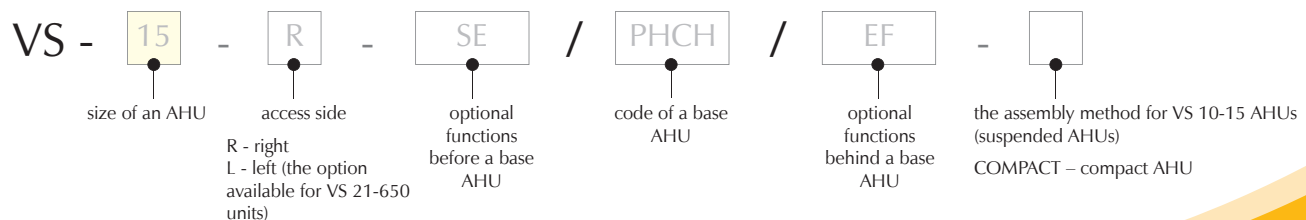
(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

L* – air supply side length in configuration with a liquid trap behind a cooler

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



Supply-exhaust AHUs: cross-flow exchanger Cooling

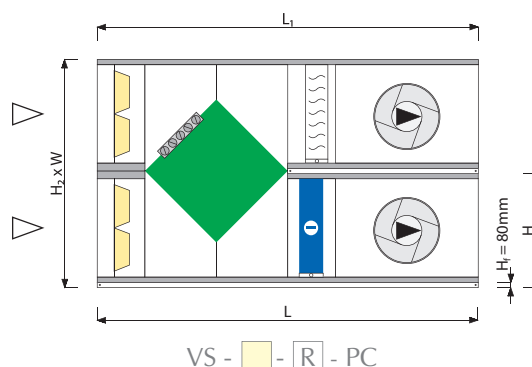
A

Base AHU

87
89

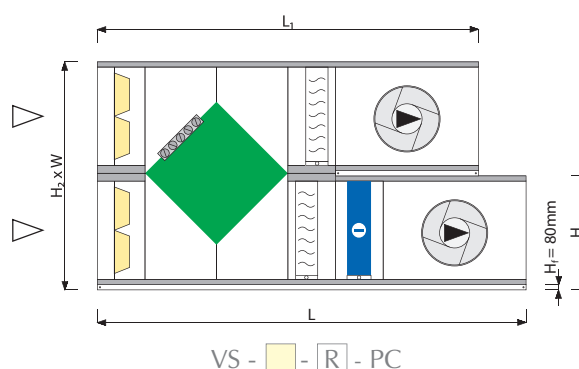

VS 21 ÷ 650 sizes

Heat recovery option: only winter



VS 21 ÷ 650 sizes

Heat recovery option: winter and summer



VS	V _{min}		V _{max}		L		L*		L ₁		H [mm]	H ₂ [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]					
21	1167	687	2200	1295	2221	2587	2587	2953	2221	2221	528	976	961	313x821	250x660
30	1586	933	3100	1825	2221	2587	2587	2953	2221	2221	660	1240	961	440x821	380x613
40	1958	1152	4100	2413	2221	2587	2587	2953	2221	2221	660	1240	1168	440x1028	440x821
55	2878	1694	6054	3563	2953	3318	3318	3684	2953	2953	795	1510	1339	575x1199	440x1028
75	3805	2240	8150	4797	2953	3318	3318	3684	2953	2953	915	1750	1480	695x1340	575x1199
100	4863	2862	10700	6298	3318	3684	3684	4050	3318	3318	1015	1950	1660	795x1520	695x1340
120	5815	3423	13300	7828	3318	3684	3684	4050	3318	3318	1052	2024	1891	832x1751	795x1520
150	7167	4218	16400	9653	3684	4050	4050	4415	3684	3684	1153	2226	2085	933x1945	795x1520
180	8640	5085	19900	11713	3684	4050	3684	4050	3684	3684	1357	2714	2085	1137x1945	795x1520
230	10398	6120	24600	14479	3684	4050	3684	4050	3684	3684	1357	2714	2493	1137x2353	740x1913
300	13491	7941	32900	19364	4781	5147	4781	5147	4781	4781	1656	3312	2585	1436x2445	933x1945
400	18704	11009	44500	26192	4781	5147	4781	5147	4781	4781	1889	3778	3085	1669x2945	933x2650
500	21817	12841	54000	31783	4781	5147	4781	5147	4781	4781	1889	3778	3585	1669x3445	933x3150
650	28725	16907	71400	42025	5513	5878	5513	5878	5513	5513	2366	4732	3697	2146x3557	933x3250

L₁ – unit length

(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

L* – air supply side length in configuration with a liquid trap behind a cooler

V_{max} – parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

* VS 10 ÷ 15 AHUs are available as indoor units only.

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

① Inlet/Outlet configurations of E empty section are presented on page 53.

② Inlet/Outlet configurations of M mixing box are presented on page 53.

③ Dimensions of optional functions are presented on page 53.

④ Applying a priority air treatment function.

⑤ Change of interrelated settings of a heater and a cooler results in changing the code of a specific AHU.

Supply-exhaust AHUs: cross-flow exchanger

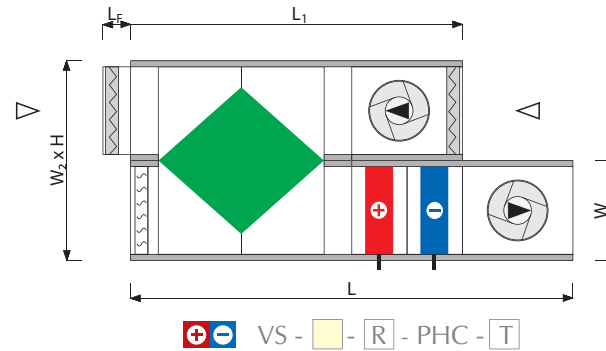
Heating, Cooling

Base AHU



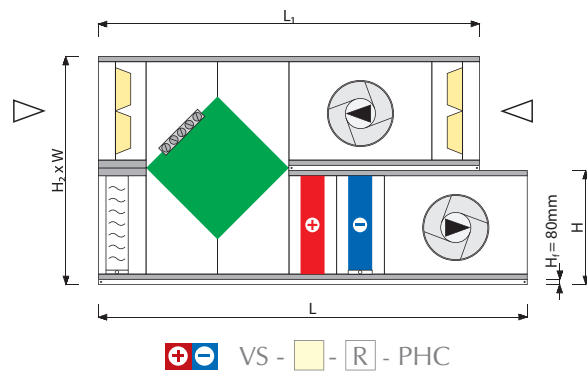
VS 10÷15 sizes (suspended)*

A
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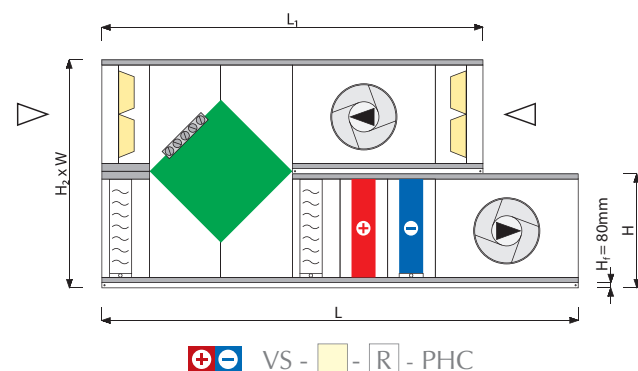


VS 21 ÷ 650 sizes

Heat recovery option: only winter



Heat recovery option: winter and summer



VS	V _{min}		V _{max}		L		L*		L ₁		H	H ₂	W	W ₂	h x w
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]					
10	436	257	1160	683	2248	2248	1883	1883	2248	2248	360	-	660	1330	220x500
15	648	381	1740	1024	2980	2980	2248	2248	2248	2248	390	-	800	1610	250x660
21	1167	687	2200	1295	2587	2953	2953	3318	2221	2221	528	976	961	-	313x821
30	1586	933	3100	1825	2587	2953	2953	3318	2221	2221	660	1240	961	-	440x821
40	1958	1152	4100	2413	2587	2953	2953	3318	2221	2221	660	1240	1168	-	440x1028
55	2878	1694	6054	3563	3318	3684	3684	4050	2953	2953	795	1510	1339	-	575x1199
75	3805	2240	8150	4797	3318	3684	3684	4050	2953	2953	915	1750	1480	-	695x1340
100	4863	2862	10700	6298	3684	4050	4050	4415	3318	3318	1015	1950	1660	-	795x1520
120	5815	3423	13300	7828	3684	4050	4050	4415	3318	3318	1052	2024	1891	-	832x1751
150	7167	4218	16400	9653	4050	4415	4415	4781	3684	3684	1153	2226	2085	-	933x1945
180	8640	5085	19900	11713	4050	4415	4050	4415	3684	3684	1357	2714	2085	-	1137x1945
230	10398	6120	24600	14479	4050	4415	4050	4415	3684	3684	1357	2714	2493	-	1137x2353
300	13491	7941	32900	19364	5147	5513	5147	5513	4781	4781	1656	3312	2585	-	1436x2445
400	18704	11009	44500	26192	5147	5513	5147	5513	4781	4781	1889	3778	3085	-	1669x2945
500	21817	12841	54000	31783	5147	5513	5147	5513	4781	4781	1889	3778	3585	-	1669x3445
650	28725	16907	71400	42025	5878	6244	5878	6244	5513	5513	2366	4732	3697	-	2146x3557

L₁ – unit length

(W) – heat recovery only in winter

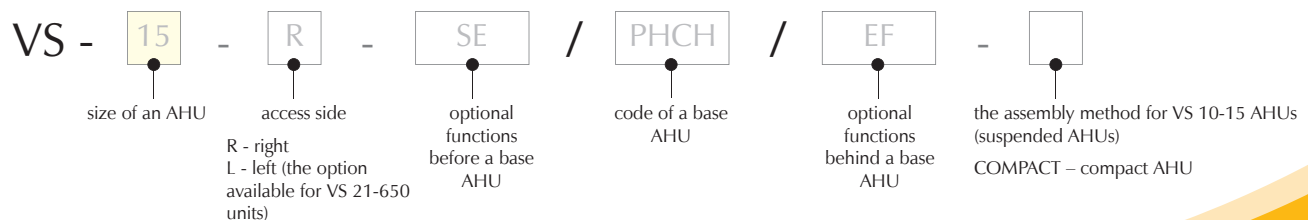
(W+S) – heat recovery in winter and summer

L* – air supply side length in configuration with a liquid trap behind a cooler

L_F = 95mm

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



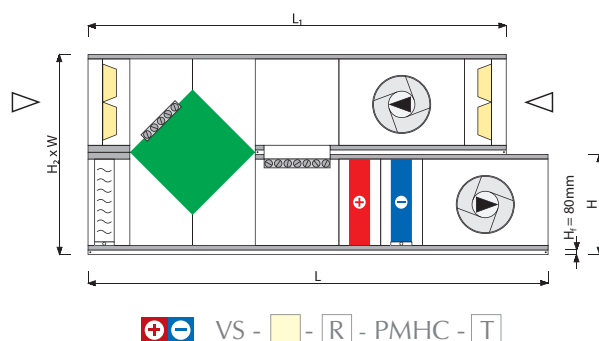
Supply-exhaust AHUs: cross-flow exchanger

Mixing box, Heating, Cooling

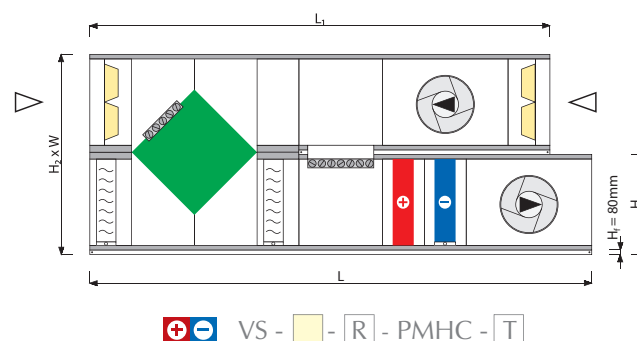
Base AHU



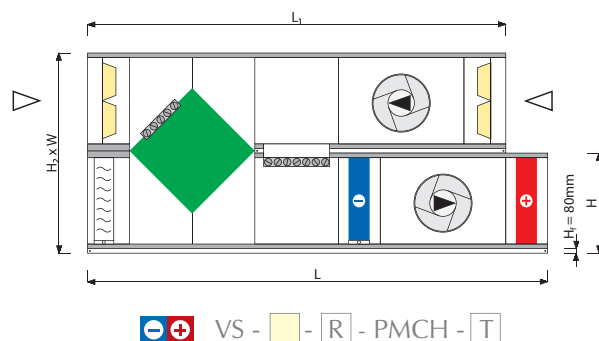
VS 21 ÷ 650 sizes
Heat recovery option: only winter



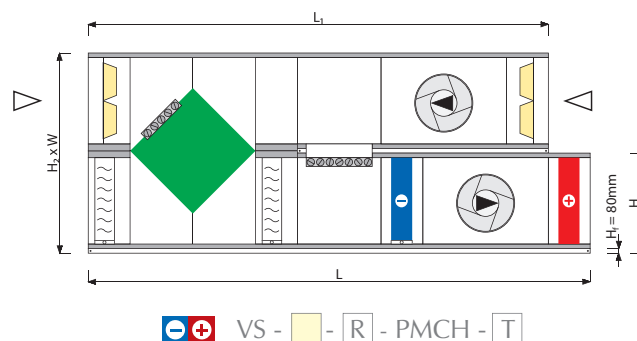
Heat recovery option: winter and summer



VS 21 ÷ 650 sizes
Heat recovery option: only winter



Heat recovery option: winter and summer



VS	V _{min}		V _{max}		L		L*		L ₁		H	H ₂	W	h x w
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]				
21	1167	687	2200	1295	3318	3684	3684	4050	2953	3318	528	976	961	313x821
30	1586	933	3100	1825	3318	3684	3684	4050	2953	3318	660	1240	961	440x821
40	1958	1152	4100	2413	3318	3684	3684	4050	2953	3318	660	1240	1168	440x1028
55	2878	1694	6054	3563	4050	4415	4415	4781	3684	4050	795	1510	1339	575x1199
75	3805	2240	8150	4797	4050	4415	4415	4781	3684	4050	915	1750	1480	695x1340
100	4863	2862	10700	6298	4415	4781	4781	5147	4050	4415	1015	1950	1660	795x1520
120	5815	3423	13300	7828	4415	4781	4781	5147	4050	4415	1052	2024	1891	832x1751
150	7167	4218	16400	9653	5147	5513	5513	5878	4781	5147	1153	2226	2085	933x1945
180	8640	5085	19900	11713	5147	5513	5147	5513	4781	5147	1357	2714	2085	1137x1945
230	10398	6120	24600	14479	5147	5513	5147	5513	4781	5147	1357	2714	2493	1137x2353
300	13491	7941	32900	19364	6244	6610	6244	6610	5878	6244	1656	3312	2585	1436x2445
400	18704	11009	44500	26192	6244	6610	6244	6610	5878	6244	1889	3778	3085	1669x2945
500	21817	12841	54000	31783	6244	6610	6244	6610	5878	6244	1889	3778	3585	1669x3445
650	28725	16907	71400	42025	6975	7341	6975	7341	6610	6975	2366	4732	3697	2146x3557

L₁ – unit length
(W) – heat recovery only in winter
(W+S) – heat recovery in winter and summer
L* – air supply side length in configuration with a liquid trap behind a cooler

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

* VS 10 ÷ 15 AHUs are available as indoor units only.

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

🌀 Inlet/Outlet configurations of E empty section are presented on page 53.

🌀 Inlet/Outlet configurations of M mixing box are presented on page 53.

🌀 Dimensions of optional functions are presented on page 53.

🌀 Applying a priority air treatment function.

🌀 Change of interrelated settings of a heater and a cooler results in changing the code of a specific AHU.

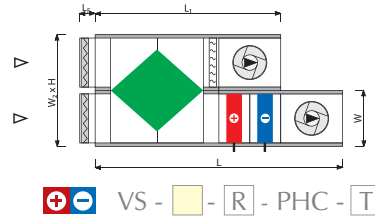
Supply-exhaust AHUs: cross-flow exchanger

Heating, Cooling

Base AHU



VS 10÷15 sizes (suspended)*

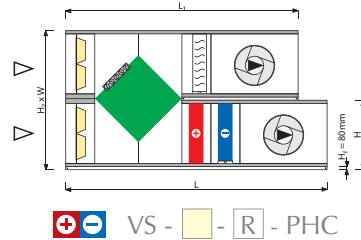


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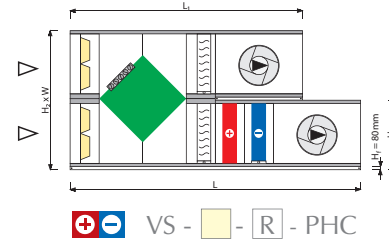


VS 21÷650 sizes

Heat recovery option: only winter

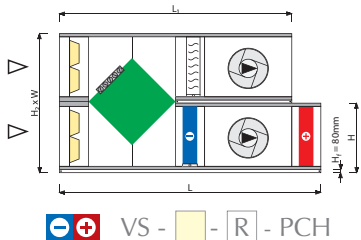


Heat recovery option: winter and summer

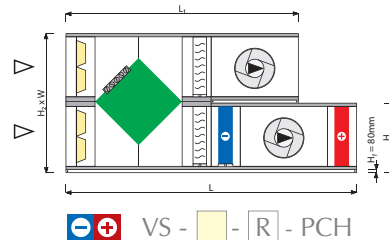


VS 21÷650 sizes

Heat recovery option: only winter



Heat recovery option: winter and summer



VS	V _{min}		V _{max}		L		L*		L ₁		H	H ₂	W	W ₂	h x w	h ₁ x w ₁
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W)	(W+S)	(W)	(W+S)	(W)	(W+S)	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
10	436	257	1160	683	2248	-	-	-	-	-	360	-	660	1330	220x500	-
15	648	381	1740	1024	2980	-	-	-	-	-	390	-	800	1610	250x660	-
21	1167	687	2200	1295	2587	2953	2953	3318	2221	2221	528	976	961	-	313x821	250x660
30	1586	933	3100	1825	2587	2953	2953	3318	2221	2221	660	1240	961	-	440x821	380x613
40	1958	1152	4100	2413	2587	2953	2953	3318	2221	2221	660	1240	1168	-	440x1028	440x821
55	2878	1694	6054	3563	3318	3684	3684	4050	2953	2953	795	1510	1339	-	575x1199	440x1028
75	3805	2240	8150	4797	3318	3684	3684	4050	2953	2953	915	1750	1480	-	695x1340	575x1199
100	4863	2862	10700	6298	3684	4050	4050	4415	3318	3318	1015	1950	1660	-	795x1520	695x1340
120	5815	3423	13300	7828	3684	4050	4050	4415	3318	3318	1052	2024	1891	-	832x1751	795x1520
150	7167	4218	16400	9653	4050	4415	4415	4781	3684	3684	1153	2226	2085	-	933x1945	795x1520
180	8640	5085	19900	11713	4050	4415	4050	4415	3684	3684	1357	2714	2085	-	1137x1945	795x1520
230	10398	6120	24600	14479	4050	4415	4050	4415	3684	3684	1357	2714	2493	-	1137x2353	740x1913
300	13491	7941	32900	19364	5147	5513	5147	5513	4781	4781	1656	3312	2585	-	1436x2445	933x1945
400	18704	11009	44500	26192	5147	5513	5147	5513	4781	4781	1889	3778	3085	-	1669x2945	933x2650
500	21817	12841	54000	31783	5147	5513	5147	5513	4781	4781	1889	3778	3585	-	1669x3445	933x3150
650	28725	16907	71400	42025	5878	6244	5878	6244	5513	5513	2366	4732	3697	-	2146x3557	933x3250

L₁ – unit length

(W) – heat recovery only in winter

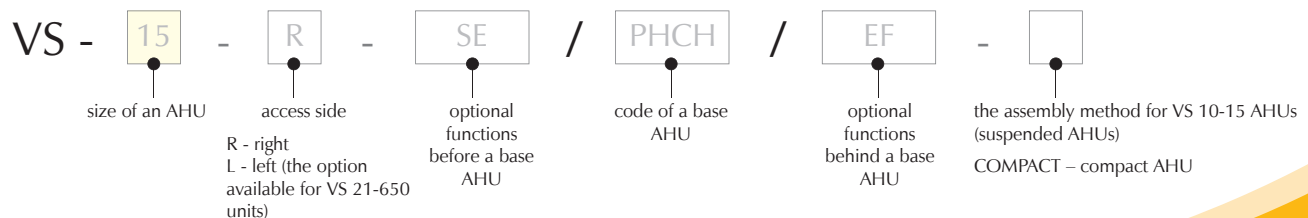
(W+S) – heat recovery in winter and summer

L* – air supply side length in configuration with a liquid trap behind a cooler

L_F = 95mm

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21÷650 delivered in sections).



Supply-exhaust AHUs: cross-flow exchanger

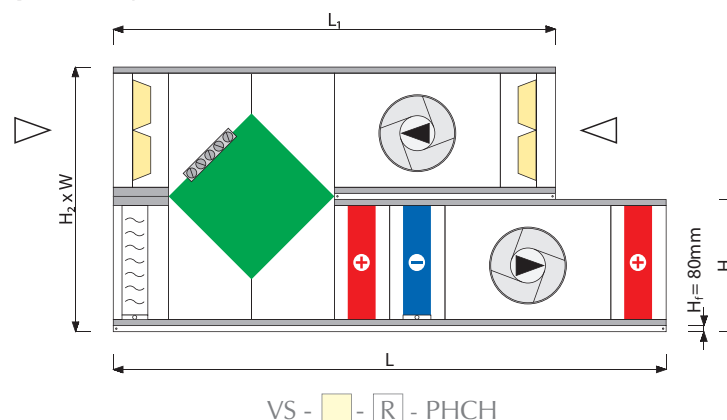
Heating, Cooling, Heating

Base AHU



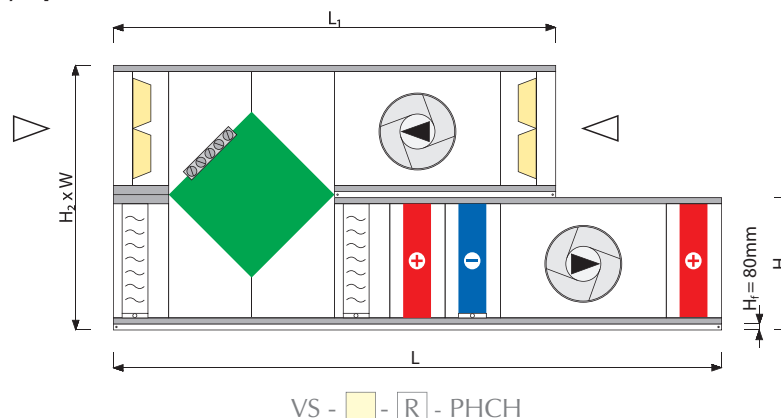
VS 21 ÷ 650 sizes

Heat recovery option: only winter



VS 21 ÷ 650 sizes

Heat recovery option: winter and summer



VS	V _{min}		V _{max}		L		L*		L ₁		H ₂ [mm]	W [mm]	h x w [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]			
21	1167	687	2200	1295	4050	4415	4415	4781	2953	3318	976	961	313x821
30	1586	933	3100	1825	4050	4415	4415	4781	2953	3318	1240	961	440x821
40	1958	1152	4100	2413	4050	4415	4415	4781	2953	3318	1240	1168	440x1028
55	2878	1694	6054	3563	5147	5513	5513	5878	3684	4050	1510	1339	575x1199
75	3805	2240	8150	4797	5147	5513	5513	5878	3684	4050	1750	1480	695x1340
100	4863	2862	10700	6298	5878	6244	6244	6610	4050	4415	1950	1660	795x1520
120	5815	3423	13300	7828	5878	6244	6244	6610	4050	4415	2024	1891	832x1751
150	7167	4218	16400	9653	6244	6610	6610	6975	4415	4781	2226	2085	933x1945
180	8640	5085	19900	11713	6244	6610	6244	6610	4415	4781	2714	2085	1137x1945
230	10398	6120	24600	14479	6244	6610	6244	6610	4415	4781	2714	2493	1137x2353
300	13491	7941	32900	19364	7707	8072	7707	8072	5513	5878	3312	2585	1436x2445
400	18704	11009	44500	26192	7707	8072	7707	8072	5513	5878	3778	3085	1669x2945
500	21817	12841	54000	31783	7707	8072	7707	8072	5513	5878	3778	3585	1669x3445
650	28725	16907	71400	42025	8438	8804	8438	8804	6244	6610	4732	3697	2146x3557

L₁ – unit length

(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

L* – air supply side length in configuration with a liquid trap behind a cooler

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

* VS 10 ÷ 15 AHUs are available as indoor units only.

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

① Inlet/Outlet configurations of E empty section are presented on page 53.

① Inlet/Outlet configurations of M mixing box are presented on page 53.

① Dimensions of optional functions are presented on page 53.

① Applying a priority air treatment function.

Supply-exhaust AHUs: cross-flow exchanger

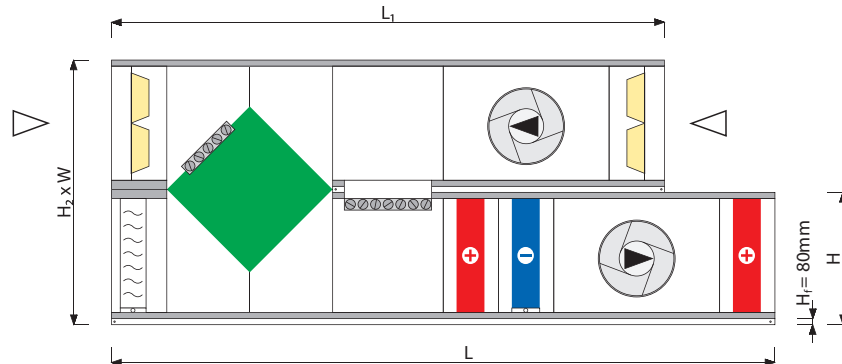
Mixing box, Heating, Cooling, Heating

Base AHU



VS 21 ÷ 650 sizes

Heat recovery option: only winter

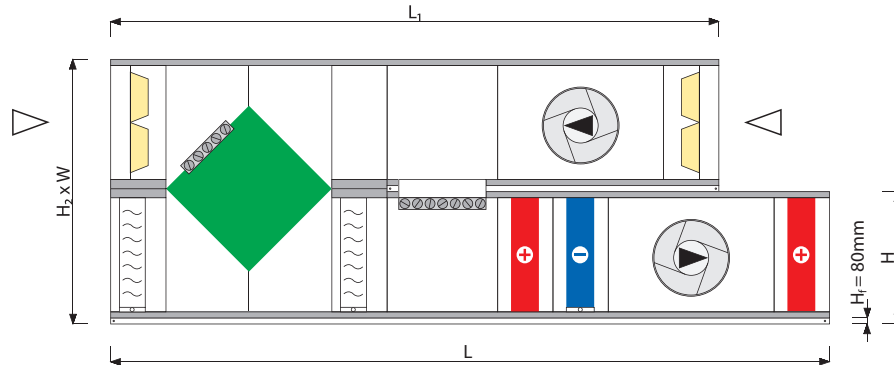


VS - - R - PMHCH



VS 21 ÷ 650 sizes

Heat recovery option: winter and summer



VS - - R - PMHCH

VS	V _{min}		V _{max}		L		L*		L ₁		H	H ₂	W	h x w
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]				
21	1167	687	2200	1295	3684	4050	4050	4415	2953	3318	528	976	961	313x821
30	1586	933	3100	1825	3684	4050	4050	4415	2953	3318	660	1240	961	440x821
40	1958	1152	4100	2413	3684	4050	4050	4415	2953	3318	660	1240	1168	440x1028
55	2878	1694	6054	3563	4415	4781	4781	5147	3684	4050	795	1510	1339	575x1199
75	3805	2240	8150	4797	4415	4781	4781	5147	3684	4050	915	1750	1480	695x1340
100	4863	2862	10700	6298	4781	5147	5147	5513	4050	4415	1015	1950	1660	795x1520
120	5815	3423	13300	7828	4781	5147	5147	5513	4050	4415	1052	2024	1891	832x1751
150	7167	4218	16400	9653	5513	5878	5878	6244	4781	5147	1153	2226	2085	933x1945
180	8640	5085	19900	11713	5513	5878	5513	5878	4781	5147	1357	2714	2085	1137x1945
230	10398	6120	24600	14479	5513	5878	5513	5878	4781	5147	1357	2714	2493	1137x2353
300	13491	7941	32900	19364	6610	6975	6610	6975	5878	6244	1656	3312	2585	1436x2445
400	18704	11009	44500	26192	6610	6975	6610	6975	5878	6244	1889	3778	3085	1669x2945
500	21817	12841	54000	31783	6610	6975	6610	6975	5878	6244	1889	3778	3585	1669x3445
650	28725	16907	71400	42025	7341	7707	7341	7707	6610	6975	2366	4732	3697	2146x3557

L₁ – unit length

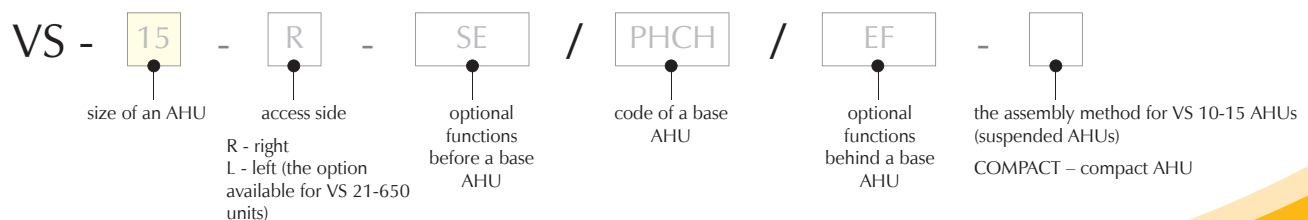
(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

L* – air supply side length in configuration with a liquid trap behind a cooler

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



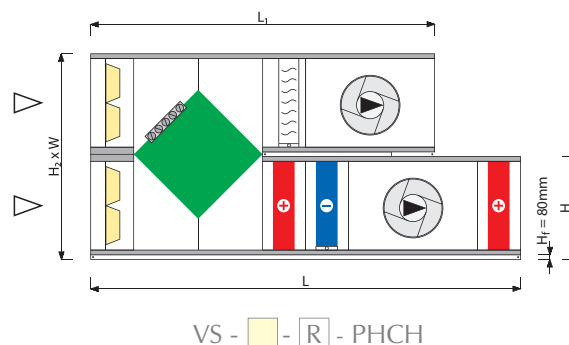
Supply-exhaust AHUs: cross-flow exchanger

Heating, Cooling, Heating

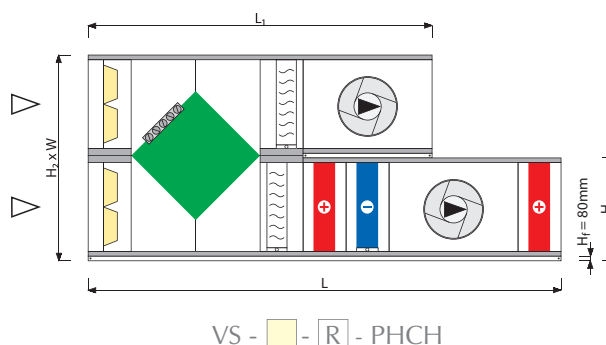
Base AHU



VS 21 ÷ 650 sizes
Heat recovery option: only winter



VS 21 ÷ 650 sizes
Heat recovery option: winter and summer



VS	V _{min}		V _{max}		L		L*		L ₁		H	H ₂	W	h x w	h ₁ x w ₁
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]	(W) [mm]	(W+S) [mm]					
21	1167	687	2200	1295	2953	3318	3318	3684	2221	2221	528	976	961	313x821	250x660
30	1586	933	3100	1825	2953	3318	3318	3684	2221	2221	660	1240	961	440x821	380x613
40	1958	1152	4100	2413	2953	3318	3318	3684	2221	2221	660	1240	1168	440x1028	440x821
55	2878	1694	6054	3563	3684	4050	4050	4415	2953	2953	795	1510	1339	575x1199	440x1028
75	3805	2240	8150	4797	3684	4050	4050	4415	2953	2953	915	1750	1480	695x1340	575x1199
100	4863	2862	10700	6298	4050	4415	4415	4781	3318	3318	1015	1950	1660	795x1520	695x1340
120	5815	3423	13300	7828	4050	4415	4415	4781	3318	3318	1052	2024	1891	832x1751	795x1520
150	7167	4218	16400	9653	4415	4781	4781	5147	3684	3684	1153	2226	2085	933x1945	795x1520
180	8640	5085	19900	11713	4415	4781	4415	4781	3684	3684	1357	2714	2085	1137x1945	795x1520
230	10398	6120	24600	14479	4415	4781	4415	4781	3684	3684	1357	2714	2493	1137x2353	740x1913
300	13491	7941	32900	19364	5513	5878	5513	5878	4781	4781	1656	3312	2585	1436x2445	933x1945
400	18704	11009	44500	26192	5513	5878	5513	5878	4781	4781	1889	3778	3085	1669x2945	933x2650
500	21817	12841	54000	31783	5513	5878	5513	5878	4781	4781	1889	3778	3585	1669x3445	933x3150
650	28725	16907	71400	42025	6244	6610	6244	6610	5513	5513	2366	4732	3697	2146x3557	933x3250

L₁ – unit length

(W) – heat recovery only in winter

(W+S) – heat recovery in winter and summer

L* – air supply side length in configuration with a liquid trap behind a cooler

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

* VS 10 ÷ 15 AHUs are available as indoor units only.

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

🌀 Inlet/Outlet configurations of E empty section are presented on page 53.

🌀 Inlet/Outlet configurations of M mixing box are presented on page 53.

🌀 Dimensions of optional functions are presented on page 53.

🌀 Applying a priority air treatment function.

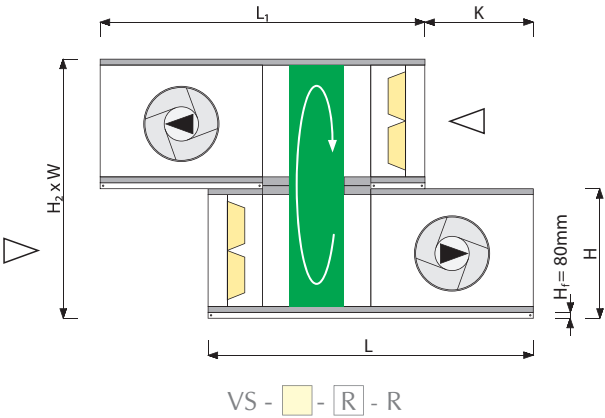
Supply-exhaust AHUs: rotary exchanger
Ventilation

Base AHU

A
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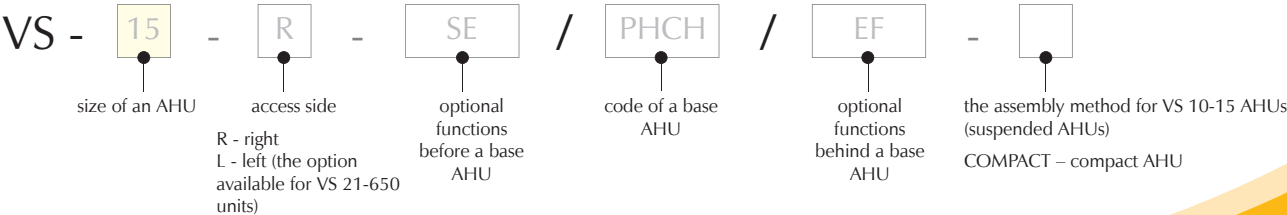
VS 21 ÷ 650 sizes



VS	Vmin		Vmax		L [mm]	L1 [mm]	K [mm]	H [mm]	H2 [mm]	W [mm]	 h x w [mm]	 h1 x w1 [mm]
	[m³/h]	[CFM]	[m³/h]	[CFM]								
21	1193	702	3550	2089	1856	1856	366	528	976	961	313x 821	250x660
30	1586	933	4530	2666	1856	1856	366	660	1240	961	440x 821	380x613
40	2099	1235	6700	3943	1856	1856	366	660	1240	1168	440x 1028	440x821
55	2878	1694	9720	5721	2221	2221	731	795	1510	1339	575x 1199	440x1028
75	3805	2240	12519	7368	2221	2221	731	915	1750	1480	695x 1340	575x1199
100	4863	2862	13550	7975	2587	2587	1097	1015	1950	1660	795x 1520	695x1340
120	5985	3523	20748	12212	2587	2587	1097	1052	2024	1891	832x 1751	795x1520
150	7415	4364	25400	14950	2587	2587	1097	1153	2226	2085	933x 1945	795x1520
180	8640	5085	25707	15131	2587	2587	1097	1357	2714	2085	1137x 1945	795x1520
230	10640	6262	36886	21710	2587	2587	1097	1357	2714	2493	1137x 2353	740x1913
300	13491	7941	40081	23591	2953	2953	1463	1656	3312	2585	1436x 2445	933x1945
400	18704	11009	55594	32722	2953	2953	1463	1889	3778	3085	1669x 2945	933x2650
500	22399	13184	77648	45702	2953	2953	1463	1889	3778	3585	1669x 3445	933x3150
650	28725	16907	83241	48994	2953	2953	1463	2366	4732	3697	2146x 3557	933x3250

Vmax - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



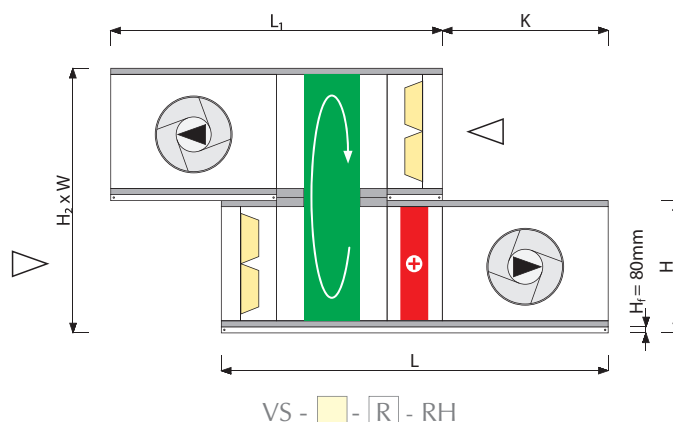
A

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Base AHU



VS 21÷650 sizes



VS	V _{min}		V _{max}		L [mm]	L ₁ [mm]	K [mm]	H [mm]	H ₂ [mm]	W [mm]	 h x w [mm]	 h ₁ x w ₁ [mm]
	[m³/h]	[CFM]	[m³/h]	[CFM]								
21	1193	702	3080	1813	2221	1856	731	528	976	961	313x 821	250x660
30	1586	933	4322	2544	2221	1856	731	660	1240	961	440x 821	380x613
40	2099	1235	5661	3332	2221	1856	731	660	1240	1168	440x 1028	440x821
55	2878	1694	8216	4836	2587	2221	1097	795	1510	1339	575x 1199	440x1028
75	3805	2240	11379	6697	2587	2221	1097	915	1750	1480	695x 1340	575x1199
100	4863	2862	13550	7975	2953	2587	1463	1015	1950	1660	795x 1520	695x1340
120	5985	3523	18079	10641	2953	2587	1463	1052	2024	1891	832x 1751	795x1520
150	7415	4364	22420	13196	2953	2587	1463	1153	2226	2085	933x 1945	795x1520
180	8640	5085	25707	15131	2953	2587	1463	1357	2714	2085	1137x 1945	795x1520
230	10640	6262	33460	19694	2953	2587	1463	1357	2714	2493	1137x 2353	740x1913
300	13491	7941	40081	23591	3318	2953	1829	1656	3312	2585	1436x 2445	933x1945
400	18704	11009	55594	32722	3318	2953	1829	1889	3778	3085	1669x 2945	933x2650
500	22399	13184	74350	43761	3318	2953	1829	1889	3778	3585	1669x 3445	933x3150
650	28725	16907	83241	48994	3318	2953	1829	2366	4732	3697	2146x 3557	933x3250

Vmax - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21÷650 delivered in sections).

** Optional functions are available for VS 21÷650 AHUs only.

*** Optional function is available for VS 10÷650 AHUs (VS 10÷15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

❶ Inlet/Outlet configurations of E empty section are presented on page 53.

● Inlet/Outlet configurations of M mixing box are presented on page 53.

❗ Dimensions of optional functions are presented on page 53.

- Applying a priority air treatment function.

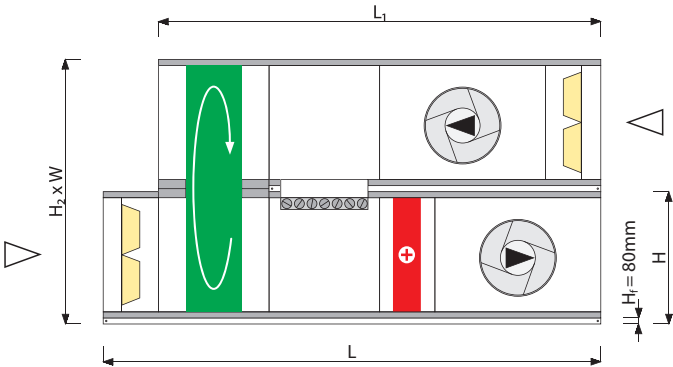
Supply-exhaust AHUs: rotary exchanger

Mixing box, Heating

Base AHU



VS 21 ÷ 650 sizes

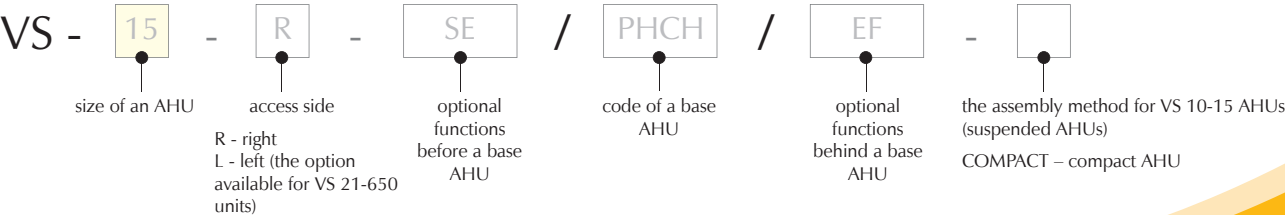


VS - - R - RMH

VS	V _{min}		V _{max}		L [mm]	L ₁ [mm]	H [mm]	H ₂ [mm]	W [mm]	 h x w [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]						
21	1193	702	3080	1813	2953	2587	528	976	961	313x 821
30	1586	933	4322	2544	2953	2587	660	1240	961	440x 821
40	2099	1235	5661	3332	2953	2587	660	1240	1168	440x 1028
55	2878	1694	8216	4836	3318	2953	795	1510	1339	575x 1199
75	3805	2240	11379	6697	3318	2953	915	1750	1480	695x 1340
100	4863	2862	13550	7975	3684	3318	1015	1950	1660	795x 1520
120	5985	3523	18079	10641	3684	3318	1052	2024	1891	832x 1751
150	7415	4364	22420	13196	4050	3684	1153	2226	2085	933x 1945
180	8640	5085	25707	15131	4050	3684	1357	2714	2085	1137x 1945
230	10640	6262	33460	19694	4050	3684	1357	2714	2493	1137x 2353
300	13491	7941	40081	23591	4415	4050	1656	3312	2585	1436x 2445
400	18704	11009	55594	32722	4415	4050	1889	3778	3085	1669x 2945
500	22399	13184	74350	43761	4415	4050	1889	3778	3585	1669x 3445
650	28725	16907	83241	48994	4415	4050	2366	4732	3697	2146x 3557

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



Supply-exhaust AHUs: rotary exchanger Cooling

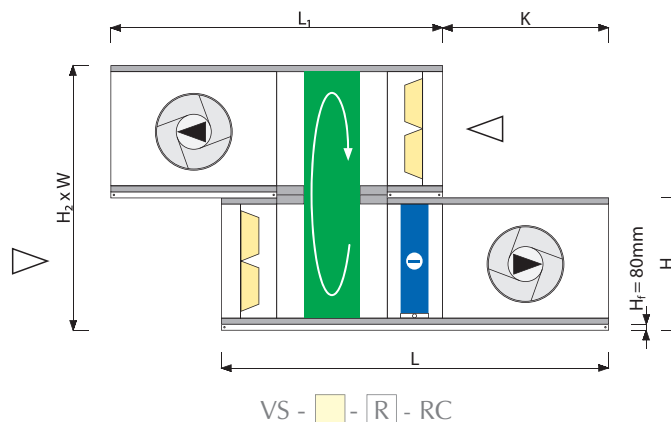
A

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Base AHU



VS 21 ÷ 650 sizes



VS	V _{min}		V _{max}		L [mm]	L* [mm]	L ₁ [mm]	K [mm]	K* [mm]	H [mm]	H ₂ [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]										
21	1193	702	2200	1295	2221	2587	1856	731	1097	528	976	961	313x 821	250x660
30	1586	933	3100	1825	2221	2587	1856	731	1097	660	1240	961	440x 821	380x613
40	2099	1235	4100	2413	2221	2587	1856	731	1097	660	1240	1168	440x 1028	440x821
55	2878	1694	6054	3563	2587	2953	2221	1097	1463	795	1510	1339	575x 1199	440x1028
75	3805	2240	8150	4797	2587	2953	2221	1097	1463	915	1750	1480	695x 1340	575x1199
100	4863	2862	10700	6298	2953	3318	2587	1463	1829	1015	1950	1660	795x 1520	695x1340
120	5985	3523	13300	7828	2953	3318	2587	1463	1829	1052	2024	1891	832x 1751	795x1520
150	7415	4364	16400	9653	2953	3318	2587	1463	1829	1153	2226	2085	933x 1945	795x1520
180	8640	5085	19900	11713	2953	2953	2587	1463	1463	1357	2714	2085	1137x 1945	795x1520
230	10640	6262	24600	14479	2953	2953	2587	1463	1463	1357	2714	2493	1137x 2353	740x1913
300	13491	7941	32900	19364	3318	3318	2953	1829	1829	1656	3312	2585	1436x 2445	933x1945
400	18704	11009	44500	26192	3318	3318	2953	1829	1829	1889	3778	3085	1669x 2945	933x2650
500	22399	13184	54000	31783	3318	3318	2953	1829	1829	1889	3778	3585	1669x 3445	933x3150
650	28725	16907	71400	42025	3318	3318	2953	1829	1829	2366	4732	3697	2146x 3557	933x3250

L* - air supply side length in configuration with a liquid trap behind a cooler

K* - K distance for sets with a liquid trap

Vmax - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

Inlet/Outlet configurations of E empty section are presented on page 53.

Inlet/Outlet configurations of M mixing box are presented on page 53.

Dimensions of optional functions are presented on page 53.

Applying a priority air treatment function.

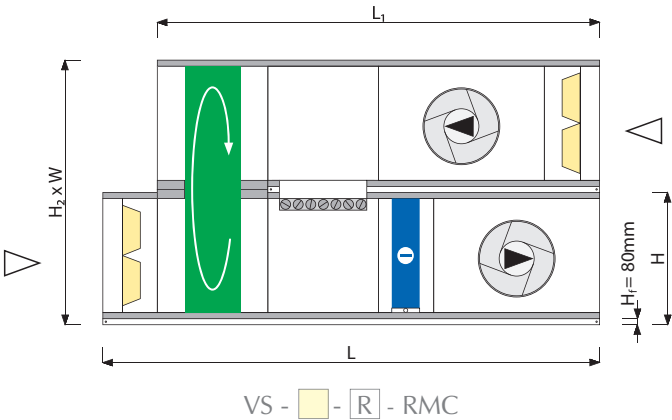
Supply-exhaust AHUs: rotary exchanger

Mixing box, Cooling

Base AHU



VS 21 ÷ 650 sizes

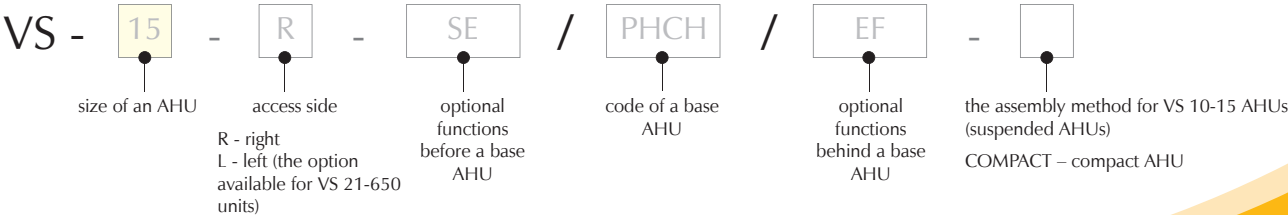


VS	V _{min}		V _{max}		L [mm]	L* [mm]	L ₁ [mm]	K* [mm]	H [mm]	H ₂ [mm]	W [mm]	h x w [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]								
21	1193	702	2200	1295	2953	3318	2587	366	528	976	961	313x 821
30	1586	933	3100	1825	2953	3318	2587	366	660	1240	961	440x 821
40	2099	1235	4100	2413	2953	3318	2587	366	660	1240	1168	440x 1028
55	2878	1694	6054	3563	3318	3684	2953	366	795	1510	1339	575x 1199
75	3805	2240	8150	4797	3318	3684	2953	366	915	1750	1480	695x 1340
100	4863	2862	10700	6298	3684	4050	3318	366	1015	1950	1660	795x 1520
120	5985	3523	13300	7828	3684	4050	3318	366	1052	2024	1891	832x 1751
150	7415	4364	16400	9653	4050	4415	3684	366	1153	2226	2085	933x 1945
180	8640	5085	19900	11713	4050	4050	3684	366	1357	2714	2085	1137x 1945
230	10640	6262	24600	14479	4050	4050	3684	366	1357	2714	2493	1137x 2353
300	13491	7941	32900	19364	4415	4415	4050	366	1656	3312	2585	1436x 2445
400	18704	11009	44500	26192	4415	4415	4050	366	1889	3778	3085	1669x 2945
500	22399	13184	54000	31783	4415	4415	4050	366	1889	3778	3585	1669x 3445
650	28725	16907	71400	42025	4415	4415	4050	366	2366	4732	3697	2146x 3557

L* - air supply side length in configuration with a liquid trap behind a cooler
K* - K distance for sets with a liquid trap

V_{max} - parametres description on page 20

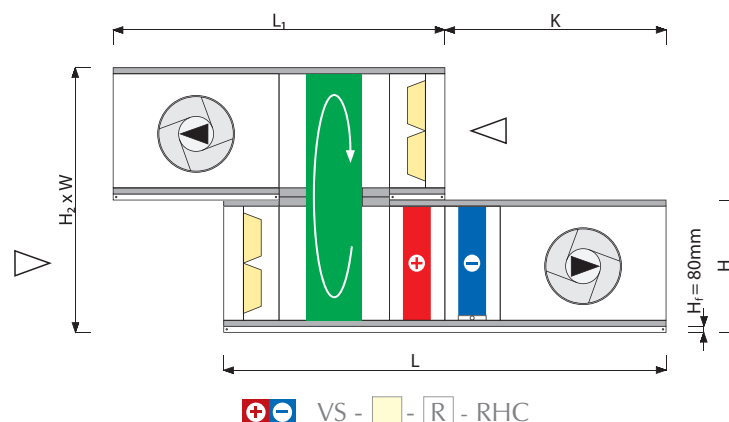
Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



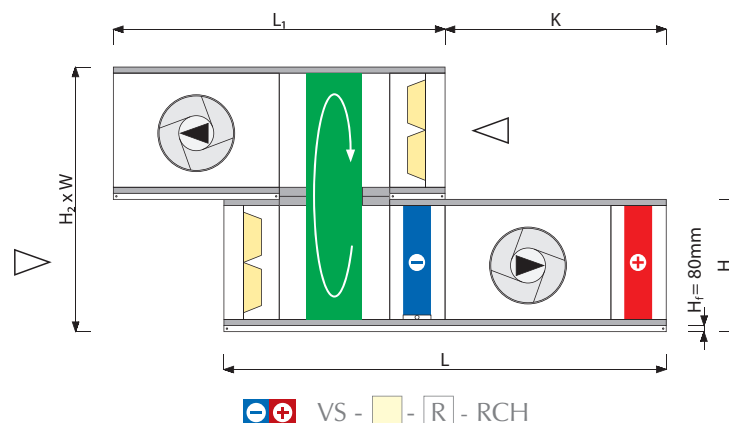
Supply-exhaust AHUs: rotary exchanger

Heating, Cooling

A Base AHU
92 VS 21 ÷ 650 sizes



VS 21 ÷ 650 sizes



VS	V _{min}		V _{max}		L [mm]	L* [mm]	L ₁ [mm]	K [mm]	K* [mm]	H [mm]	H ₂ [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]										
21	1193	702	2200	1295	2587	2953	1856	1097	1463	528	976	961	313x 821	250x660
30	1586	933	3100	1825	2587	2953	1856	1097	1463	660	1240	961	440x 821	380x613
40	2099	1235	4100	2413	2587	2953	1856	1097	1463	660	1240	1168	440x 1028	440x821
55	2878	1694	6054	3563	2953	3318	2221	1463	1829	795	1510	1339	575x 1199	440x1028
75	3805	2240	8150	4797	2953	3318	2221	1463	1829	915	1750	1480	695x 1340	575x1199
100	4863	2862	10700	6298	3318	3684	2587	1829	2194	1015	1950	1660	795x 1520	695x1340
120	5985	3523	13300	7828	3318	3684	2587	1829	2194	1052	2024	1891	832x 1751	795x1520
150	7415	4364	16400	9653	3318	3684	2587	1829	2194	1153	2226	2085	933x 1945	795x1520
180	8640	5085	19900	11713	3318	3318	2587	1829	1829	1357	2714	2085	1137x 1945	795x1520
230	10640	6262	24600	14479	3318	3318	2587	1829	1829	1357	2714	2493	1137x 2353	740x1913
300	13491	7941	32900	19364	3684	3684	2953	2194	2194	1656	3312	2585	1436x 2445	933x1945
400	18704	11009	44500	26192	3684	3684	2953	2194	2194	1889	3778	3085	1669x 2945	933x2650
500	22399	13184	54000	31783	3684	3684	2953	2194	2194	1889	3778	3585	1669x 3445	933x3150
650	28725	16907	71400	42025	3684	3684	2953	2194	2194	2366	4732	3697	2146x 3557	933x3250

L* - air supply side length in configuration with a liquid trap behind a cooler

K* - K distance for sets with a liquid trap

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

① Inlet/Outlet configurations of E empty section are presented on page 53.

② Inlet/Outlet configurations of M mixing box are presented on page 53.

③ Dimensions of optional functions are presented on page 53.

④ Applying a priority air treatment function.

⑤ Change of interrelated settings of a heater and a cooler results in changing the code of a specific AHU.

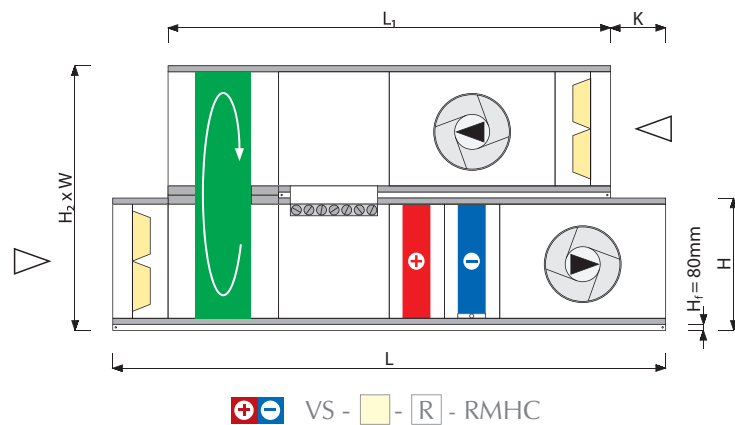
Supply-exhaust AHUs: rotary exchanger

Mixing box, Heating, Cooling

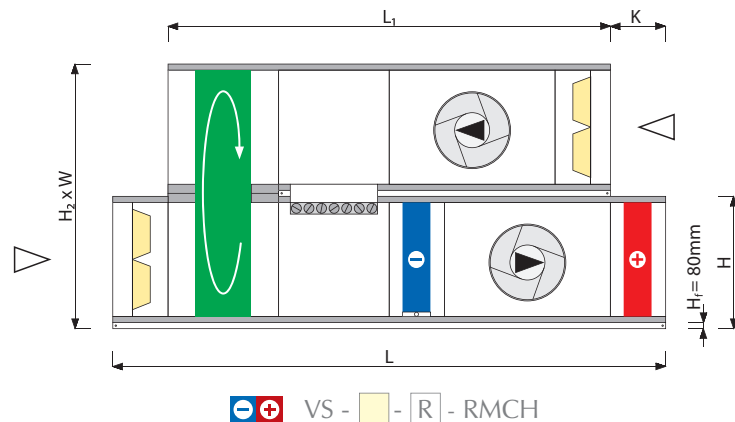
Base AHU



VS 21 ÷ 650 sizes



VS 21 ÷ 650 sizes

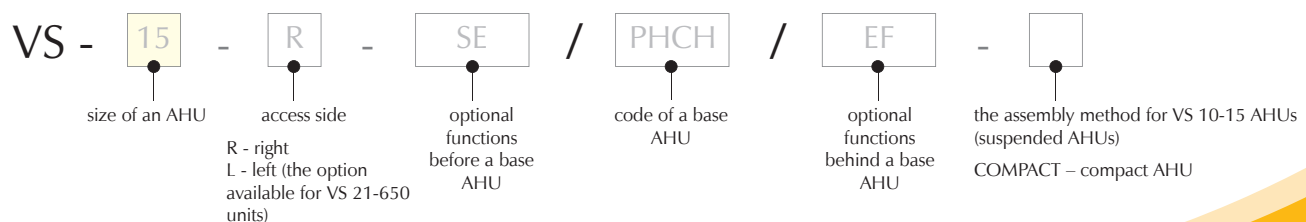


VS	V _{min}		V _{max}		L [mm]	L* [mm]	L ₁ [mm]	K [mm]	K* [mm]	H [mm]	H ₂ [mm]	W [mm]	h x w [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]									
21	1193	702	2200	1295	3318	3684	2587	366	731	528	976	961	313x 821
30	1586	933	3100	1825	3318	3684	2587	366	731	660	1240	961	440x 821
40	2099	1235	4100	2413	3318	3684	2587	366	731	660	1240	1168	440x 1028
55	2878	1694	6054	3563	3684	4050	2953	366	731	795	1510	1339	575x 1199
75	3805	2240	8150	4797	3684	4050	2953	366	731	915	1750	1480	695x 1340
100	4863	2862	10700	6298	4050	4415	3318	366	731	1015	1950	1660	795x 1520
120	5985	3523	13300	7828	4050	4415	3318	366	731	1052	2024	1891	832x 1751
150	7415	4364	16400	9653	4415	4781	3684	366	731	1153	2226	2085	933x 1945
180	8640	5085	19900	11713	4415	4415	3684	366	731	1357	2714	2085	1137x 1945
230	10640	6262	24600	14479	4415	4415	3684	366	731	1357	2714	2493	1137x 2353
300	13491	7941	32900	19364	4781	4781	4050	366	731	1656	3312	2585	1436x 2445
400	18704	11009	44500	26192	4781	4781	4050	366	731	1889	3778	3085	1669x 2945
500	22399	13184	54000	31783	4781	4781	4050	366	731	1889	3778	3585	1669x 3445
650	28725	16907	71400	42025	4781	4781	4050	366	731	2366	4732	3697	2146x 3557

L* - air supply side length in configuration with a liquid trap behind a cooler
K* - K distance for sets with a liquid trap

V_{max} - Parametres description on page 20

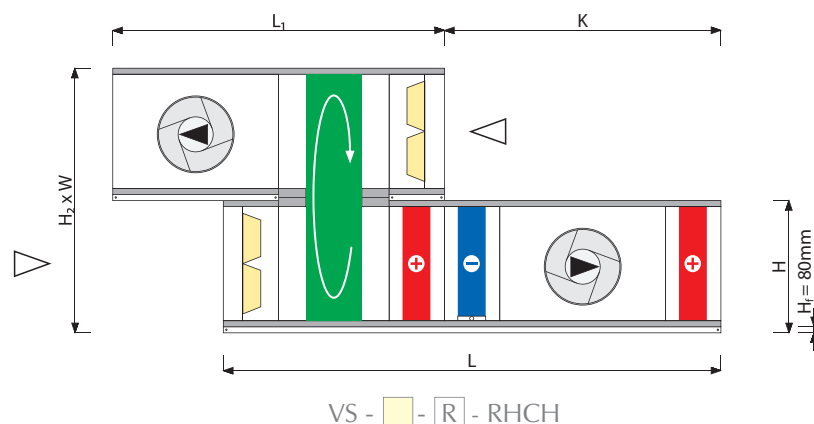
Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



Base AHU



VS 21 ÷ 650 sizes



VS	V _{min}		V _{max}		L [mm]	L* [mm]	L ₁ [mm]	K [mm]	K* [mm]	H [mm]	H ₂ [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]										
21	1193	702	2200	1295	3684	4050	1856	1463	1829	528	976	961	313x 821	250x660
30	1586	933	3100	1825	3684	4050	1856	1463	1829	660	1240	961	440x 821	380x613
40	2099	1235	4100	2413	3684	4050	1856	1463	1829	660	1240	1168	440x 1028	440x821
55	2878	1694	6054	3563	4050	4415	2221	1829	2194	795	1510	1339	575x 1199	440x1028
75	3805	2240	8150	4797	4050	4415	2221	1829	2194	915	1750	1480	695x 1340	575x1199
100	4863	2862	10700	6298	4415	4781	2587	2194	2560	1015	1950	1660	795x 1520	695x1340
120	5985	3523	13300	7828	4415	4781	2587	2194	2560	1052	2024	1891	832x 1751	795x1520
150	7415	4364	16400	9653	4781	5147	2587	2194	2560	1153	2226	2085	933x 1945	795x1520
180	8640	5085	19900	11713	4781	4781	2587	2194	2194	1357	2714	2085	1137x 1945	795x1520
230	10640	6262	24600	14479	4781	4781	2587	2194	2194	1357	2714	2493	1137x 2353	740x1913
300	13491	7941	32900	19364	5147	5147	2953	2560	2560	1656	3312	2585	1436x 2445	933x1945
400	18704	11009	44500	26192	5147	5147	2953	2560	2560	1889	3778	3085	1669x 2945	933x2650
500	22399	13184	54000	31783	5147	5147	2953	2560	2560	1889	3778	3585	1669x 3445	933x3150
650	28725	16907	71400	42025	5147	5147	2953	2560	2560	2366	4732	3697	2146x 3557	933x3250

L* - air supply side length in configuration with a liquid trap behind a cooler

K* - K distance for sets with a liquid trap

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

🌀 Inlet/Outlet configurations of E empty section are presented on page 53.

🌀 Inlet/Outlet configurations of M mixing box are presented on page 53.

🌀 Dimensions of optional functions are presented on page 53.

🌀 Applying a priority air treatment function.

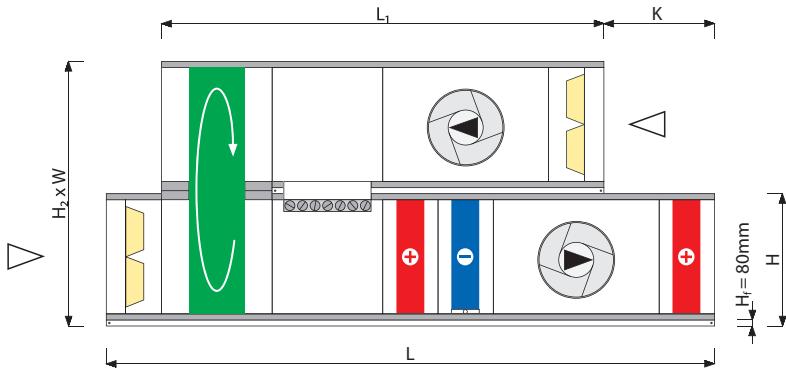
Supply-exhaust AHUs: rotary exchanger

Mixing box, Heating, Cooling, Heating

Base AHU



VS 21 ÷ 650 sizes



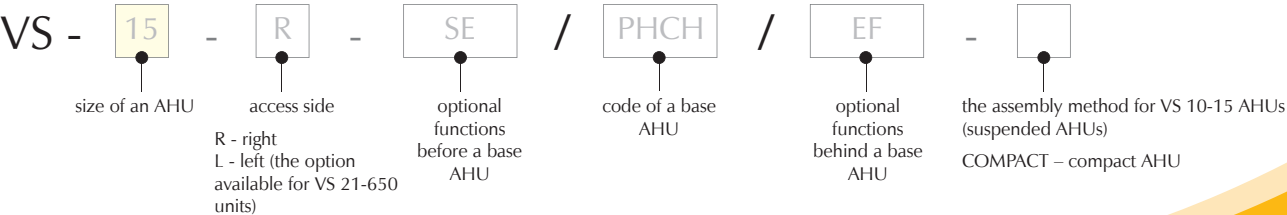
VS - [] - R - RMHCH

VS	V _{min}		V _{max}		L [mm]	L* [mm]	L ₁ [mm]	K [mm]	K* [mm]	H [mm]	H ₂ [mm]	W [mm]	h x w [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]									
21	1193	702	2200	1295	3684	4050	2953	731	1097	528	976	961	313x 821
30	1586	933	3100	1825	3684	4050	2953	731	1097	660	1240	961	440x 821
40	2099	1235	4100	2413	3684	4050	2953	731	1097	660	1240	1168	440x 1028
55	2878	1694	6054	3563	4050	4415	3318	731	1097	795	1510	1339	575x 1199
75	3805	2240	8150	4797	4050	4415	3318	731	1097	915	1750	1480	695x 1340
100	4863	2862	10700	6298	4415	4781	3684	731	1097	1015	1950	1660	795x 1520
120	5985	3523	13300	7828	4415	4781	3684	731	1097	1052	2024	1891	832x 1751
150	7415	4364	16400	9653	4781	5147	4050	731	1097	1153	2226	2085	933x 1945
180	8640	5085	19900	11713	4781	4781	4050	731	1097	1357	2714	2085	1137x 1945
230	10640	6262	24600	14479	4781	4781	4050	731	1097	1357	2714	2493	1137x 2353
300	13491	7941	32900	19364	5147	5147	4415	731	1097	1656	3312	2585	1436x 2445
400	18704	11009	44500	26192	5147	5147	4415	731	1097	1889	3778	3085	1669x 2945
500	22399	13184	54000	31783	5147	5147	4415	731	1097	1889	3778	3585	1669x 3445
650	28725	16907	71400	42025	5147	5147	4415	731	1097	2366	4732	3697	2146x 3557

L* - air supply side length in configuration with a liquid trap behind a cooler
K* - K distance for sets with a liquid trap

V_{max} - parametres description on page 20

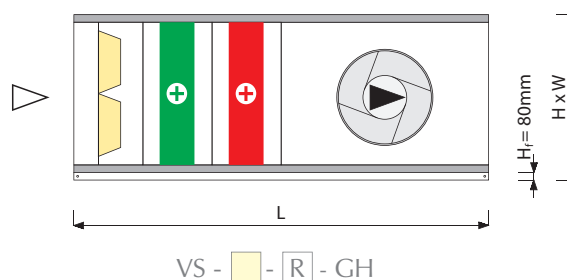
Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



Base AHU



VS 21 ÷ 650 sizes



VS	V _{min}		V _{max}		L [mm]	H [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]					
21	1167	687	3080	1813	1856	528	961	313x821	250x660
30	1586	933	4322	2544	1856	660	961	440x821	380x613
40	1958	1152	5661	3332	1856	660	1168	440x1028	440x821
55	2878	1694	8216	4836	2221	795	1339	575x1199	440x1028
75	3805	2240	11379	6697	2221	915	1480	695x1340	575x1199
100	4863	2862	13550	7975	2587	1015	1660	795x1520	695x1340
120	5815	3423	18079	10641	2587	1052	1891	832x1751	795x1520
150	7167	4218	22420	13196	2587	1153	2085	933x1945	795x1520
180	8640	5085	27220	16021	2587	1357	2085	1137x1945	795x1520
230	10398	6120	33460	19694	2587	1357	2493	1137x2353	740x1913
300	13491	7941	44760	26345	2953	1656	2585	1436x2445	933x1945
400	18704	11009	60501	35610	2953	1889	3085	1669x2945	933x2650
500	21817	12841	74350	43761	3318	1889	3585	1669x3445	933x3150
650	28725	16907	98500	57975	3684	2366	3697	2146x3557	933x3250

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

🔧 Inlet/Outlet configurations of E empty section are presented on page 53.

🔧 Inlet/Outlet configurations of M mixing box are presented on page 53.

🔧 Dimensions of optional functions are presented on page 53.

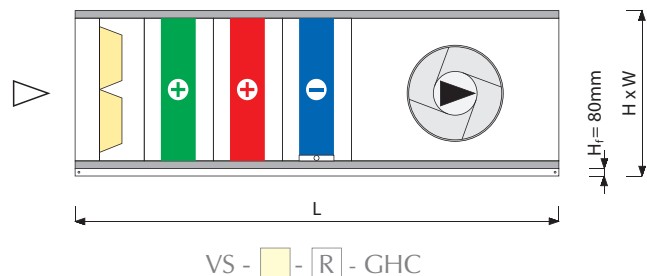
Supply-exhaust AHUs: glycol system

Heating, Cooling

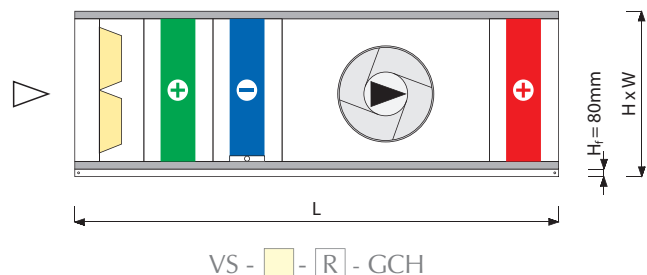
Base AHU



VS 21 ÷ 650 sizes



VS 21 ÷ 650 sizes

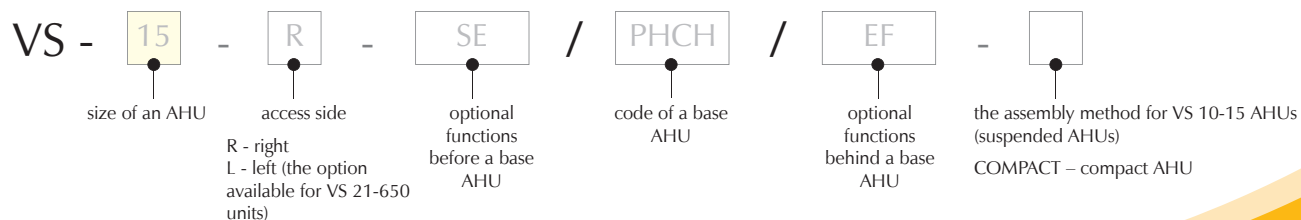


VS	V _{min}		V _{max}		L [mm]	L* [mm]	H [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]						
21	1167	687	2200	1295	2221	2587	528	961	313x821	250x660
30	1586	933	3100	1825	2221	2587	660	961	440x821	380x613
40	1958	1152	4100	2413	2221	2587	660	1168	440x1028	440x821
55	2878	1694	6054	3563	2587	2953	795	1339	575x1199	440x1028
75	3805	2240	8150	4797	2587	2953	915	1480	695x1340	575x1199
100	4863	2862	10700	6298	2953	3318	1015	1660	795x1520	695x1340
120	5815	3423	13300	7828	2953	3318	1052	1891	832x1751	795x1520
150	7167	4218	16400	9653	2953	3318	1153	2085	933x1945	795x1520
180	8640	5085	19900	11713	2953	2953	1357	2085	1137x1945	795x1520
230	10398	6120	24600	14479	2953	2953	1357	2493	1137x2353	740x1913
300	13491	7941	32900	19364	3318	3318	1656	2585	1436x2445	933x1945
400	18704	11009	44500	26192	3318	3318	1889	3085	1669x2945	933x2650
500	21817	12841	54000	31783	3318	3318	1889	3585	1669x3445	933x3150
650	28725	16907	71400	42025	3318	3318	2366	3697	2146x3557	933x3250

L* - air supply side length in configuration with a liquid trap behind a cooler

V_{max} - parametres description on page 20

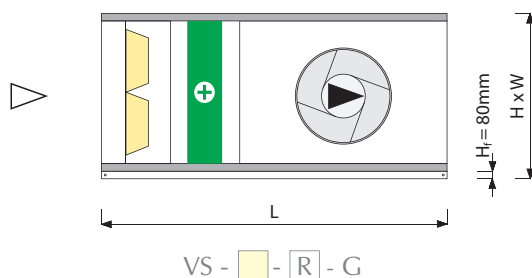
Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).



Base AHU



VS 21 ÷ 650 sizes



VS	V _{min}		V _{max}		L [mm]	H [mm]	W [mm]	h x w [mm]	h ₁ x w ₁ [mm]
	[m ³ /h]	[CFM]	[m ³ /h]	[CFM]					
21	1167	687	3080	1813	1490	528	961	313x821	250x660
30	1586	933	4322	2544	1490	660	961	440x821	380x613
40	1958	1152	5661	3332	1490	660	1168	440x1028	440x821
55	2878	1694	8216	4836	1856	795	1339	575x1199	440x1028
75	3805	2240	11379	6697	1856	915	1480	695x1340	575x1199
100	4863	2862	13550	7975	2221	1015	1660	795x1520	695x1340
120	5815	3423	18079	10641	2221	1052	1891	832x1751	795x1520
150	7167	4218	22420	13196	2221	1153	2085	933x1945	795x1520
180	8640	5085	27220	16021	2221	1357	2085	1137x1945	795x1520
230	10398	6120	33460	19694	2221	1357	2493	1137x2353	740x1913
300	13491	7941	44760	26345	2587	1656	2585	1436x2445	933x1945
400	18704	11009	60501	35610	2587	1889	3085	1669x2945	933x2650
500	21817	12841	74350	43761	2587	1889	3585	1669x3445	933x3150
650	28725	16907	98500	57975	2587	2366	3697	2146x3557	933x3250

* - for VS-10, VS-15 with water heater L= 758 mm, with electric heater L=1124 mm

V_{max} - parametres description on page 20

Presented AHU's length is proper for AHU that is equipped with direct driven PLUG-FANS (21 ÷ 650 delivered in sections).

** Optional functions are available for VS 21 ÷ 650 AHUs only.

*** Optional function is available for VS 10 ÷ 650 AHUs (VS 10 ÷ 15 AHUs are equipped with the function of mixing defined just as a set of two air dampers).

① Inlet/Outlet configurations of E empty section are presented on page 53.

① Inlet/Outlet configurations of M mixing box are presented on page 53.

① Dimensions of optional functions are presented on page 53.

Optional Functions and Elements

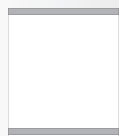
Optional functions



N - Electric pre-heater

L_H

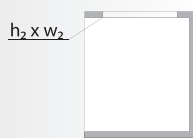
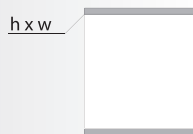
VS	L_H [mm]	m_H [kg]
10	731	31
15	731	37
21	731	44
30	731	49
40	731	56
55	731	67
75	731	75
100	731	86
120	731	94
150	731	105
180	731	121
230	731	133
300	731	149
400	731	182
500	-	-
650	-	-



E - empty section

L_E

VS	L_E [mm]	$h \times w$ [mm]	$h_2 \times w_2$ [mm]	m_E [kg]
10	731	220x500	-	22
15	731	250x660	-	25
21	731	313x821	220x500	33
30	731	440x821	220x500	36
40	731	440x1028	250x660	40
55	731	575x1199	440x821	47
75	731	695x1340	440x1028	54
100	731	795x1520	575x1199	60
120	731	832x1751	575x1199	65
150*	731/1097	933x1945	795x1520	72/116
180*	731/1097	1137x1945	795x1520	81/132
230*	731/1097	1137x2353	933x1945	89/148
300*	731/1097	1436x2445	933x1945	100/171
400*	731/1097	1669x2945	933x2650	125/217
500*	731/1097	1669x3445	933x3150	136/241
650*	731/1097	2146x3557	933x3250	150/280



S - silencer

L_S

VS	L_S [mm]	m_S [kg]
10	731	26
15	731	31
21	1097	60
30	1097	68
40	1097	79
55	1097	101
75	1097	116
100	1097	141
120	1097	159
150	1097	178
180	1097	205
230	1097	243
300	1463	345
400	1463	510
500	1463	580
650	1463	702

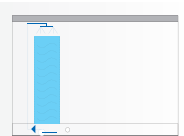
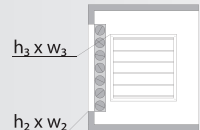
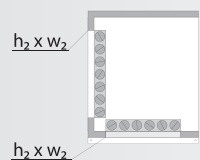
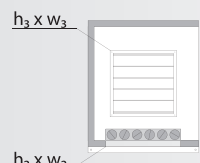
* Data regarding length and weight refers to the section with a horizontal or a top/bottom inlet/outlet respectively.



M - mixing box

L_M

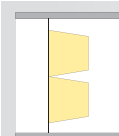
VS	L_M [mm]	$h_2 \times w_2$ [mm]	$h_3 \times w_3$ [mm]	m_M [kg]
10	-	-	-	-
15	-	-	-	-
21	731	220x500	213x380	40
30	731	220x500	313x380	43
40	731	250x660	313x380	49
55	731	440x821	413x380	62
75	731	440x1028	413x380	73
100	731	575x1199	613x380	85
120	731	575x1199	613x380	91
150	1097	795x1520	713x740	126
180	1097	795x1520	913x740	155
230	1097	933x1945	913x740	188
300	1097	933x1945	1213x740	202
400	1097	933x2650	1513x740	252
500	1097	933x3150	1513x740	282
650	1097	933x3250	1913x740	304



W - Pad Humidifier

L_W

VS	L_W [mm]	m_W [kg]
10	-	-
15	-	-
21	1097	56
30	1097	62
40	1097	69
55	1097	81
75	1097	110
100	1097	122
120	1097	136
150	1097	155
180	1097	171
230	1097	189
300	1097	210
400	1097	253
500	1097	271
650	1097	305

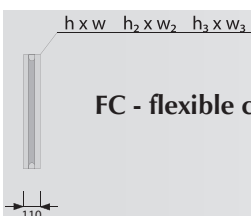


F - secondary filter

L_F

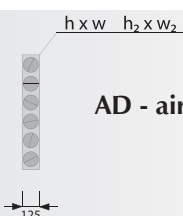
VS	L_F [mm]	m_F [kg]
10	-	-
15	-	-
21	731	39
30	731	43
40	731	47
55	731	57
75	731	69
100	731	78
120	731	83
150	731	94
180	731	106
230	731	117
300	731	140
400	731	181
500	731	200
650	731	230

Optional elements



FC - flexible connection

110



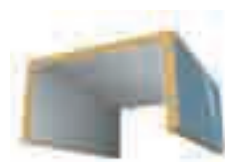
AD - air damper

125

Function and application

Operation parameters

Construction: Non-skeleton casing



VS 10÷15



VS 21÷650



- Non-skeleton construction made of 'sandwich' type panels formed in 'C' shape and reinforced with an inner system of bulkheads.
- Panels' construction:
 - external material: zinc coated steel sheet S280GD+Z275 covered with anticorrosive coating;
 - insulation: polyurethane foam.
- Casing equipped with a system of connectors enabling suspension of the unit.
- Access to an AHU: from the bottom.

➊ **AHU designed for indoor installation.**

- Non-skeleton construction made on the basis of 'sandwich' type panels formed in 'C' shape and reinforced with an inner frame system.
- Panels construction:
 - external material: zinc coated steel sheet S280GD+Z275 covered with anticorrosive coating;
 - insulation: polyurethane foam;
 - internal material: zinc coated steel sheet S280GD+Z275.
- Casing:
 - VS 21-150 fixed to flanges (poliamid) or easy-to-transport steel frame (optional), ability of both suspension and foundation of the whole installation on the floor;
 - VS 180-650 fixed to easy-to-transport steel frame enable to place whole installation on the floor.
- Access to the unit: from the side.

➋ **Unit designed for both indoor and outdoor installation.**

Casing:

- Operation temperature: $-40 \div +90^{\circ}\text{C}$.
- Casing heat transfer coefficient
 $K = 0,6 \text{ W/m}^2\text{K}$ **CLASS T2 Acc. EN 1886:2007**
- Thermal bridges coefficient:
 $K_b = 0,69 \text{ (MB PUR 40)}$ **CLASS TB2 Acc. EN 1886:2007**
 $K_b = 0,52 \text{ (MB PUR 40 AZ)}$ **CLASS TB3 Acc. EN 1886:2007**
- Mechanical strength of casing:
 $-2500 \text{ Pa} \div 2500 \text{ Pa} < 2\text{mm}$ **CLASS D1 Acc. EN 1886:2007**
- Casing tightness:
 $-400 \text{ Pa} - 0,05 \text{ l/sm}^2$ **CLASS L1 Acc. EN 1886:2007**
 $+700 \text{ Pa} - 0,13 \text{ l/sm}^2$ **CLASS L1 Acc. EN 1886:2007**

Panels:

- Operation temperature: $-40 \div +90^{\circ}\text{C}$.
- Panel thickness: 40mm.
- Metal sheet thickness: 0,5mm.
- Thermal conductivity
 $\text{PPU } \lambda = 0,022 \text{ W/mK}$
- Casing fire rating:
 non-flammable material (NRO)
- Moisture absorption: 0,04%.
- PPU density: $\rho = 42\text{kg/m}^3$.
- Panel weight: $m = 10\text{kg/m}^2$.
- Color -RAL 7031.

Anticorrosive protection:

- 275g/m² galvanized zinc (Zn) coating
- External protection coating material/thickness:
 polyester / 25μm

➌ **Compliance with standards: EN1886.**

Available options of AHU location

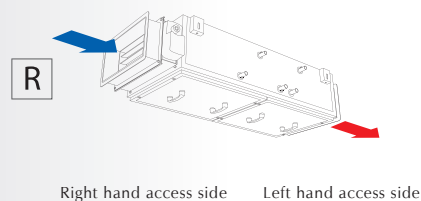
	Location options		Supply AHUs		Exhaust AHUs	Supply and exhaust AHUs
VS 21-150 AHU		Supporting blocks	$H_i = 80 \text{ [mm]}$	The option is available for all systems	The option is available for all systems	The option is available for all systems
				Possible transport up to 3.3 [m]	Possible transport up to 3.3 [m]	Transport not available
		Transport - foundation frame	$H_i = 80 \text{ [mm]}$	The option is available for all systems	The option is available for all systems	The option is available for all systems
				Possible transport of systems up to 4.4 [m] equipped with a homogeneous longitudinal element of the frame	Possible transport of systems up to 4.4 [m] equipped with a homogeneous longitudinal element of the frame	Possible transport of systems up to 4.4 [m] equipped with a homogeneous longitudinal element of the frame and with the top part projecting over the bottom one No transport option for VS180-650

Advantages

- Energy loss reduction – no thermal bridges.
- Elimination of moisture condensation phenomenon.
- High rigidity of construction.
- Labyrinth modules connection – elimination of air leakages.
- Elimination of moisture absorption.
- Insulation material with a very long decomposition period.
- Smooth internal surfaces of the casing – easy to maintain hygiene.
- Light inspection panels - easy handling.
- High resistance to external atmospheric factors.
- High resistance to mechanical factors.

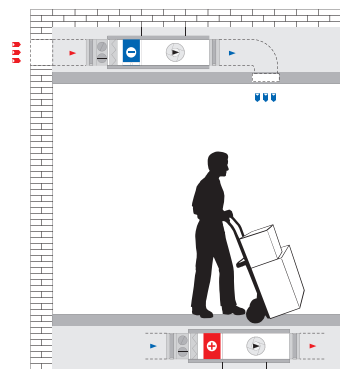
Teaching aids

Access side: VS 10÷15



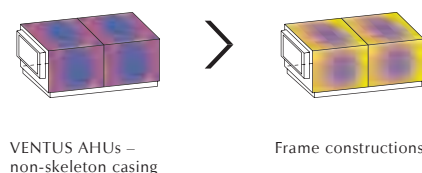
Installation of: VS 10÷15

Suspended VENTUS AHUs, due to their small dimensions and low weight, are ideal for installation in the structural areas of buildings (suspended ceilings, raised floors) directly in the ventilation duct system.

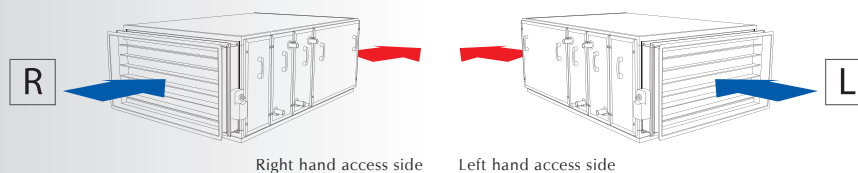


Non-skeleton technology

In the construction of VTS AHUs a modern 'non-skeleton' technology is applied. The casing made of homogenous laminar panel in 'C' shape contains appropriate sub-assemblies carrying out a desired air handling process. This kind of construction in connection with a labyrinth system of modules connection constitutes a perfectly tight system similar in its construction to a vacuum flask. As a result both the number of thermal bridges (elimination of energy loss and moisture condensation phenomena) as well as air leakages have been reduced.



Access side: VS 21÷650



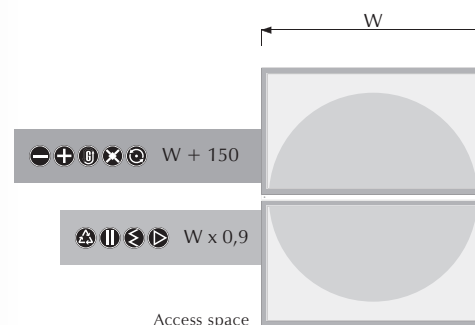
Connection pins of the exchangers for STANDARD AHUs are located on the access side and for the COMPACT AHUs on the opposite side.

Device location

The AHU should be located in such a way so as to enable connection of related systems (ventilation ducts, piping, cable trays) without getting in the way of inspection panels. For efficient installation, operation and maintenance of the AHU, the minimum distances between the access side and fixed structural components of the installation location (walls, supports, pipelines, etc.) should be kept.

The access space can be built up with systems, pipelines, support structures only in a way which permits easy disassembly and assembly during maintenance.

In the case of COMPACT AHUs it is necessary to take an appropriate space for connecting exchangers on the side opposite to the access side into consideration.



FILTERS

VENTUS

Pre-filters

Function and application

Design

Flat filters



G4 type



VS 10 ÷ 650

- Ventilation and air conditioning systems for rooms with average requirements of air purity as the final filter.
- Ventilation and air conditioning systems with high purity requirements as a pre-filter in front of higher efficiency filters. Possible applications:
 - hotels;
 - restaurants;
 - cinemas;
 - theatres;
 - department stores;
 - concert halls.

- Pleated filter material encased in a wire mesh installed in a frame 50mm thick.
- Filter material made of polyester fiber fabric.

● **Assembly: system of guide rails enabling quick and easy replacement of filters.**

Preliminary bag filters



G4/F5 type



VS 21 ÷ 650

- Ventilation and air conditioning systems for rooms with average requirements of air purity as the final filter.
- Ventilation and air conditioning systems with high purity requirements as a pre-filter before higher efficiency filters. Possible applications:
 - hotels;
 - restaurants;
 - cinemas;
 - theatres;
 - department stores;
 - concert halls.

- Filtration bags 300mm long installed in a frame 25mm thick.
- Filter material made of polyester fiber fabric.
- Vertical arrangement of filtration bags.

● **Assembly: system of guide rails enabling quick and easy replacement of filters.**

Secondary filters

Function and application

Design

Secondary bag filters



F7 type



VS 21 ÷ 650

- Ventilation and air conditioning systems for rooms with high requirements of air purity as the final filter:
 - hospitals;
 - pharmaceuticals;
 - food industry;
 - varnishing chambers;
 - dehumidification chambers.

- Filtration bags 600mm long installed in a frame 25mm thick.
- Filter material made of polyester fiber fabric.
- Vertical arrangement of filtration bags.

● **Assembly: system of guide rails enabling quick and easy replacement of filters.**

Secondary bag filters



F9 type



VS 21 ÷ 650

- Ventilation and air conditioning systems for clean rooms as the final filtration stage.
- Ventilation and air conditioning systems for clean rooms as the pre-filter stage for activated carbon filters:
 - production of electronic components,
 - production of optical components,
 - sterile operating theatres,
 - pharmaceutical clean rooms.

- Filtration bags 600mm long installed in a frame 25mm thick.
- Filter material made of polyester fiber fabric.
- Vertical arrangement of filtration bags.

● **Assembly: system of guide rails enabling quick and easy replacement of filters.**

Operation parameters

- Average filtration ratio $A_m = 92\%$.
- Max. pressure difference: $\Delta p = 150\text{Pa}$.
- Max. air velocity: $v = 4,2\text{m/s}$.
- Filter bypass leakage **F9 Acc. EN 1886**.
- Ambient temperature: max. $70^\circ\text{C} / 100\%$.

● **Protection:** The permitted level of filter contamination may be signaled by the pressure differential control (an optional element).

Compliance with standards: EN779.

- Average filtration ratio $A_m = 90\%$.
- Max. pressure difference:
G4 - $\Delta p = 150\text{Pa}$
F5 - $\Delta p = 250\text{Pa}$
- Max. air velocity: $v = 4,6\text{m/s}$.
- Filter bypass leakage **F9 Acc. EN 1886**.
- Ambient temperature: max. $70^\circ\text{C} / 100\%$.

● **Protection:** the permitted level of filter contamination may be signaled by the pressure differential control (an optional element).

Compliance with standards: EN779.

Operation parameters

- Average filtration ratio $E_m = 80 \div 85\%$.
- Max. pressure difference: $\Delta p = 250\text{Pa}$.
- Max. air velocity: $v = 3,6\text{m/s}$.
- Filter bypass leakage **F9 Acc. EN 1886**.
- Ambient temperature: max. $70^\circ\text{C} / 100\%$.

● **Protection:** The permitted level of filter contamination may be signaled by the pressure differential control (an optional element).

Compliance with standards: EN779.

- Average filtration ratio $E_m = 90 \div 95\%$.
- Recommended filter change: $\Delta p = 350\text{Pa}$.
- Max. air velocity: $v = 3,6\text{m/s}$.
- Filter bypass leakage **F9 Acc. EN 1886**.
- Ambient temperature: max. $70^\circ\text{C} / 100\%$.

● **Protection:** The permitted level of filter contamination may be signaled by the pressure differential control (an optional element).

Compliance with standards: EN779.

Teaching aids

Filter configurations

- in base units:



- in optional functions - ref.VS 21:650 AHUs

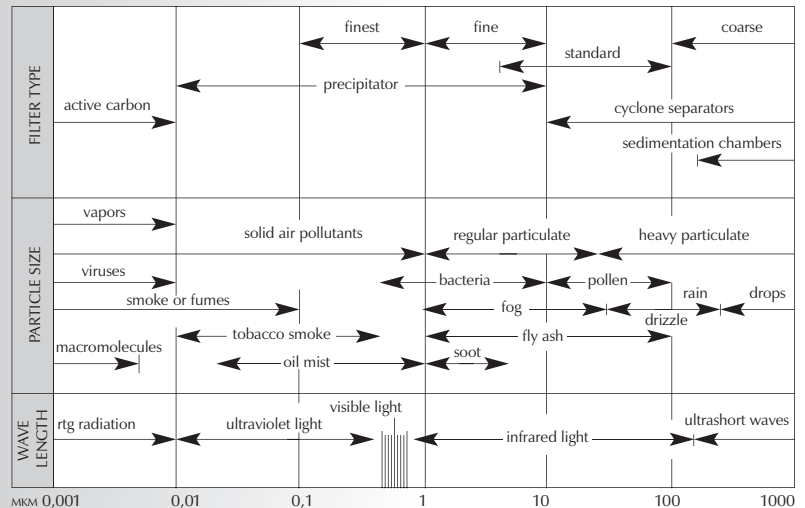


Filters' dimensions in optional functions are demonstrated on page 53.

Classification of filters used

	Class	B ₂	C	Q
PN-B-76003:1996	initial efficiency	>75% (gravimetric filtration method)	<85% (gravimetric filtration method)	-
	Average filtration efficiency	>90% (gravimetric filtration method)	>95% (gravimetric filtration method)	>85% (paraffin oil mist method)
ASHRAE St.52.2:1999	Class	MERV 6,6-7, 7-8, 6-8	MERV 8-9, 9-10	MERV 13-14
EN 779:1992 greenDIN 24184	Class	G4	F5	F7
	Class	EU4	EU5	EU7
DIN 24185 EUROVENT 4/5	average effectiveness for particulate	$90\% \leq A_m$	$40\% \leq E_m$ $\leq 60\%$	$80\% \leq E_m$ $\leq 90\%$
Initial pressure of a clean filter [Pa]		30-60	50-80	100-200
Maximum allowed pressure drop [Pa]		150	250	350

Sizes of some particulate in the air



source: Recknagel, Sprenger

Average particulate content in air

Technological area or process		Average concentration [mg/m ³]	Most frequent particle size [mm]	Upper Limit of the size of particles [mm]
Non-urban areas	During rain	0,05	0,8	4
	During dry periods	0,10	2,0	25
Large urban area	Residential area	0,10	7,0	60
	Industrial area	0,30-0,5	20	100
	Industrial facilities	1,0-3,0	60	1000
	Habitats	1-2	-	-
	Department stores	2-5	-	-
	Workshops	1-10	-	-
	Cement factories	100-200	-	-
	Air in mines	100-300	-	-
Coke fired furnace flue gases	Hand loaded	10-50	-	-
	Mechanically loaded	100-200	-	-
	Furnace flue gases	1000-15000	-	-

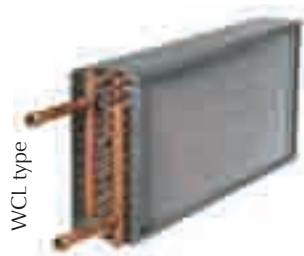
source: Recknagel, Sprenger

Heaters

Function and application

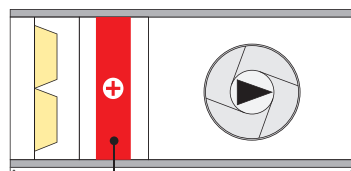
Design

Water heater

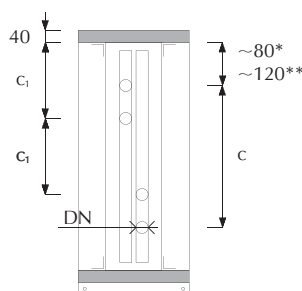


WCL type

- Heating of the air supplied to the room.
- Heating of the air after the dehumidification process.
- ❶ **Used if a heating water system is available (local boiler or municipal heating system).**



Water heater



* VS 10÷40
** VS 55 ÷ 650

- Copper pipes with aluminium plate fins (Cu/Al).
- Distance between fins:
VS 10 ÷ 15 - 2,1mm
VS 21 ÷ 650 - 2,5mm
- Fin thickness: 0,1mm (Al).
- Pipe wall thickness: 0,37mm.
- Pipe diameter:
VS 10 ÷ 15 - 3/8"
VS 21 ÷ 650 - 1/2"
- Collector diameter:

VS	DN	Material	Connection
10,15	20	brass	thread R3/4"
21 30,40 (≤4R)	25	brass	thread R1"
30,40 55,75 (≤4R) 100,120,150 (2R)	32	brass	thread R1 1/4"
55 (6R,8R) 100,120,150 (4R) 180 (2R)	50	steel	thread R2"
120 ÷ 650	80	steel	thread R3"
180 ÷ 400 (8R) 500 ÷ 650 (≥2R)	2x80	steel	thread 2xR3"

- Number of heater rows R: 2 ÷ 8.
- Connections of exchanger are equipped with drain and vent.

- ❶ **The connectors are on the tending side of the AHU.**
- ❷ **Connecting the exchanger to the power supply in a cocurrent system results in reduction of the heating capacity of more than 10%.**
- ❸ **Exchanger is connected to the hot water supply by means of the top or bottom connector depending on the access side of the AHU in order to enable countercurrent air flow with reference to liquid flow in the cooler – universal design of exchanger: right/left.**

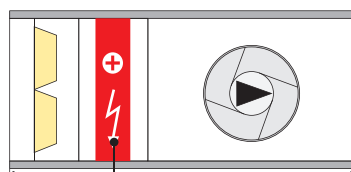
Electrical heater



HE type

VS 10 ÷ 650

- Heating of the air supplied to the room.
- Heating of the air after the dehumidification process.
- ❶ **Used when heating water is not available or in case of lower heating powers.**



Electrical heater

- A complex of resistance heating elements made of Cr-Ni-Fr alloy, power: 6kW/400V each.
- Casing: frame made of zinc-coated steel.
- Terminal strip.
- As standard, the heater is equipped with an overheat protection thermostat.

- ❶ **If the device is staged together with a control system, the heater is integrated with a control module.**
- ❷ **The wires are connected to the terminal strip of the exchanger on the AHU access side.**
- ❸ **Desired power can be obtained by means of the system of smooth regulation (HE module as an optional control element) or gradual regulation (a diagram of connections available in the manual).**

Coolers

Function and application

Design

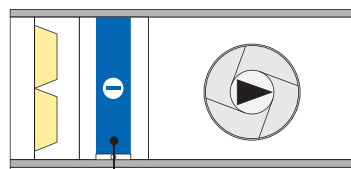
Water cooler



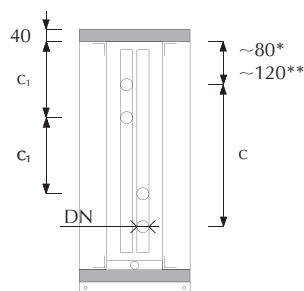
WCL type

- Cooling of the air supplied to the room.
- Air dehumidification during summer.

● **Exchanger used in complex air conditioning systems – several or even more units powered from one source of chilledwater system (chiller) or in case of using a unit with a relatively high cooling capacity.**



Water cooler



* VS 10 ÷ 40
** VS 55 ÷ 650

- Copper pipes with aluminium plate fins (Cu/Al).
- In pitch distance between fins:
VS 10 ÷ 15 - 2,1mm
VS 21 ÷ 650 - 2,5mm
- Fin thickness: 0,1mm (Al).
- Pipe wall thickness: 0,37mm.
- Pipe diameter:
VS 10 ÷ 15 - 3/8"
VS 21 ÷ 650 - 1/2"
- Collector diameter:

VS	DN	Material	Connection
10,15	20	brass	thread R3/4"
21 30,40 (≤4R)	25	brass	thread R1"
30,40 55,75 (≤4R) 100,120,150 (2R)	32	brass	thread R11/4"
55 (6R,8R) 100,120,150 (4R) 180 (2R)	50	steel	thread R2"
120 ÷ 650	80	steel	thread R3"
180 ÷ 400 (8R) 500 ÷ 650 (≥2R)	2x80	steel	thread 2xR3"

- Number of cooler rows R: 2 ÷ 8.
- Drain pan (made of stainless steel).
- Connectors of the exchanger are equipped with the drain and vent.

● **The connectors are on the access side of the AHU.**
● **Connecting the exchanger to the chilled water supply in a parallel flow fashion results in reduction of the cooling capacity by more than 10%.**

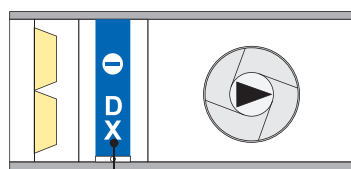
Direct expansion cooler



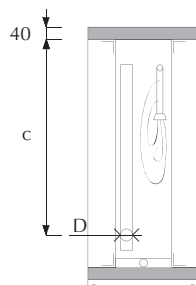
DX type

- Cooling of air supplied to the room.
- Air dehumidification during summer.

● **Used for lower cooling capacity systems in comparison to water coolers (compressor units) in single air conditioning systems.**



DX cooler



- Copper pipes with aluminium plate fins (Cu/Al).
- Drain pan (made of stainless steel).
- Options:
- mono-section exchanger <100kW;
- double-section exchanger (50%/50%) >50kW.
- Fin pitch distance between fins:
VS 10 ÷ 15 - 2,1mm
VS 21 ÷ 650 - 2,5mm
- Fin thickness: 0,1mm (Al).
- Pipe wall thickness: 0,37mm.
- Pipe diameter:
VS 10 ÷ 15 - 3/8"
VS 21 ÷ 650 - 1/2"
- Collector diameter:

VS	D _{in}	D _{out}
10 ÷ 30	5/8"	Ø28
40 ÷ 650	CCOL	

- Number of cooler rows R: 2 ÷ 6.

● **The connectors are on the access side of the AHU.**

Operation parameters

- Min. liquid temperature for chilled water: +2°C.
- Max. operation pressure of the liquid: 1.6 MPa = 16 bar (tested 21 bar).
- Max. glycol content: 50%.
- Cooling capacity - available in technical specification (CCOL).
- Fluid pressure drop and fluid flow rate - available in technical specification (CCOL).
- Air gap between the exchanger frame and AHU casing: < 2 mm.

Geometry of water heaters

VS	Distance		Exchanger's Capacity			
	C [mm]	C _L [mm]	2R [l]	4R [l]	6R [l]	8R [l]
10	115	x	0,70	1,40	2,10	x
15	140	x	1,04	2,08	3,12	x
21	164	x	1,77	3,54	5,31	7,08
30	294	x	2,48	4,96	7,43	9,91
40	294	x	3,25	6,49	9,74	12,98
55	347	x	4,71	9,42	14,14	18,85
75	459	x	6,53	13,05	19,58	26,11
100	554	x	8,54	17,08	25,62	34,15
120	586	x	10,37	20,74	31,11	41,48
150	681	x	12,87	25,74	38,61	51,47
180	872	380	15,62	31,24	46,86	62,47
230	872	379	19,2	38,39	57,59	76,78
300	1189	478	25,69	51,38	77,07	102,76
400	1380	554	34,71	69,42	104,13	138,84
500	1412	553	42,65	85,30	127,95	170,6
650	1888	711	56,79	113,58	170,37	227,16

- **Exchanger is connected to the chilled water supply by means of the top or bottom connector depending on the access side of the AHU in order to enable counter-current air flow with reference to liquid flow in the cooler – universal design of exchanger: right/left.**

Compliance with standards: EN 305, EN 1216, EN 13053.

- Min. cooling agent evaporation temperature: +3°C.
- Max. operation pressure of the liquid: 2.2 MPa = 22 bar (tested 29 bar).
- Cooling capacity - available in technical specification (CCOL).
- Air gaps between the exchanger frame and AHU casing: < 2 mm.

- **The exchanger can be selected for a wide range refrigerants (R12, R22, R134a, R407c...).**

Geometry of DX coolers

VS	Distance		Exchanger's Capacity			
	C [mm]		2R [l] 1 sekc./ 2 sekc.	3R [l] 1 sekc./ 2 sekc.	4R [l] 1 sekc./ 2 sekc.	6R [l] 1 sekc./ 2 sekc.
10	195		0,7 / x	1,05 / x	1,40 / x	2,1 / x
15	195		1,04 / x	1,56 / x	2,08 / x	3,12 / x
21	244		1,77 / x	3,54 / x	5,31 / x	7,08 / x
30	374		2,48 / x	4,96 / x	7,43 / x	9,91 / 7,43
40	374		3,25 / x	6,49 / x	9,74 / 6,49	12,98 / 9,74
55	467		4,71 / x	9,42 / 7,07	14,14 / 9,42	18,85 / 21,20
75	586		6,53 / x	13,05 / 9,79	19,58 / 13,05	26,11 / 29,37
100	684		8,54 / 8,54	17,08 / 12,81	25,62 / 17,08	x / 25,62
120	718		10,37 / 10,37	20,74 / 15,56	31,11 / 20,74	x / 31,11
150	817		12,87 / 12,87	25,74 / 19,30	38,61 / 25,74	x / 38,61
180	1017		15,62 / 15,62	31,24 / 23,43	x / 31,24	x / 46,86
230	1021		x / 19,20	x / 28,79	x / 38,39	x / 57,59
300	1315		x / 25,69	x / 38,53	x / 51,38	x / 77,07
400	1543		x / 34,71	x / 52,06	x / 69,42	x / 104,13
500	1538		x / 42,65	x / 63,97	x / 85,30	x / 127,95
650	2014		x / 56,79	x / 85,18	x / 113,58	x / 170,37

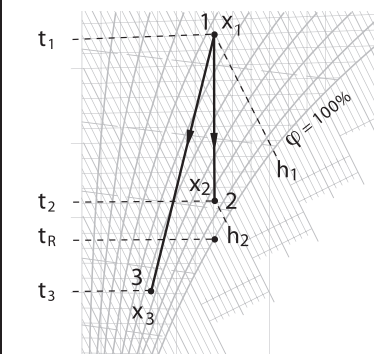
- **1 section / 2 section – 1 section or 2 section water cooler (capacity 50/50%).**

Compliance with standards: EN 305, EN 1216, EN 13053.

Teaching aids

The exchange surface area of the water heater/cooler

VS	2R [m²]	4R [m²]	6R [m²]	8R [m²]
10	5,94	11,87	17,81	x
15	8,83	17,66	26,50	x
21	10,74	21,47	32,21	42,94
30	15,03	30,06	45,09	60,12
40	19,69	39,37	59,06	78,75
55	28,58	57,16	85,73	114,31
75	39,59	79,17	118,76	158,34
100	51,79	103,58	155,37	207,15
120	62,90	125,80	188,71	251,61
150	78,05	156,11	234,16	312,21
180	94,73	189,46	284,19	378,93
230	116,43	232,86	349,29	465,72
300	155,82	311,64	467,46	623,28
400	210,53	421,05	631,58	842,10
500	258,69	517,37	776,06	1034,74
650	344,45	688,90	1033,35	1377,80



t₁ [°C] - air temperature before the cooler
t₂, t₃ [°C] - air temperature behind cooler

Cooling capacity

Cooling capacity for cooling air flow V [m³/h] from the temperature at point 1 to the temperature at point 2 (x=const) or to the temperature at point 3 (x= var)

'Dry' cooling (alteration 1-2)

$$Q = V/3600 \cdot \rho_p \cdot (h_1 - h_2) \text{ [kW]}; x_1 = x_2, w = 0$$

V [m³/h] - air flow capacity, h₁ [kJ/kg] – enthalpy of air flow before the cooler
h₂, h₃ [kJ/kg] – enthalpy of air flow after the cooler
ρ_p [kg/m³] – air density (1,2 kg/m³ for 20°C)

$$t_2 < t_1 \quad x_2 = x_1$$

'Wet' cooling (alteration 1-3)

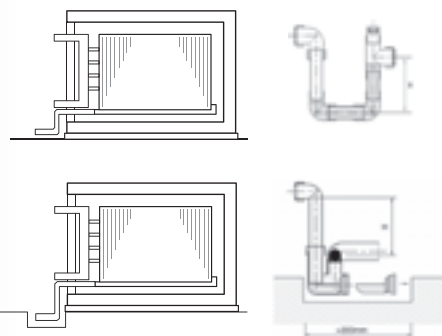
$$Q = V/3600 \cdot \rho_p \cdot (h_1 - h_3) \text{ [kW]}$$

$$W = V/3600 \cdot \rho_p \cdot (x_1 - x_3) \text{ [kg/s]}$$

V [m³/h] - air flow capacity, W [kg/s] - amount of condensed moisture
x₁ [kg/kg] – amount of moisture before the cooler, x₂, x₃ [kg/kg] – amount of moisture after the cooler, h₁ [kJ/kg] – enthalpy of air before the cooler
h₂, h₃ [kJ/kg] – enthalpy of air behind the cooler, ρ_p [kg/m³] – air density (1,2 kg/m³ dla 20°C) $t_3 < t_1 \quad x_3 < x_1$

The exchange surface area of the DX cooler

VS	2R [m²]	3R [m²]	4R [m²]	6R [m²]
10	5,94	8,91	11,87	17,81
15	8,83	13,25	17,66	26,50
21	10,84	16,27	21,69	32,53
30	15,18	22,77	30,36	45,54
40	19,89	29,83	39,77	59,66
55	28,87	43,30	57,73	86,60
75	39,98	59,98	79,97	119,95
100	52,31	78,46	104,62	156,93
120	63,53	95,30	127,07	190,60
150	78,84	118,26	157,67	236,51
180	95,68	143,52	191,37	287,05
230	117,60	176,40	235,20	352,80
300	157,38	236,08	314,77	472,15
400	212,64	318,96	425,28	637,92
500	261,28	391,93	522,57	783,85
650	347,91	521,87	695,82	1043,73



VS	Full Fan pressure [Pa]	Working height H[mm]
1.	<600	60
2.	600-1000	100
3.	1000-1400	140
4.	1400-1800	180
5.	1800-2200	200
6.	2200-2600	240

Energy recovery

VENTUS

Regeneration

Function and application

Design

Non- hydroscopic and hydroscopic rotary exchanger



Type: AIR - AIR

- Indirect energy recovery (sensible heat) accumulated in the exhaust air flow and its transfer to the counter current supply air flow.
- Indirect recovery of latent heat (moisture) when the rotor surface temperature on the side of the exhaust air is lower than the supply air dew-point temperature.
- Energy recovery without total separation of the supply and exhaust air flows (air leakages of 2 ÷ 5%).
- Application in block supply-exhaust AHUs.

- The rotor which is 200mm thick, is installed on a shaft with bearing and built in a steel construction frame.
- Rotor filling: a spiral built of two alternating layers of flat and corrugated aluminium sheets 0.07mm thick creating ducts of hydraulic diameter D=1.6mm.
- Variable rotary speed drive system enabling max. exchanger efficiency and regulation of energy recovery level.
- Ppurge sector reducing the penetration of 'dirty' exhaust air into the supply air to the minimum.
- Brush seals placed on the rotor's perimeter and the dividing line providing additional protection against air leakages.

● **Brush seals placed on the rotor's perimeter and the dividing line providing additional protection against air leakages.**

vertical system: VS 21 ÷ 650

Recuperation

Function and application

Design

Cross-flow exchanger



Type: AIR - AIR

- Indirect energy recovery (sensible heat) accumulated in the stream of exhaust air and its transfer to the ventilation air supplied to the rooms.
- Heat recovery at very high separation of the streams of supplied and exhaust air (99.9%).
- Application in block supply-exhaust AHUs.

- A system of crosswise formed 0.12 ÷ 0.2mm thick aluminium plates, between which separated streams of supply and exhaust air flow in an alternating crosswise pattern.
- Internal by-pass duct (VS-21 ÷ 650) with installed air damper which allows to divert air flow outside the exchanger "window":
 - disabling energy recovery function;
 - function of the exchanger's anti-freeze protection.
- Drop eliminator with a drain pan.

horizontal system: VS 10 ÷ 15

vertical system: VS 21 ÷ 650

Glycol system, Run-around coil



- Indirect energy recovery (sensible heat) with a total (100%) separation of supply and exhaust air flows.
- System applied when there is a necessity to separate (even at significant distances) supply from exhaust AHUs.

- System of two exchangers – placed in the exhaust air flow, which takes over the heat (cooler) and transfers it through an intermediate agent (water and glycol solution) to an exchanger, mounted in the supply air flow (heater).
- Construction of exchangers included in the recovery system is similar to the construction of water VTS exchangers.
- Number of rows R: 8.

Type: AIR - INTERMEDIARY LIQUID - AIR



VS 21 ÷ 650

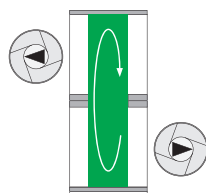
- **Glycol installation system with a circulating pump and control system is not included in VTS offer.**
- **The connectors are placed on the access side of the AHU.**
- **Exchanger is connected to the liquid supply by means of the top or bottom connector depending on the access side of the AHU in order to enable countercurrent air flow with reference to liquid flow in the exchanger – universal exchanger right/left type.**
- **Connecting the exchanger to the liquid supply in a parallel flow fashion system results in reduction of the cooling by up to 20%.**

Operation parameters

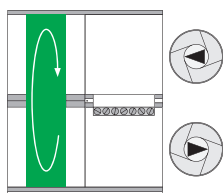
- Efficiency up to 85% (depends on the temperature differences between the air streams, moisture and ratio of air flows) – exchanger class A acc. EN 13053.
- Exchanger tightness for nominal operation parameters: 97%.
- Max. permissible air flow speed: 5,2m/s.
- Rotor rotational speed: 10rpm.
- Life of bearings:
 $L_{10} = 50000h / L_{50} = 250000h$ (<VS-120)
 $L_{10} = 25000h / L_{50} = 125000h$ (> VS-120)
- Recommended max. pressure drop: 450Pa.
- Ambient temperature: -30÷70°C.

Cooperation between the exchanger and the fan unit

Basic configuration



Configuration for a unit cooperating with an internal mixing box



Compliance with standards: EN 308, EN 13053.

Operation parameters

- Efficiency up to 75% (depends on the temperature differences between the air streams, moisture and ratio of air streams) – exchanger class B acc. EN 13053.
- Exchanger tightness for nominal operation parameters: 99.9%.
- Max. permissible air flow speed: 3.8m/s.
- Recommended max. pressure drop: 450Pa.
- Max. difference between air flow pressures of supply and exhaust air: 1500Pa.
- Ambient temperature: -40÷80°C.

Compliance with standards: EN 308, EN 13053.

- Efficiency up to 55% - exchanger class C acc. EN 13053.
- Max. permissible air flow speed:
 heater $v = 4,4$ m/s
 cooler $v = 3,5$ m/s
- Max. operation pressure of the agent: 1.6MPa=16 bar (tested 21 bar).
- Min. agent temperature depends on the glycol concentration.
- Gglycol content: max. 50%.
- Pressure drop on the exchangers/agent flow available in technical specification (CCOL).

Compliance with standards: EN 779, EN 13053.

Teaching aids

Total heat recovery efficiency (sensible and latent heat)

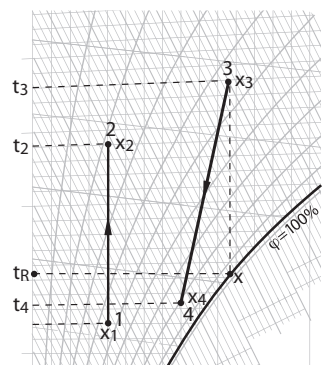
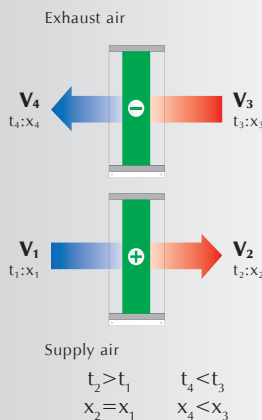
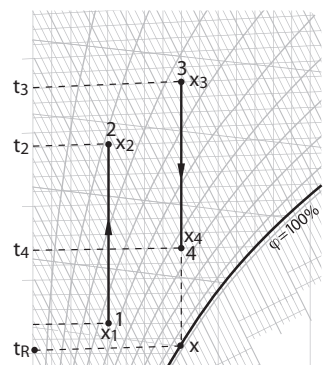
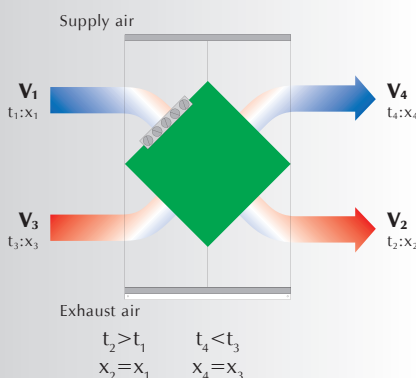
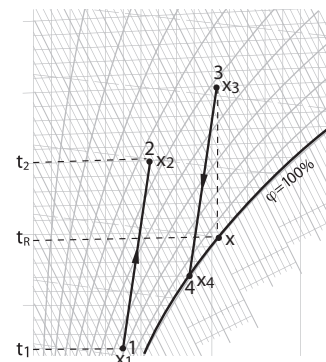
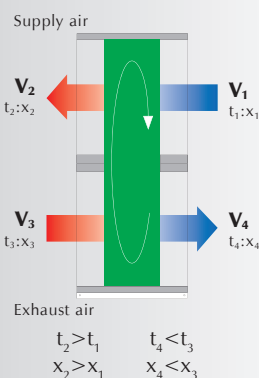
$$\eta_c = \frac{(h_2 - h_1)}{(h_3 - h_1)}$$

Enthalpy and temperature of the supply air:
 h_1 [kJ/kg], t_1 [°C] – before the exchanger
 h_2 [kJ/kg], t_2 [°C] – behind the exchanger

Heat recovery sensible efficiency (sensible heat)

$$\eta_t = \frac{(t_2 - t_1)}{(t_3 - t_1)}$$

Exhaust air enthalpy and temperature:
 h_3 [kJ/kg], t_3 [°C] – before the exchanger
 h_4 [kJ/kg], t_4 [°C] – behind the exchanger



Function and application

Design

PLUG fan unit with a direct drive



SWSI type

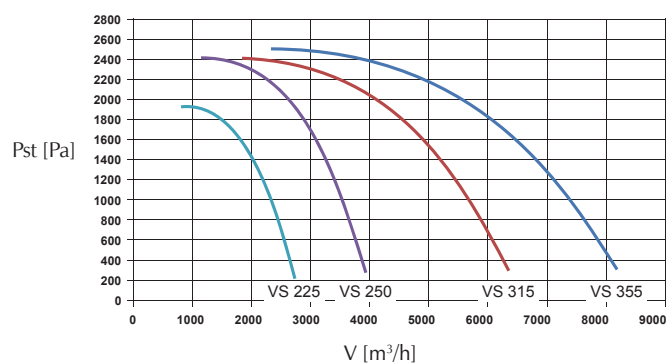


- Low and medium pressure ventilation and air conditioning systems, with total pressures of up to 2000 Pa.
- Single-draw centrifugal fan without casing with impeller's blades curved backwards.
- VS 10 – equipped with the fan set and a motor with the following parameters $n = 2790$ rpm, $P = 0,55$ kW.
- VS 15 – equipped with the fan set and a motor with the following parameters $n = 2850$ rpm, $P = 0,75$ kW.
- VS 21 ÷ VS 150 – equipped with fan sets (direct driven).
- VS 180 ÷ VS 300 – equipped with double fan sets (direct driven).
- VS 400 ÷ VS 500 – equipped with triple fan sets (direct driven).
- VS 650 – equipped with fourfold fan sets (direct driven).

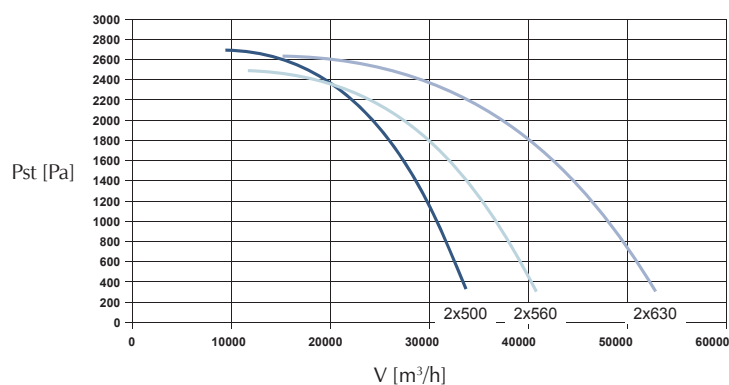
- The fan and motor unit is placed on a common frame isolated from the AHU structure by rubber vibration isolators.
- Drive type: direct – the fan impeller is installed on the motor shaft.
- TEFC type motors (Totally Enclosed Fan Cooled).
- One speed motors complying with the IEC standard.
- Frequency converter (a standard element of the fan unit).
- Impeller made of SAN (styrene/acrylonitrile) construction material with 20% glass fiber.

Maximum scope of fan set operation

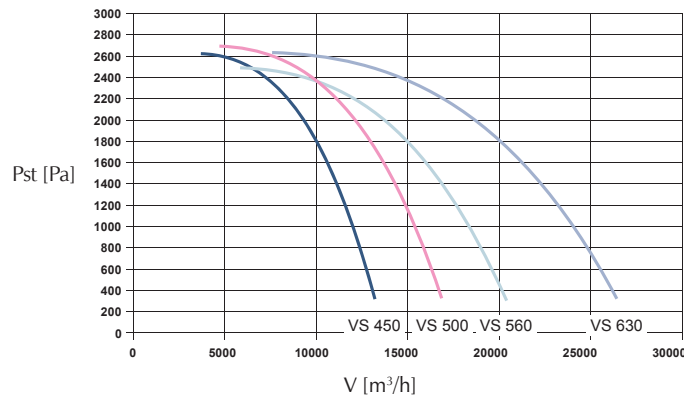
Maximum operational range for PLUG FANs, impeller size range 225-355 mm



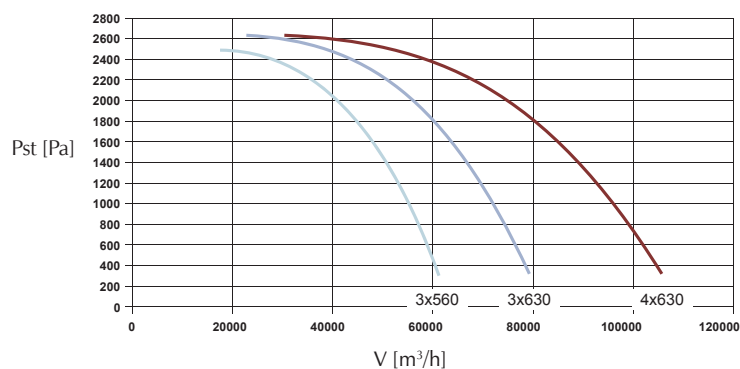
Maximum operational range for PLUG FANs working in Twin-fan array, impeller size range 500-630 mm



Maximum operational range for PLUG FANs, impeller size range 450-630 mm



Maximum operational range for PLUG FANs working in Multi-fan array, impeller size range 560-630 mm



Operation parameters

- Voltage rating: 3x400V AC.
- Motor rpm.: 1440 rpm, 2860 rpm.
- Protection type: PTC.
- Motor winding insulation class F: life (co-operation with exchanger).
- Life-span of bearings: $L_{10} = 20000h$ / $L_{50} = 100000h$.
- Level of protection: IP55.
- Ambient temperature: 60°C.

- **Technical specification of frequency converters: p. 74.**
- **Protection: operation of the fan unit may be monitored by a pressure differential switch (optional element).**

Compliance with standards: EN 1886, EN 25136, ISO 5801, AMCA standard 210.

Standard sized of PLUG FAN fans in units

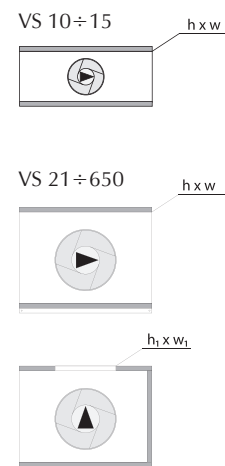
Size of fan rotors in the PLUG FAN option with direct drive

VENTUS	Economic	Low noise
21	250	250
30	315	315
40	355	355
55	400	450
75	450	500
100	500	560
120	560	630
150	560	630
180	2 x 500	2 x 500
230	2 x 560	2 x 560
300	2 x 630	2 x 630
400	3 x 560	3 x 560
500	3 x 630	3 x 630
650	4 x 630	4 x 630

Teaching aids

AHU outlet configurations - PLUG centrifugal fan

VS	h x w [mm]	h ₁ x w ₁ [mm]
10	220x500	-
15	250x660	-
21	313x821	250x660
30	440x821	380x613
40	440x1028	440x821
55	575x1199	440x1028
75	695x1340	575x1199
100	795x1520	695x1340
120	832x1751	795x1520
150	933x1945	795x1520
180	1137x1945	795x1520
230	1137x2353	740x1913
300	1436x2445	933x1945
400	1669x2945	933x2650
500	1669x3445	1199x3150
650	2146x3557	1520x3250



SFP – common indicator of the ventilation system capacity

SFP (Specific Fan Power) indicates the relation of electrical energy consumption to the amount of supplied and/or exhaust air through mechanical ventilation unit within a given time limit. It is the only parameter which reflects characteristics of air flow in an AHU as well as the one in the whole network with one value only.

$$SFP = \frac{P_{\text{supply el.}} + P_{\text{exhaust el.}}}{\dot{V}_{\text{max}}} \quad [\text{kW/m}^3/\text{s}] \text{ or } [\text{W/m}^3/\text{h}]$$

For calculations in the case of supply-exhaust AHUs a greater value of air flow capacity for supply or exhaust air should be assumed.

The analyses of ventilation systems' energetic capacity indicate that values between 1.8 and 2.3 m/s are optimum linear air flow speeds in a ventilation unit cross section.

Change of fan's capacity in relation to change of rotary speed

$$\frac{V_2}{V_1} = \frac{n_2}{n_1}$$

Change of fan's accumulation in relation to change of rotary speed

$$\frac{\Delta P_2}{\Delta P_1} = \left(\frac{n_2}{n_1} \right)^2$$

Demand for fan power in relation to change of rotary speed

$$\frac{P_2}{P_1} = \left(\frac{n_2}{n_1} \right)^3$$

Recirculation

Function and application

Design

Mixing box

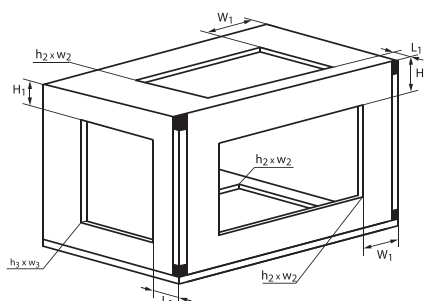


M type

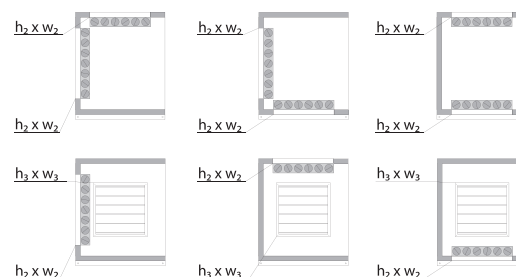


VS 21 ÷ 650

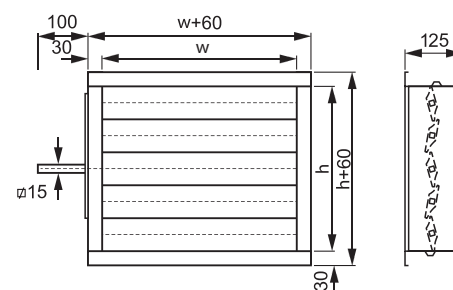
- Direct energy recovery (sensible heat, latent heat) as a result of mixing two streams of air – the external air with a part of the exhaust air.
- AHU operation in fast heating mode for units equipped with an „internal” mixing box.
- **In case of high concentration of toxic substances in a room using the recirculation function is forbidden.**
- **The recirculation function constitutes an optional element of a unit's equipment.**



- Mixing box is equipped with an appropriate doublesystem of inlets/outlets armed with air throttles regulating the proportional share of the external air to the exhaust one (the recirculation air).
- Configurations of inlets/outlets:



- **Dimensions of inlets/outlets: p. 53.**



Air damper

Silencing

Function and application

Design

Silencers



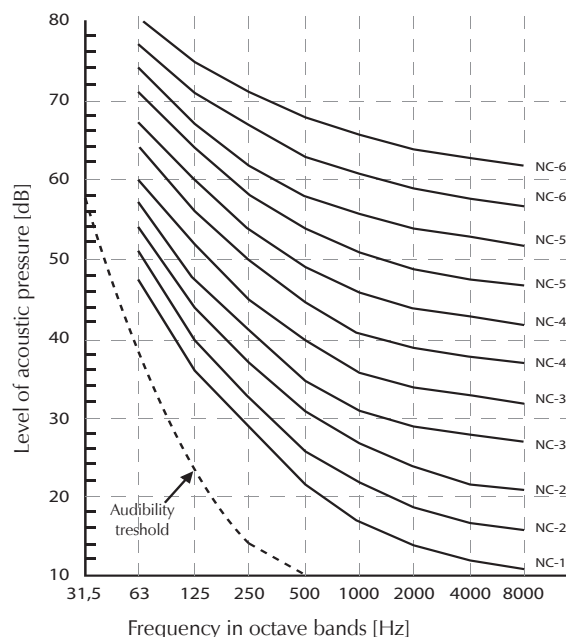
SLCR type



- Reduction of the level of acoustic power and in consequence acoustic pressure (noise) from the draw and discharge side of the ventilation or air conditioning AHU, generated by the fan unit.
- **Silencing function constitutes an optional element of a unit's equipment.**

- 140 mm thick silencing elements (plates) internal filling is made of sound absorbing and incombustible mineral wool of 60 and 80 kg/m³ density, respectively.
- Plates' casing: plastic frame.
- The outer surface of the elements is covered with a thin unwoven fabric („veil”), which prevents mineral wool particles from getting into the supply air flow.
- Number of plates per silencer: 2-13 (depending on the size of a specific AHU).

NC curve distribution (Noise criteria)



Operation parameters

- Efficiency up to 90% - exchanger class A acc. EN 13053.
- Operation temperature: -40 ÷ +70°C.

Compliance with standards: EN 13053.

Mixing box inlet and outlet dimensions

VS	inlet (outlet) top (bottom) face				Side inlet (outlet)		
	$h_1 \times w_1$	W1	H1	L1	$h_2 \times w_2$	L1	H1
21	220x500	228	112	200	213x380	165	115
30		228	178	200	313x380	165	131
40	250x660	252	163	200		165	131
55	440x821	257	135	200	413x380	165	149
75	440x1028	224	195	200		165	209
100	575x1199	228	200	125	613x380	165	159
120		344	196	125		165	177
150	795x1520	280	137	200	713x740	165	178
180		280	239	200	913x740	165	180
230	933x1945	272	200	125		165	180
300		318	319	125	1213x740	165	179
400	933x2650	215	436	125	1513x740	165	146
500	933x3150	215	436	125		165	146
650	933x3250	220	674	125	1913x740	165	184

Operation parameters

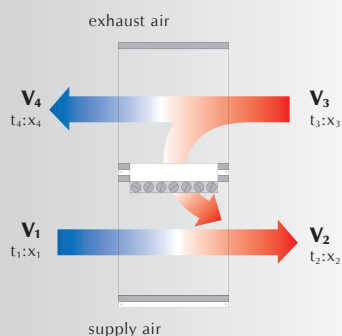
- Maximum air velocity: $v=5\text{m/s}$.
- Operation conditions: -40 ÷ +70°C.

Compliance with standards: EN ISO 7235:2005.

Silencing values for VENTUS AHU silencers

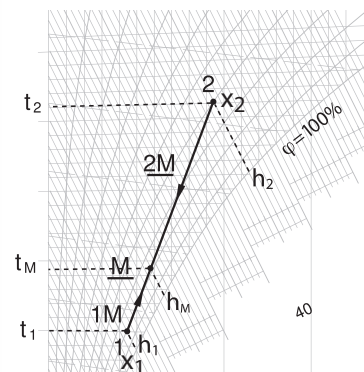
VS	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	Lw[dB]
10	6,3	9,4	15,7	18,8	20,1	20,4	20,0	26,4
15	6,8	10,2	17,0	20,4	21,7	22,0	21,5	28,0
21	10,6	16,0	26,7	32,0	34,1	34,7	33,9	40,0
30	8,7	13,0	21,7	26,1	27,8	28,2	27,6	33,9
40	10,0	15,0	24,9	30,0	32,0	32,5	31,8	37,9
55	9,4	14,1	23,5	28,1	30,0	30,4	29,9	36,0
75	9,0	13,5	22,4	26,9	28,7	29,1	28,6	34,7
100	8,9	13,4	22,3	26,8	28,6	29,1	28,5	34,7
120	9,5	14,3	23,8	28,6	30,5	31,0	30,3	36,5
150	9,5	14,2	23,7	28,5	30,3	30,8	30,2	36,3
180	8,4	12,6	21,0	25,2	26,9	27,3	26,8	33,0
230	9,5	14,2	23,7	28,4	30,3	30,8	30,1	36,3
300	11,4	17,1	28,3	34,0	36,3	36,9	36,0	42,2
400	11,7	17,4	29,0	34,9	37,2	37,8	36,9	43,0
500	12,8	19,3	32,1	38,5	41,1	41,7	40,9	46,9
650	11,2	16,8	28,0	33,6	35,8	36,4	35,7	41,7

Teaching aids



$$\frac{V_1}{V_2} = \frac{2M}{1M} = \frac{h_2 - h_M}{h_M - h_1} = \frac{x_2 - x_M}{x_M - x_1}$$

$$\frac{V_1}{V} = \frac{2M}{12} \quad \frac{V_2}{V} = \frac{1M}{12}$$



t [°C] - air temperature
 w [kg/kg] - amount of moisture in the air
 h [kJ/kg] - enthalpy of air
 V [m³/h] - air flow

Level of acoustic power

The acoustic power level, which is an objective value describing the source of noise in acoustic terms, is used for acoustic calculations (it is neither dependent of the distance of the sound source nor the room type).

Level of acoustic pressure

The measure of acoustic pressure of sound in relation to reference pressure amounting to
 $p_0 = 2 \cdot 10^{-5} \text{ Pa}$ (audibility threshold):

$$L_p = 20 \log (p/p_0) \text{ [dB]}$$

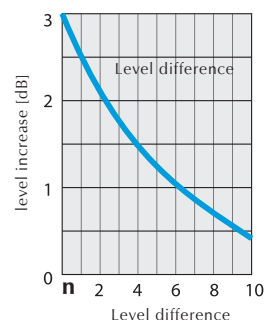
Acoustic pressure as a value perceived by human ear depends on the sound source and room type. Therefore the figures provided in technical specifications of equipment describe only an approximate value of the level of acoustic pressure.

Two and more sound sources

Summation of noise level from identical sound sources:

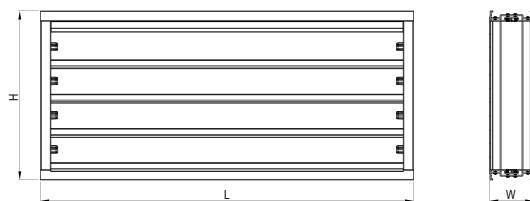
$$L_s = L + 10 \lg n \text{ [dB(A)]}$$

Where n – number of sources
 L_s - total sound level
 L - sound level of individual sources



For two sources ($n=2$) with identical acoustic power the sound level rises by 3 dB(A) at $n=10$ increase by 10 dB(A). For summation of two sources with different sound levels, the level of the louder source must be increased according to the chart depending on the level difference between the two sources. For more sound sources all sound sources should be totaled one by one.

● The letter "A" added to the acoustic pressure level unit [dB(A)] - shows that the indicated noise level takes into account the reaction of human middle ear to sounds of different frequencies. It is known that low frequencies of the same acoustic pressure are more tolerable to humans than high frequencies, which is shown by the "A" curve.

	Function and application	Design
Pad Humidifier  	● Humidifying of supply air. ● Improvement of in-door climate conditions by adjustment of supply air humidity.	● Humidifier pad made of CELDEK II material. ● Humidifier casing made of stainless steel. ● Direct water drainage (VS 21-VS 55). ● System of recirculating water supported by pump (VS 75-VS 650). ● Droplet eliminator integrated with humidifier pad (VS 75-VS 650). ● Water drainage system securing against too high water level in the tank. ● Float-valve for water supply and water level control (VS 75-VS 650).
Air damper   A.DAMP type	● Cutting off the air flow through AHU. ● Control of air flow through AHU. ● Control of air mixing rate in the supply and exhaust AHU system. ● Protection of cross-flow exchanger - by-pass type air damper.	● Aluminium blades protected with rubber seals on the edges. ● Aluminium frame. ● Driven by plastic gears installed inside aluminium framework of the damper. ● Damper is equipped with a square pin adjusted for cooperation with an actuator (dampers with hydraulic diameters greater than 4m² have two pins coupled with a connector). ❶ Assembly: - outside AHU's casing; - mixing box: inside AHU's casing.
Flexible connection   FLX.CNC type	● Protection of the ventilation system (ducts) against transmission of vibrations from the ventilation or air conditioning AHU. ● Compensation of axial symmetry of ventilation ducts in relation to the AHU's axis.	● Flange material: 1 mm thick galvanized steel, 30 mm wide. Fire resistance: 97HB [ISO1210] PVC-C material with UV stabilizer. Surrounding temperature: 30°C to +97°C. Fire resistance: 97HB [ISO1210]. ● Elastic material: polyester fabric covered with PVC. Surrounding temperature -30°C to +70°C. ● Operation position: span 110 mm. ● PE are equipped with ground load in order to equalize potentials. ❶ Optional: Galvanized steel collar - thickness 1 mm, width 30 mm
Air intake, Air terminal  VS 21 ÷ 650	● Protection of the ventilation or air conditioning AHU against the effects of outdoor factors (water, sand) for outdoor systems. ❶ Each of these components can operate as an independent option.	● Air intake: made from aluminum, air intake handlebars made from ABS. ● Air terminal: made from aluminum, air terminal handlebars made from ABS. 
Lighting   INT.LGHT type	● AHU inspection and maintenance.	● Casing. ● Glow tube. ❶ Installation: Filtration compartment, Fan compartment.

VS 21 ÷ 650

Lighting

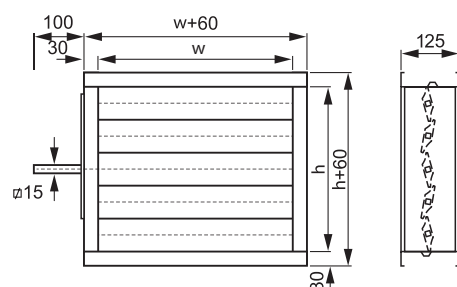
INT.LGHT type

VS 21 ÷ 650

Operation parameters

- Air Humidifying based on adiabatic water evaporation realized in the humidifier pad.
- Max air face velocity threw the humidifier pad: 3,00 m/s (VS 21-VS 55); 4,00 m/s (VS 75-VS 650).
- Supplying water pressure range: 0,15 ÷ 0,75 Mpa.
- Requirements regarding supplying water quality – standard municipal water.
- Reaching final air temperature and humidity after re-heating realized on secondary heater.

- Leakages behind the closed blades: 50m³/h/m² – at pressure difference of 100Pa.
- Ambient temperature: -40 ÷ +70 °C.



- Pressure strength of material in accordance with DIN24194.
- Position of operation: span 110mm.
- Ambient temperature: -40 ÷ +70 °C.

VS	W	L	H
	[mm]	[mm]	[mm]
21	128	881	373
30	128	881	493
40	128	1088	493
55	128	1259	630
75	128	1400	730
100	128	1580	830
120	128	1810	893
150	128	2002	993
180	128	2002	1193
230	128	2410	1193
300	128	2504	1493
400	128	3003	1730
500	128	3504	1730
650	128	3615	2193

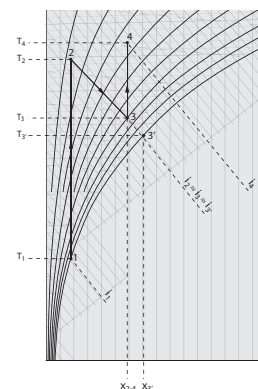
- Power supply voltage: 230V AC.
- Power: 11W.
- Protection clas: IP54.
- Ambient temperature: 0 ÷ +70°C.

Teaching aids

Water flow for pad humidifiers

AHU Size	Min. recommended water flow through the pad	Nominal water flow for best humidifying performance
VS	l/min	l/min
21	0,54	1,08
30	0,79	1,58
40	0,97	1,95
55	1,49	2,98
75	1,68	3,37
100	2,24	4,47
120	2,71	5,42
150	3,31	6,61
180	4,16	8,32
230	5,03	10,05
300	6,79	13,58
400	9,64	19,28
500	11,27	22,54
650	15,26	30,53

Adiabatic humidifying process, followed by air re-heating



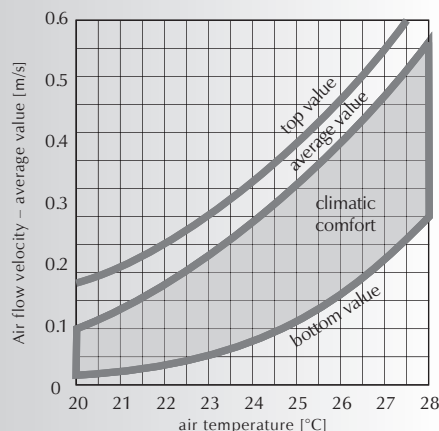
Formula for humidifying efficiency ratio calculation is a measure of approaching the air condition to the dew point $\phi=100\%$

$$\epsilon_a = \frac{x_3 - x_2}{x_{3'} - x_2} \cdot 100\%$$

x_3 – humidity ratio after humidifying process for point 3

x_2 – humidity ratio before humidifying process for point 2

$x_{3'}$ – humidity ratio for dew point of the air having the same enthalpy like in point 3



Air flow velocity in a populated area

Usually in a populated area (up to 1.8m above the floor and at 0.15m intervals from all surfaces of the room) at 24°C the recommended velocity of air flow is 0,15 m/s. You can approximately determine air velocity in the room using the chart. Use the standards for more accurate calculations.

Source: EN ISO 7730, ASHRAE 55.

Calculating the amount of ventilation air considering the required multiple of replacement

$$V = n \cdot V_p \text{ [m}^3/\text{h]}$$

V_p – [m³] – cubic capacity of the room
 n – [h⁻¹] – required multiple of replacement in the room

You need to remember that the method of determining the amount of ventilation air based on the replaced multiple is a simplified method not considering the thermal load of the room, the number of persons or concentration of pollutants. The values in the table based on the DIN 1946, ASHRAE standard should be treated as approximate.

Type of room	Multiple of air replacement [h⁻¹]
Utility room	1 ÷ 2
Bank	2 ÷ 3
Swimming pool	3 ÷ 4
Library, Classroom	3 ÷ 5
Shopping Centre, Mechanical Workshop	3 ÷ 6
Auditorium, Office room	3 ÷ 8
Cinema, Theatre, Garage, Warehouse, Cloakroom	4 ÷ 6
Hotel room	4 ÷ 8
Server room	5 ÷ 10
Physical laboratory	5 ÷ 15
Conference room, Shop	6 ÷ 8
Restaurant	8 ÷ 12
Bar, Laundry	10 ÷ 15
Kitchen	10 ÷ 30

Calculation of the amount of ventilation air depending on the number of people

$$V = n \cdot V_i \text{ [m}^3/\text{h]}$$

V_i – [m³/h] – amount of the outdoor air (so called hygienic minimum) per person
 n – number of persons

Usually the value of V_i is assumed from 20 to 60 m³/h per person, depending on the type of a room. In any case, the amount of air calculated in this way is at the same time the minimum amount of outdoor air that must be supplied to the room.

Source: DIN 1946, ASHRAE standard.

automation ***VENTUS***



Stable operation, easy control, full safety

VENTUS air handling and conditioning units are not only devices, they also feature systems of carefully selected and programmed control applications enabling professional management of air ventilation and conditioning circuits.

The control algorithms used have been developed with cost-in-use reduction in mind, while at the same time maintaining required parameters of the air supplied as well as ensuring reliability of our units.

For management of our VENTUS air handling and conditioning units we recommend our application in two versions:

- Control system based on a UPC controller – for use in applications where ventilating system working specification requires advanced control functions, such as external local communication or integration with a BSM system.
- OPTIMA control system – designed for less complex applications, where only standard management solutions for our units are required.
- CG-0-1 application, being a specialized solution for exhaust units, realizing control based on external binary signals.

A set of user interfaces dedicated individually to each application ensures unprecedented convenience in operation of our applications and facilitates the management of air parameters.

Controls

Control elements	72
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Control applications	80
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Supply AHUs

Heating: AS-1, AS-65	81
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Cooling: AS-4, AS-68	82
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Heating, Cooling: AS-5, AS-69	83
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Exhaust AHUs

Ventilation: AE-0	84
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Supply-exhaust AHUs: cross-flow exchanger

Ventilation: AP-0 (VS 10÷15)	86
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Heating: AP-1 (VS 10÷15)	86
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Cooling: AP-4 (VS 10÷15)	87
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Heating, Cooling: AP-5 (VS 10÷15)	87
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Ventilation: AP-32 (VS 21÷650)	88
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Heating: AP-33 (VS 21÷650)	88
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Cooling: AP-36 (VS 21÷650)	89
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Heating, Cooling: AP-37 (VS 21÷650)	89
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Supply-exhaust AHUs: rotary exchanger

Ventilation: AR-0	91
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Heating: AR-1	91
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Cooling: AR-4	92
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Heating, Cooling: AR-5	92
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Supply-exhaust AHUs: run-around-coil system

Ventilation: AG-1	93
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Heating: AG-257	93
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	Function and application	Design
Duct temperature sensor 	● Measurement of the temperature of supply, exhaust and outdoor air. ● Securing max. and min. temperature of supply air. ● Protection against frosting on the energy recovery unit via the temperature measurement of air exhausted upstream the energy recovery unit.	● Resistance measuring element installed in an aluminium bayonet probe of 25 cm length.
Room temperature sensor 	● Dedicated for UPC controller based automation applications. ● Room temperature measurement.	● Resistance measuring element fitted on a PCB installed inside a plastic housing.
Differential pressure switch 	● Monitoring of filter contamination in the AHU by measurement of difference between static pressures before and after the filter element. ● Control of the operation of a fan unit with a belt drive – lack of fan static pressure increase indication by measurement of difference between static pressures at the supply and exhaust side of the fan. ● Control of the operation of a direct driven fan unit in case of cooperation with electric heater.	● Membrane coupled with the mechanical system deforms when a set acceptable pressure difference is exceeded, and, as a result, switches electrical contacts (filter contamination signal or fan unit operation). ● Housing material: ABS.
Thermostat at air side 	Anti-frost protection of water heater ● Anti-frost protection of water heater based on the measurement of minimum acceptable temperature of air after the exchanger. ● When the air temperature drops below the minimum allowable temperature, signal from the thermostat stops AHU fans, closes external air dampers and adjusts control valve of the heater to the max. flow of heating medium. ● Switching into permanent alarm condition if the AHU protection is triggered three times within an hour. Control of initial operation of the electric heater ● Switching ON and OFF control for the electric preheater equipped with MHE control system. ● At the moment of air temperature drop at the upstream side of the heater below the set value, the thermostat signal activates MHE control module and starts heating of the outside air.	● Measuring element: Capillary of length, respectively 2m for VS 10÷40 6m for VS 55÷650 Filled with refrigerant. ● The thermostat is equipped with adjusting screws which enable setting the minimum allowable operating temperature as well as the temperature of system reactivation (hysteresis). ● Housing: plastic. ❗ The thermostat is always installed on the first water heater of the AHU.
Overheat protection thermostat 	● Over-heating protection for electric heater – switching off the heater and automatic reactivation once the temperature is lowered by the hysteresis value. ❗ The component is a part of optional equipment of the electric heater.	● Bimetallic element installed inside a metal housing.

Operation parameters

- Measurement range: $-50 \div +90^{\circ}\text{C}$.
- Air humidity: $5 \div 100\%$.
- Measurement Accuracy: $\pm 0.5\text{K}$.
- Measuring element: NTC 10k (UPC), PT 1000 (OPTIMA).
- Output signal: resistance.
- Cables length: max. 100 m.
- Protection class: IP67.

❗ **The connection between the sensor and control box is made with a shielded cable.**

- Measurement range: $-20 \div +70^{\circ}\text{C}$.
- Air humidity: $5 \div 95\%$ without condensation.
- Measurement accuracy: $\pm 0.5\text{K}$.
- Measuring element: NTC 10k (UPC).
- Output signal: resistance.
- Cables length: max. 100 m.
- Protection class: IP20.

❗ **The connection between the sensor and control box is made with a shielded cable.**

- Measurement: $30 \div 500\text{Pa}$ (filters of class G4 ÷ F9).
- Rated operating voltage: 250V AC ($I_{\text{max}}=3\text{A}$).
- Output signal: potential-free contact, NO or NC according to the application.
- Switching capacity: 1mln of cycles (in temp. of 60°C).
- Protection class: IP54.
- Ambient temperature: $-20^{\circ}\text{C} \div +60^{\circ}\text{C}$.

- Measurement: $-18 \div +15^{\circ}\text{C}$.
- Anti-frost signal setpoint value: $+5^{\circ}\text{C}$ (manufacturer).
- Hysteresis: $1.7 \div 12\text{K}$.
- Rated operating voltage:
30 V DC
230 V AC
- Output signal: potential-free (switchover contact).
- Protection class: IP 44.

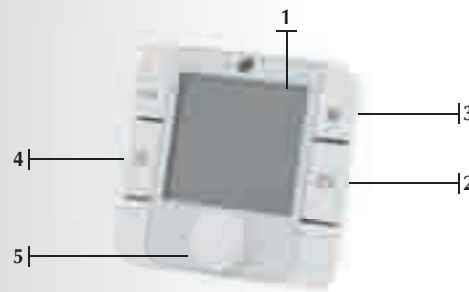
❗ **If the thermostat is used as anti-frost protection of the water heater, the capillary should be installed in the lowest temperature zone of the medium flowing into the exchanger.**

❗ **If the thermostat is used for controlling the air electric preheater, it shouldn't (both the capillary and the casing) be installed at the direct vicinity of the heater.**

- Overheating setpoint temperature: 65°C .
- Re-switch On setpoint temperature: 45°C .
- Output signal: potential-free (switchover contact).
- Rated operating voltage:
20 V DC
230 V AC

HMI BASIC UPC

Description



1. LCD display

Shows the actual temperature in the room or measured by the main control sensor and the selected setting, operation mode, fan speed, time and day.

2. ON/OFF button

Switching between ON and OFF state (forces the AHUs to stop or enables selection of the operation mode).

3. Fan button

Button for setting the fan operation mode.

4. Clock button

Setting the Auto mode. The controller will operate according to the schedule from the Calendar settings.

5. Push&roll button (knob)

Fast, intuitive and facilitating entering the values, changing the settings, confirming the new values.

HMI Basic: functions

- Measurement and displaying of temperature in the room.
- Changing and displaying the value of temperature setting.
- Displaying the actual fan speed setting or information of Auto mode along with the mode switching option.
- Changing predefined operation modes of the AHU:

Low – lower economical mode; wide dead band for the temperature adjustment, low fan speed

Econo – higher economical mode; narrow dead band for the temperature adjustment, higher fan speed

Comfort – comfort mode; the narrowest dead band, the highest fan speed

- Built-in interface Calendar – as an alternative to the main Calendar of UPC controller.
- Alarm condition indication (the alarm codes are described in the technical and maintenance manuals for the supply and exhaust AHUs).

Function and application

Design

Carbon monoxide (CO) detector



- Indoor carbon monoxide detection. Increase of carbon monoxide concentration over the acceptable threshold activates the outputs controlling the fan speed.

● **Optional control element.**

- Measuring element with microprocessor circuit installed inside a high-impact housing.
- Housing: plastic.

ON-OFF and 0-10 V air damper actuator

Typ ON – OFF; 0 – 10V



- Opening/cutting off air flow in the AHU: ON/OFF actuator.
- Mixing ratio control for outdoor and room-exhausted air (recirculation): 0-10 V actuator.
- Control of bypass air damper opening level for the cross-flow exchangers – anti-frost protection of the exchanger (VS 21-650): 0-10 V actuator.

- Mechanical system with an electric motor installed inside plastic housing.
- Actuator fitted for installation with a square-section stem $10 \div 16$ mm or a round-section stem $\varnothing 10 \div 20$ mm.

● **For air handling units equipped with water heater, the air damper actuator is additionally equipped with a return spring - air damper is closed when no supply voltage is present.**

Electric heater control module – MHE type

Typ MHE VS 10 ÷ 650



- Power supply, protection and smooth electric power regulation (thermal power) of multi-stage heaters by means of PWM (Pulse Width Modulation) signal.
- Power of the heater is adjusted by alternate switching ON and OFF of the first heating stage, which is equipped with semiconducting relays. The subsequent heating stages are switched ON by the contactors, when the first heating stage reaches its maximum power. After switching the next heating stage, power of the first one drops to the minimum.

- Main switch – disconnection of the electric heater power supply.
- Control module.
- Set of contactors – switching ON the heating element circuits.
- Set of system switches – protection of the system cables and protection of the loads connected to it against short circuits and overcurrents.

● **The control module is factory integrated with the electric heater – can not be sold as an independent control element.**

Three-way valve with electric actuator



- Temperature adjustment of the medium flowing through the water exchanger – the heater. Qualitative control which guarantees constant flow of the medium supplied to the exchanger at its varying supply temperature.
- Adjustment of the medium flow supplied to the exchanger at constant supply medium temperature – the cooler (installation of the valve in the medium return circuit from the exchanger).
- Integration of the valve with a circulation pump is required in order to minimize the risk of the medium freezing inside the exchanger (heater).

Actuator:

- Mechanical system with an electric motor installed inside the plastic housing enables smooth adjustment of the valve opening.

Valve:

- Body: brass / steel.
- The valve regulation element: Ball / head.
- Material of the valve regulation element: stainless steel.
- Connection type:
threaded
DN15 for $k_{vs}=2,5; 4,0$
DN20 for $k_{vs}=6,3$
DN25 for $k_{vs}=10$;
DN32 for $k_{vs}=16$
DN50 for $k_{vs}=25; 40$
DN50 for $k_{vs}=58$
- Connection type:
flanged
DN80 for $k_{vs}=100$

Service mains switch



- Disconnection of the VS 10 (18 kW) and VS 15 (36 kW) AHUs electric heaters from the power supply.

- The housing made of plastic.
- Common disconnecter for all 3 phases of the heater power supply circuit.

Operation parameters

- Supply voltage: 230 V AC.
- Output signal: potential-free (switchover) contact, 12 V DC / max. 0.1 A.
- Power consumption: 5W.
- Protection class: IP 40.
- Ambient temperature: $-10 \div +40^{\circ}\text{C}$.

- Regulation method:
 - two-point;
 - smooth 0-100%.
- Supply voltage: 24 V AC.
- Input signal:
 - ON/OFF
 - 0 - 10 V DC
- Rated torque: 16 Nm.
- Rotation angle 90° .
- Opening time: - ON/OFF
 - 80 ÷ 120s (spring 10s)
 - 0-10 V: 80 ÷ 90s (spring 10s)
- Number of cycles: 60 000.
- Max. air damper area: 4 m².
- Protection class: IP54.
- Ambient temperature:
 - $-20 \div +50^{\circ}\text{C}$

● **The connection between the sensor and control box is made with a shielded cable.**

- Adjustment range: $0 \div 100\%$.
- Rated operating voltage: 3*400 V/50 Hz.
- Control circuits supply voltage: 24 V AC.
- Input signal:
 - digital 3x 24 V DC
- Output signal:
 - digital 6x 24 V DC
 - PWM 1x 24 V DC.
- Ambient temperature: $0 \div 50^{\circ}\text{C}$.

Actuator

- Adjustment range: 0 - 100%.
- Supply voltage: 24 V AC/DC.
- Input signal: 0-10 V DC.
- Rated torque:
 - 5-20Nm for $k_{vs}=2,5 \div 58$
- Nominal pressure:
 - 1800 N for $k_{vs}=100$
- Rotation angle: 90° .
- Protection class: IP54.
- Ambient temperature:
 - $-20 \div +50^{\circ}\text{C}$

Valve

- Operating characteristics:
 - Equal percentage/proportional
 - k_{vs} : 2,5 / 4,0 / 6,3 / 10 / 16 / 25 / 40 / 58 / 100
- Pressure drop
 - $\Delta p_{\max} = 200 \text{ kPa } k_{vs} \leq 25$
 - $\Delta p_{\max} = 240 \text{ kPa } k_{vs} > 25$
- Medium temperature:
 - $k_{vs} = 2,5 \div 58$: $-10 \div 120^{\circ}\text{C}$
 - $k_{vs} = 100$: $5 \div 120^{\circ}\text{C}$
- Maximum glycol content in the medium: 50%.
- Ambient temperature:
 - $-20 \div +50^{\circ}\text{C}$

- Protection class: IP 44.
- Maximum current load: 100A.
- Dimensions: 200x150x100mm.

HMI ADVANCED UPC



1. LCD display

Displays the available settings and the current values

2. Main menu structure

Main screen with key statuses and settings.

- HMI operation mode – used for setting main operation mode with HMI
- Operation mode – displays the current AHU status resulting from the HMI configuration, alarms, external control signals, etc.
- temp HMI setting – for input of main temperature setting of the HMI
- Current temperature – displays the main measurement temperature.

Second screen of main status

- Fans – displays the current status and speed of fans
- Air dampers – displays the current status and opening of air dampers
- Regulator – displays the status and output of the main regulator for the heating/cooling function
- Recovery – displays the current status for the heat recovery

The parameter highlighted with the cursor is the parameter being edited.

The parameter not highlighted with the cursor is the readout parameter.

3. Function keys

BELL

- opens the alarm management screen

PRG

- quick opening of the Calendar main screen
- quick setpoint configuration on the Calendar screens
- push and hold the key on the ALARM screen to clear the errors

ESC

- returns to the previous screen and cancels the parameter change

Up arrow

- moves the cursor up through the menu screens (when the cursor is in left top corner)
- increases the parameter value

ENTER

- moves the cursor through the screen – the cursor jumps to the next editable parameter. Read-only parameters are not highlighted with the cursor.
- confirms entered values
- opens submenu from the main menu level:
 - Parameters
 - Calendar
 - Alarms
 - Configuration
 - Service

Down arrow

- Moves the cursor down through the menu screens (when the cursor is in left top corner)
- decreases the parameter value

Function and application

Design

Frequency converter



- Smooth regulation of the AHU air flow by proportional change of the motor-fan unit rotational speed.
- Maintaining fixed AHU operating parameters at varying air flow resistances of ductworks.
- Protection of maximal value of motor current.
- Controlling of fan start-up with simultaneous protection of maximal value of start-up current.
- Integration with external analog and binary signals
- Displaying and modification of fan-set working parameters.

● **The converter is designated only for VS 10÷650 AHUs equipped with a direct drive fan assemblies.**

- The electronic circuit enabling motor voltage frequency adjustment and maintaining optimal U/f ratio.
- The circuit is installed inside a plastic housing.
- The fan ensuring cooling of the converter internal circuits.
- The operating panel allowing entering the frequency converter parameters.

HMI Basic - simplified user interface



- Measurement of the air temperature in room.
- Setting and reading of basic operating parameters of ventilation or air conditioning units:
 - air parameters;
 - efficiency change;
 - operation mode change;
 - breakdown states.
- Independent Calendar.
- Knob default function – air temperature setting.

● **Optional control element.**

- Electronic circuit with thermistor measuring element (NTC) installed in a plastic housing.
- LCD display.
- Operating panel.
- Knob facilitating setting of parameters.

HMI Advanced user's external interface



- Setting and reading of advanced operating parameters of ventilation or air conditioning units.
- Frequency converters remote programming.
- Management and cancelation of units operational errors is done by full text description.
- Management of the controller main Calendar.
- Configuration of the controller universal inputs and outputs.

● **Optional control element.**

- Electronic circuit installed inside a plastic housing.
- Legible textual LCD display.
- Communication cable (3 m as standard) for the controller connection with the RJ 11 connector.

HMI OPTIMA simplified user interface



- Integration with OPTIMA controllers.
- Measurement of the air temperature in rooms.
- Setting and reading of basic operating parameters of ventilation or air conditioning units:
 - air parameters;
 - efficiency change;
 - operation mode change;
 - breakdown states.

● **Optional control element.**

- Electronic circuit installed inside a plastic housing.
- Internal temperature sensor connected to the digital integrated circuit.
- Legible textual LCD display.
- Navigation keys located on the front panel.

Operation parameters

- Adjustment range:
20 ÷ 100 Hz
- Supply voltage:
1- and 3-phase 200 ÷ 240 V AC
3-phase 380 ÷ 480 V AC
Supply voltage rated frequency
48 ÷ 63 Hz
- Control circuits (programmable):
- 5 binary inputs (LG SV..iC5, Danfoss MicroDrive); 8 binary inputs (LG SV..iG5A)
- 1 analog input 0..10V (LG); 0/4..20mA (Danfoss Micro-Drive)
- Drive)
- 1 relay input with change-over contact
- 1 transistor binary output (LG SV..iC5, LG SV..iG5A)
- 1 analog output 0/4..20mA (Danfoss Micro-Drive)
- Modbus RTU communication over RS485 bus
- Motor connection: 3-phase
- Ambient temperature:
0 ÷ 40°C
- Protection class: IP20
- Forced cooling by built-in fan

❗ **The above parameters are specific for a frequency convertor models that were selected as an examples.**

❗ **The frequency convertor types and models to be used in AHUs, each time have to be confirmed with VTS Sales Representative.**

❗ **The frequency convertors comply to EMC Directive 89/336/EEC (RFI filters for the Second Environment are not required).**

- Power supply.
- Directly from the control gear
~24 VAC (-15..+10%) or 22..35 VDC
- Temperature measurement: 0 ÷ 40°C.
- Measurement accuracy: ±0.5 K.
- Communication with the controller via Modbus RTU protocol.
- Communication cable length: max. 500 m.
- Protection class: IP30.
- Ambient temperature: -10 ÷ +60°C / ϕ <90%, without condensation.

- Power supply: directly from the UPC controller.
- Communication port: serial port, RS485 standard.
- Communication cable length: max. 1200 m.
- Connection method: 1:1.
- Protection class: IP31.
- Ambient temperature: -20 ÷ +60°C / ϕ <85%, without condensation.

- Supply voltage: 24 VDC.
- Power supply: Directly from the control gear.
- Temperature measurement: 0 ÷ 50°C.
- Air humidity: ϕ <85%, without condensation.
- Measurement accuracy: ±0.5 K.
- Response time: 30 sec.
- Communication with the controller via RS 485, Modbus RTU bus.
- Protection class: IP30.

HMI OPTIMA



1. LCD Display

Displays the available settings and the current values

2. Main menu structure

AHU status – indicates current ventilation and control system condition.

- Switched off – normal state, non-emergency stopping of the unit
- Switched on – unit in operation, the fans and heating/cooling/heat recovery functions are active, according to the current unit status and demand
- Alarm condition – unit under alarm condition
- Fault stop – the unit stopped by an alarm
- Preheating – preheating of the water heater in order to avoid antifreeze alarm triggering during the start-up
- Service mode – the unit is stopped and ready for configuration of basic parameters, such as control system application code
- Fast heating – special mode of recirculation enables fast heating of rooms with a maximum possible recirculation
- Rundown – a special mode for stopping the unit equipped with an electrical heater or cooler with a direct evaporation system; delays stopping of the fans in order to acquire safe conditions for a heat exchangers

Operation mode – main setting for the operation mode used for integration with HMI OPTIMA

- Stop – the unit is switched off
- 1st speed level – the unit is on, the fans are rotating with speed of the 1st speed level (low efficiency)
- 2nd speed level – the unit is on, the fans are rotating with speed of the 1nd speed level (high efficiency)
- Stand-by – the unit is stopped to save the energy, however, is ready for an automatic start-up in order to maintain rooms temperature within the set range
- Calendar – the unit operates in AUTO mode, according to real time clock program

Temperature setting – temperature setting for the controller

- Low limit: 5°C
- High limit: 35°C
- Default: 22°C

Temp. displaying – current value measured by the main temperature sensor

PARAMETERS – a link to main operating parameters readings

CALENDAR – a link to AUTO mode settings

SETTINGS – a link to detailed configuration of the controller

SERVICE MENU – a link to the basic controller settings, e.g. application code; used in the controller Service mode

Function and application

Design

VS UPC control box for air supply and supply-exhaust units



- Ventilation or air condition unit operating parameters adjustment, control and protection - operation, temperature, air flow and fault conditions.
- The AHU operation according to the Calendar with a possibility of a division into a time "zones".
- Remote management of the unit operation by means of external communication modules - HMI Basic or HMI Advanced user interfaces.
- Integration with an external modules in the scope of:
 - start signal;
 - fire protection signal;
 - START/STOP circuit.
- Analogue input for strap-on water temperature sensor returning from water heater (NTC 10 standard).

- Set of fuse-switches on the power supply circuit of the frequency converters.
- Controller.
- Mains switch.
- PC (polycarbonate) housing with dimensions: 450 mm x 640 mm x 170 mm

● **The above dimensions apply to the largest controller.**

CG OPTIMA control box



- Operation of AHUs equipped with direct drive "PLUG" type fans, supplied from a frequency converters.
- Protection and control of air supply and air supply-exhaust units equipped with:
 - two fan assemblies with a frequency converters;
 - two air dampers;
 - cooler or heater;
 - heat recovery unit.
- Analogue input for strap-on water temperature sensor returning from water heater (NTC 10 standard).

- Set of fuse-switches on the power supply circuit of the frequency converters.
- Controller.
- Mains switch.
- PC (polycarbonate) housing with dimensions: 240x400x130 mm

● **The above dimensions apply to the largest controller.**

CG 0-1 control box for air exhaust units



- The air exhaust unit operating parameters adjustment, monitoring and protection - operation, fault conditions.
- Integration with an external modules in the scope of:
 - start signal;
 - fire protection signal;
 - START/STOP circuit;
 - CO detector.
- Integration with a frequency converters operating in a configuration of 3 pre-defined fan speeds.

- Set of motor protection elements.
- Main switch.
- Control panel with the rotational speed setter.
- PC (polycarbonate) housing with dimensions: 460x340x170 mm

Pad humidifier control box



- Control over humidifier operations.
- Protection against dry operation of water pump (VS 75-VS 650).
- Periodical replacement of water in the tank by temporary opening dumping valve – protection against tank contamination due to water evaporation.
- **Control cabinet realizes only role of the humidifier operation control. It is not a device supporting temperature and humidity regulation of supplied air.**

- Protection degree: IP 42.
- Solenoid valve for direct pad supply installed in the control cabinet (VS 21-VS 55).
- System of internal relays controlling the position of main humidifier valves in fully open-fully closed mode (VS 75-VS 650).

Operation parameters

- Supply voltage: 3x400 V or 1x230 VAC.
- Frequency: 50Hz $\pm$ 1Hz.
- Control circuits supply voltage: 24 VAC.
- Power supply start permission signal of small circulating pump in the water heater qualitative control circuit, 1x230 VAC, Max. 10 A.

Controller

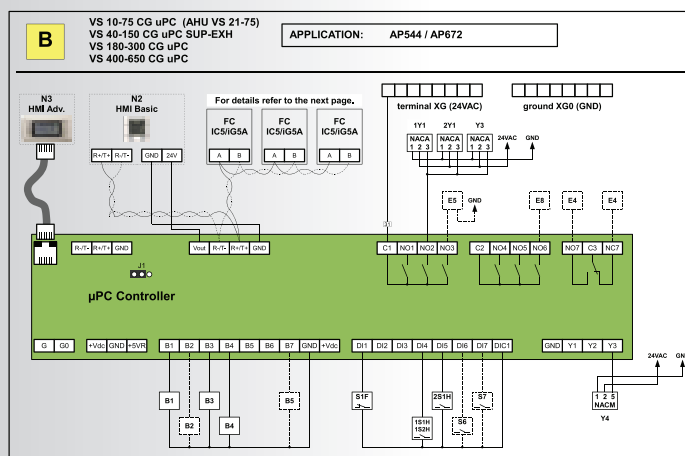
- Communication with a frequency converters and HMI Basic interface
 - RS485 bus
 - Modbus RTU communication protocol
- External communication using digital and analogue universal inputs/outputs.
- 1:1 type communication with HMI Advanced.
- Communication with BMS via Modbus TCP/IP protocol (optional).

- Supply voltage: 3x400 V or 1x230 VAC.
- Frequency: 50Hz $\pm$ 1Hz.
- Control circuits supply voltage: 24 VAC.
- Power supply start permission signal of small circulating pump in the water heater qualitative control circuit, 1x230 VAC, Max. 10 A.

- Supply voltage: 3x400 V or 1x230 VAC.
- Frequency: 50Hz $\pm$ 1Hz.
- Control circuits supply voltage: 24 VAC.
- Protection class: IP54.
- Ambient temperature: 0 $\div$ 50°C.

- Control cabinet power supply: $\sim$ 230 VAC.

Example of UPC controller connections



N3 HMI Adv. – connection of HMI ADVANCED UPC user interface

N2 HMI Basic – connection of HMI BASIC UPC user interface

FC IC5/iGSA – connection of frequency converters ModBUS communication

Terminal XG (24VAC) – three-way valves power supply output

Ground XG0 9GND0 – ground of dampers and three-way valves actuators power supply

1Y1, 2Y1, Y3 – connection of air dampers actuators communication

E5, E8 / E4 – AHU start confirmation / AHU alarm

B1 / B2 / B3 / B4 – connection of temperature sensor of supply air / room or exhaust / external / behind energy recovery

B5 – connection of multi-function analog reference

S1F – connection of fire alarm switch

1S1H, 1S2H / 2S1H – filter contamination control pressure switch on supply / exhaust

S6 / S7 – multi-function switch / optional multi-function switch

Y3 – connection of recirculation damper actuator communication

Dimensions of control boxes

UPC	VS 10÷75 CG UPC	VS 40÷150 CG UPC SUP	VS 40÷150 CG UPC SUP-EXH	VS 180÷300 CG UPC	VS 400÷650 CG UPC
Power supply	1*230 VAC	3*400 V AC	3*400 V AC	3*400 V AC	3*400 V AC
Application	VS 10÷75 Supply, Supply&Exhaust	VS 40÷150 Supply	VS 40÷150 Supply, Supply&Exhaust VS 180÷300 Supply	VS 180÷300 Supply, Supply&Exhaust VS 650 Supply	VS 400÷650 Supply&Exhaust
Max umber of fans	2	1	2	4	8
Motor nominal power range	up to 2,2 kW	3÷11 kW	up to 11 kW	3÷11 kW	3÷11 kW
Dimensions	335x400x165	335x400x165	335x400x165	335x550x170	640x450x170

CG 0-1	VS 21÷150 CG 0-1	VS 180÷300 CG 0-1	VS 400÷650 CG 0-1
Power supply	1*230 or 3*400 V AC	3*400 V AC	3*400 V AC
Application	VS 10÷75 Exhaust	VS 180÷300 Exhaust	VS 400÷650 Exhaust
Max umber of fans	1	2	4
Motor nominal power range	up to 11 kW	3÷11 kW	3÷11 kW
Dimensions	315x380x170	315x380x170	315x380x170

OPTIMA	VS 10÷75 CG OPTIMA	VS 40÷150 CG OPTIMA SUP	CG OPTIMA SUP-EXH
Power supply	1*230 V AC	3*400 V AC	3*400 V AC
Application	VS 10÷75 Supply, Supply&Exhaust	VS 40÷150 Supply	VS 40÷150 Supply&Exhaust
Max umber of fans	2	1	2
Motor nominal power range	up to 2,2 kW	3÷11 kW	up to 11 kW
Dimensions	285x235x115	315x380x170	315x380x170

Applications intended for VS 21-650 equipped with frequency converters

Application code	Functions available in particular applications									
	HW	HE	CW	DX	CWHW	PRC. BPS	MIX. CMBR	SUM. ER	PHT. HW	FAST. HTG
*AS 1										
*AS 2										
*AS 4										
AS 5										
AS 6										
*AS 8										
AS 9										
AS 10										
*AS 16										
*AS 65										
*AS 66										
*AS 68										
AS 69										
AS 70										
*AS 72										
AS 73										
AS 74										
*AS 80										
AS 193										
AS 194										
*AS 196										
AS 197										
AS 198										
*AS 200										
AS 201										
AS 202										
*AS 208										
AS 257										
AS 258										
AS 261										
AS 262										
AS 265										
AS 266										

Applications intended for VS 10-15 AHUs

Application code	Functions available in particular applications									
	HW	HE	CW	DX	CWHW	PRC. BPS	MIX. CMBR	SUM. ER	PHT. HW	FAST. HTG
AS 1										
AS 2										
AS 4										
AS 5										
AS 6										
AS 8										
AS 9										
AS 10										
AS 16										
AS 65										
AS 66										
AS 68										
AS 69										
AS 70										
AS 72										
AS 73										
AS 74										
AS 80										
AS 193										
AS 194										
AS 196										
AS 197										
AS 198										
AS 200										
AS 201										
AS 202										
AS 208										

The control system application code explanation:

* - the application available for both the UPC control system and the OPTIMA control system

no star - the application available only for the UPC control system

** - maximum size of the unit which can be operated with the OPTIMA control system: VS 150

AS - control system application for air supply units

AD - control system application for air supply-exhaust units

AG - control system application for air supply-exhaust units with glycol heat recovery system

AP - control system application for air supply-exhaust units with cross-flow heat exchanger

AR - control system application for air supply-exhaust units with thermal wheel

AE - AE - control system application for air exhaust units (not compatible with air supply units)

Symbols:

HW - water heater

HE - electrical heater

CW - water cooler

DX - cooler with direct medium evaporation system

CW/HW - reverse operation of water heat exchanger (heating - cooling)

PRC.BPS - cross-flow heat exchanger by-pass operation

MIX.CMBR - air mixing chamber

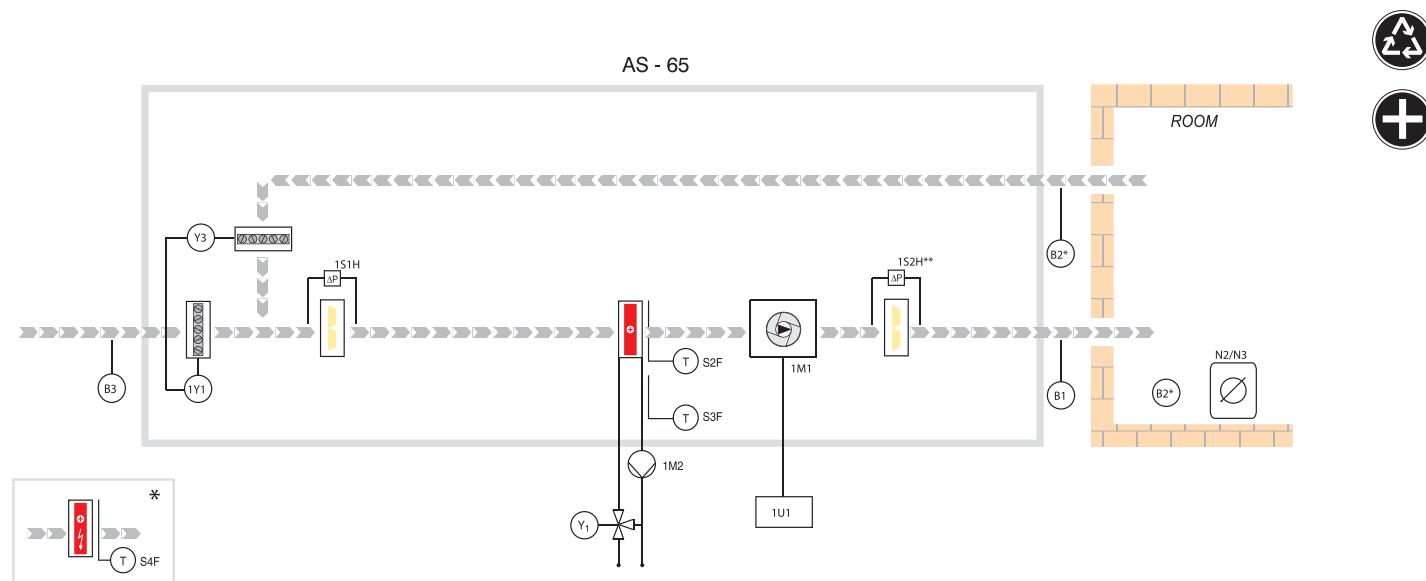
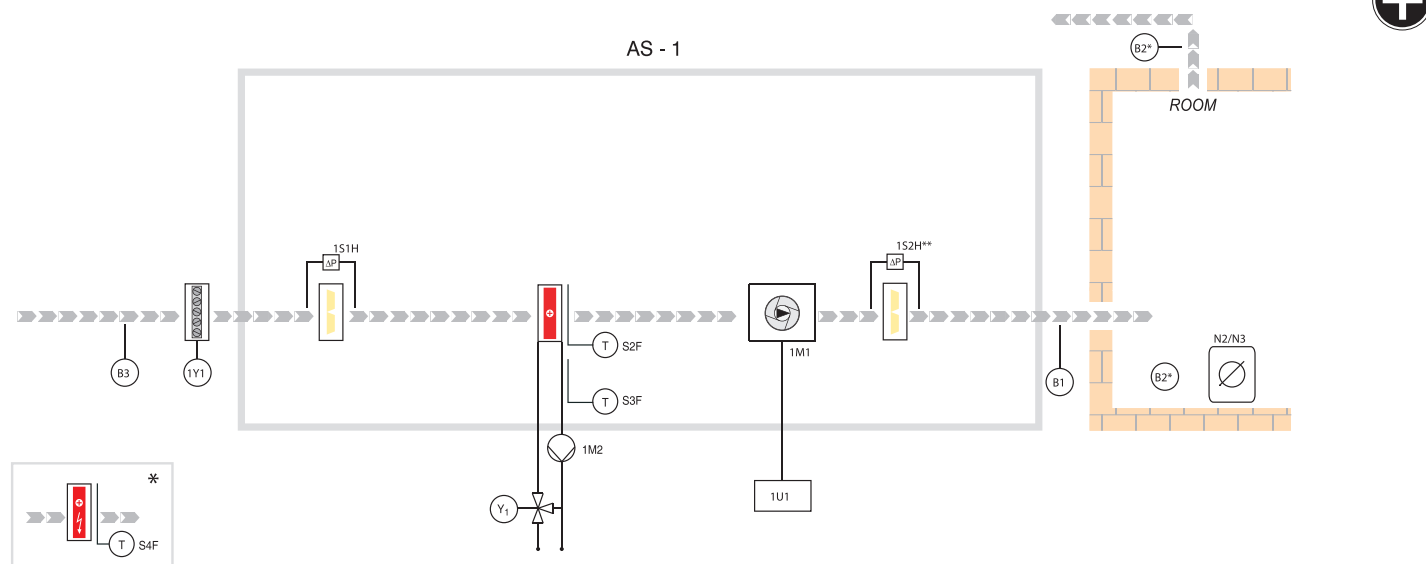
SUMM.ER - cooling recovery

PHT.HW - water preheater

FAST.HTG - fast heating function

Control applications

Supply AHUs



Control

- Control of room temperature (CG UPC, OPTIMA), optionally supply air temperature (CG UPC, OPTIMA) or exhaust air temperature (CG UPC).
- Control of the energy recovery level – first stage of heating/cooling.
- Air flow control.
- Operation according to calendar – temperature, efficiency, operation mode (OPERATION, STAND-BY, STOP).
- STAND-BY – maintaining the minimum, set indoor temperature.
- * Initial heating of external air.

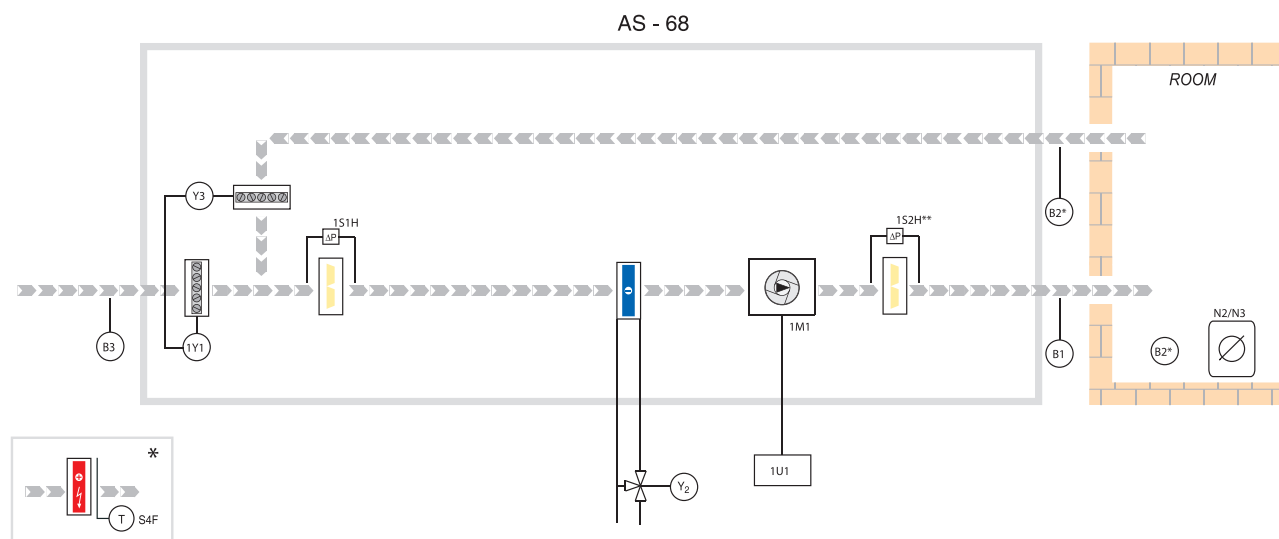
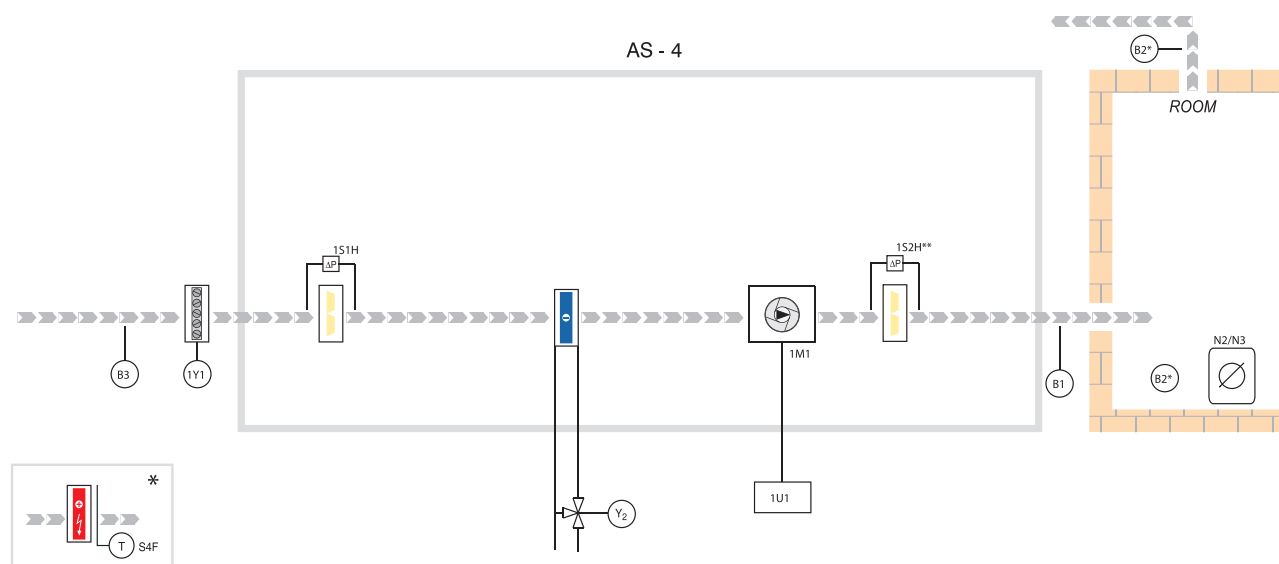
Information

- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

Protection

- Limiting the allowed supply air temperature.
- Fan unit protection – the function is active:
 - if an electric heater is applied.
- Overload protection of a drive unit.
- Anti-frost protection of a water heater.
- Protection against overheating of an electric heater.
- Optional protection against minimal and maximal temperature of medium returning from the water heater with use of Strap-on temperature sensor, standard NTC 10 (UPC) or PT 1000 (OPTIMA).

- ❗ The control application layouts have been prepared on the basis of water exchangers.
- ❗ The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).
- ❗ Optional Strap-on temperature sensor is not a part of VTS offer.



Control

- Control of room temperature (CG UPC, OPTIMA), optionally supply air temperature (CG UPC, OPTIMA) or exhaust air temperature (CG UPC).
- Control of the energy recovery level – first stage of heating/cooling.
- Air flow control.
- Operation according to calendar – temperature, efficiency, operation mode (OPERATION, STAND-BY, STOP).
- STAND-BY – maintaining the minimum, set indoor temperature.
- * Initial heating of external air.

Information

- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

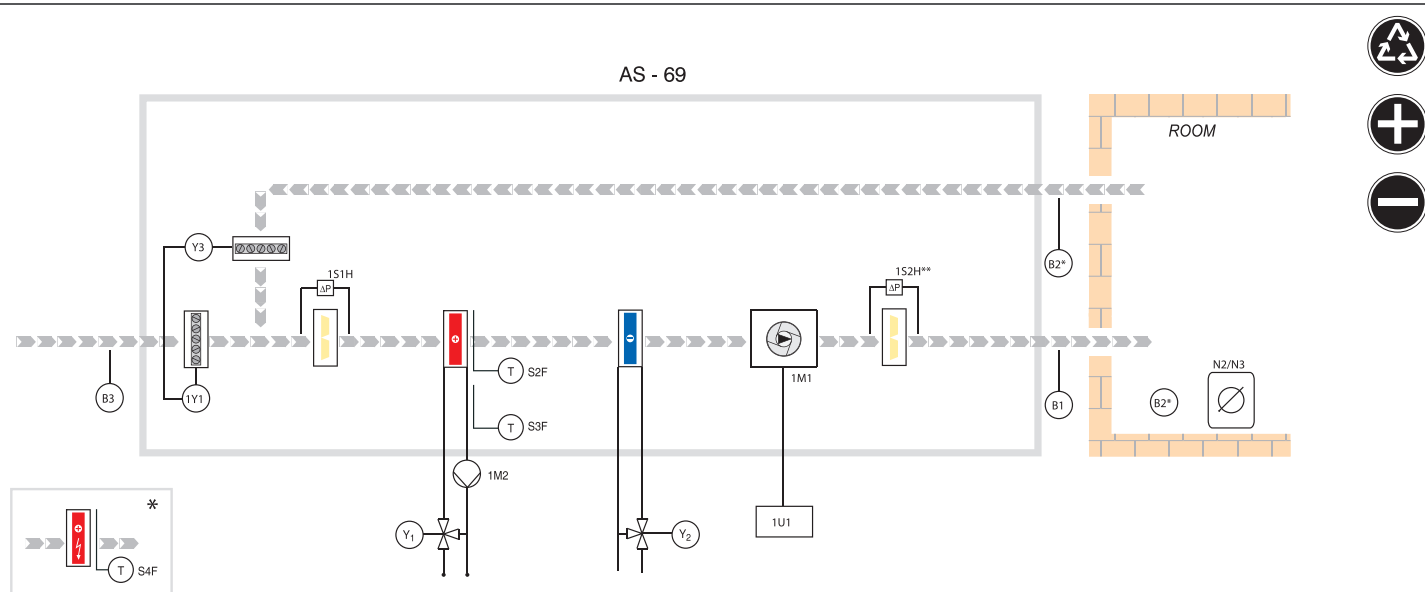
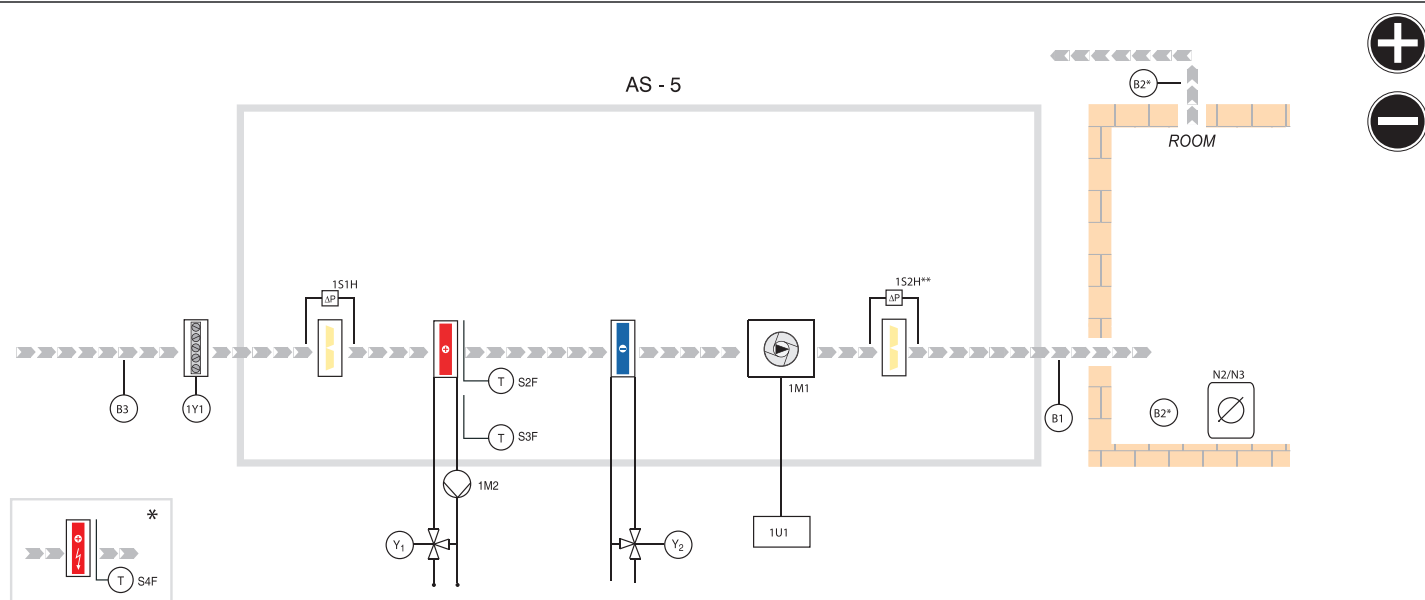
Protection

- Limiting the allowed supply air temperature.
- Fan unit protection – the function is active:
 - if an electric heater is applied.
- Overload protection of a drive unit.
- Anti-frost protection of a water heater.
- Protection against overheating of an electric heater.
- Optional protection against minimal and maximal temperature of medium returning from the water heater with use of Strap-on temperature sensor, standard NTC 10 (UPC) or PT 1000 (OPTIMA).

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- The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).
- Optional Strap-on temperature sensor is not a part of VTS offer.

Control applications

Supply AHUs



Control

- Control of room temperature (CG UPC, OPTIMA), optionally supply air temperature (CG UPC, OPTIMA) or exhaust air temperature (CG UPC).
- Control of the energy recovery level – first stage of heating/cooling.
- Air flow control.
- Operation according to calendar – temperature, efficiency, operation mode (OPERATION, STAND-BY, STOP).
- STAND-BY – maintaining the minimum, set indoor temperature.
- * Initial heating of external air.

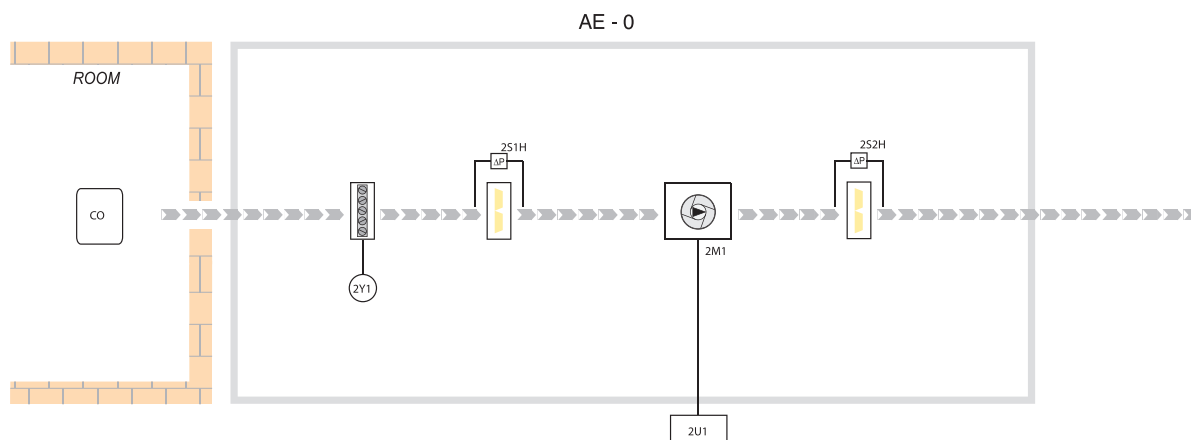
Information

- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

Protection

- Limiting the allowed supply air temperature.
- Fan unit protection – the function is active:
 - if an electric heater is applied.
- Overload protection of a drive unit.
- Anti-frost protection of a water heater.
- Protection against overheating of an electric heater.
- Optional protection against minimal and maximal temperature of medium returning from the water heater with use of Strap-on temperature sensor, standard NTC 10 (UPC) or PT 1000 (OPTIMA).

- ❗ The control application layouts have been prepared on the basis of water exchangers.
- ❗ The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).
- ❗ Optional Strap-on temperature sensor is not a part of VTS offer.



Control

- Air flow control.
- Air flow control depending on CO condensation ratio.

Information

- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

Protection

- Fan unit protection – the function is active:
 - for the fan unit with belt drive;
 - Overload protection of a drive unit.
- The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).

AP - Applications for supply – exhaust AHUs with plate-crossflow energy recovery system

Applications intended for VS 21-650 equipped with frequency converters

Application code	Functions available in particular applications									
	HW	HE	CW	DX	CWHW	PRC. BPS	MIX. CMBR	SUM. ER	PHT. HW	FAST. HTG
*AP 32										
*AP 33										
*AP 34										
*AP 36										
AP 37										
AP 38										
*AP 40										
AP 41										
AP 42										
*AP 48										
AP 160										
AP 161										
AP 162										
*AP 164										
AP 165										
AP 166										
*AP 168										
AP 169										
AP 170										
*AP 176										
AP 288										
AP 289										
AP 290										
AP 292										
AP 296										
AP 297										
AP 298										
AP 416										
AP 417										
AP 418										
AP 420										
AP 424										
AP 425										
AP 426										

Application code	Functions available in particular applications									
	HW	HE	CW	DX	CWHW	PRC. BPS	MIX. CMBR	SUM. ER	PHT. HW	FAST. HTG
AP 544										
AP 545										
AP 546										
AP 548										
AP 549										
AP 550										
AP 552										
AP 553										
AP 554										
AP 560										
AP 672										
AP 673										
AP 674										
AP 676										
AP 677										
AP 678										
AP 680										
AP 681										
AP 682										
AP 688										
AP 800										
AP 801										
AP 802										
AP 804										
AP 808										
AP 809										
AP 810										
AP 928										
AP 929										
AP 930										
AP 932										
AP 936										
AP 937										
AP 938										

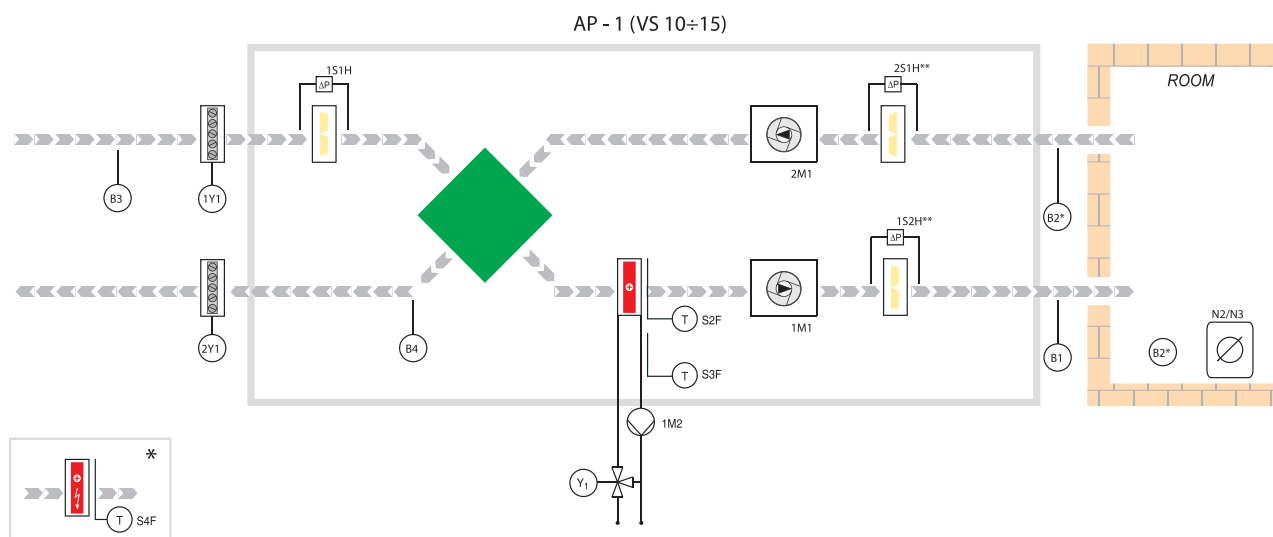
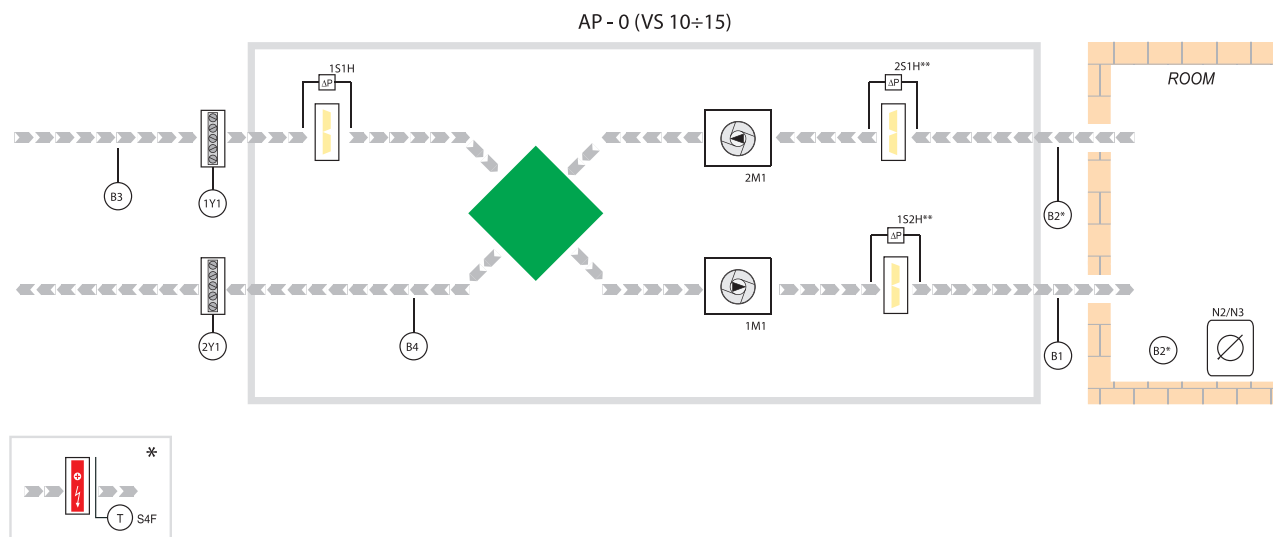
Applications intended for VS 10-15 AHUs

Application code	Functions available in particular applications									
	HW	HE	CW	DX	CWHW	PRC. BPS	MIX. CMBR	SUM. ER	PHT. HW	FAST. HTG
*AP 0										
*AP 1										
*AP 2										
*AP 4										
AP 5										
AP 6										
*AP 8										
AP 9										
AP 10										
*AP 16										

Application code	Functions available in particular applications									
	HW	HE	CW	DX	CWHW	PRC. BPS	MIX. CMBR	SUM. ER	PHT. HW	FAST. HTG
AP 128										
AP 129										
AP 130										
AP 132										
AP 133										
AP 134										
AP 136										
AP 137										
AP 138										
AP 144										

Control applications

Supply-exhaust AHUs: cross-flow exchanger



Control

- Control of room temperature (CG UPC, OPTIMA), optionally supply air temperature (CG UPC, OPTIMA) or exhaust air temperature (CG UPC).
- Control of the energy recovery level – first stage of heating/cooling.
- Air flow control.
- Operation according to calendar – temperature, efficiency, operation mode (OPERATION, STAND-BY, STOP).
- STAND-BY – maintaining the minimum, set indoor temperature.
- * Initial heating of external air.

Information

- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

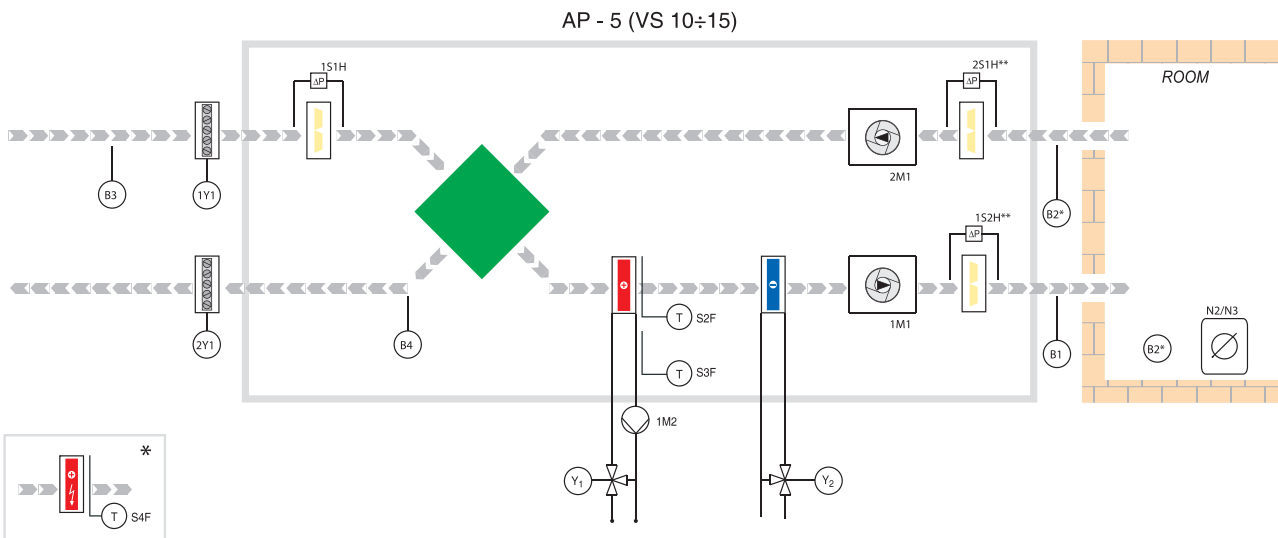
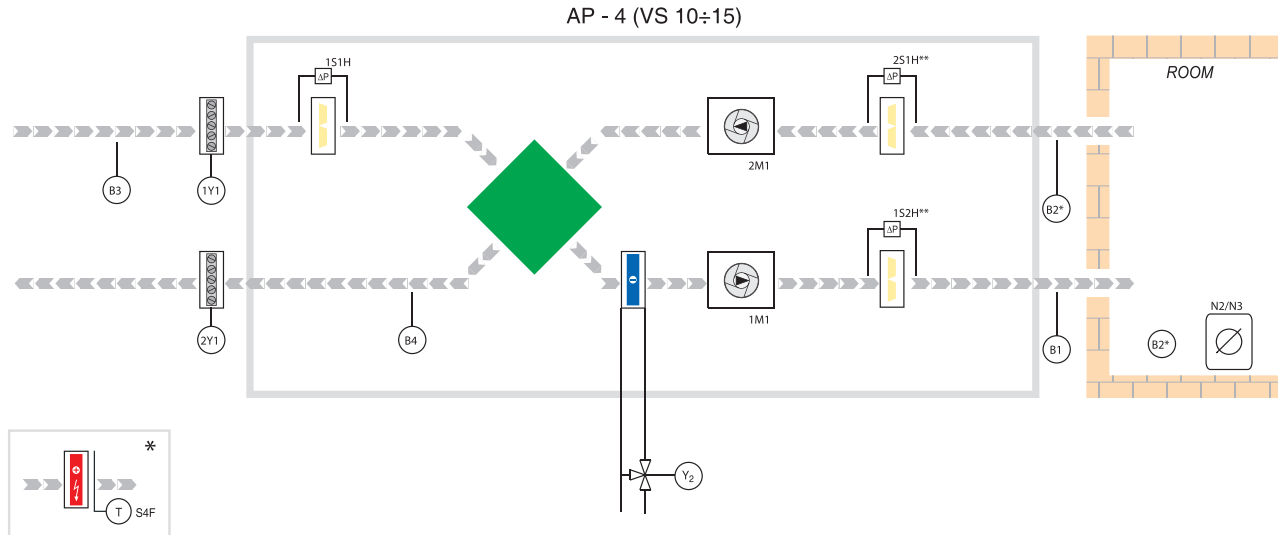
Protection

- Limiting the allowed supply air temperature.
- Fan unit protection – the function is active:
 - if an electric heater is applied.
- Overload protection of a drive unit.
- Anti-frost protection of a water heater.
- Protection against overheating of an electric heater.
- Anti-frost protection of an energy recovery exchanger.
- Optional protection against minimal and maximal temperature of medium returning from the water heater with use of Strap-on temperature sensor, standard NTC 10 (UPC) or PT 1000 (OPTIMA).

- The control application layouts have been prepared on the basis of water exchangers.
- The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).
- Optional Strap-on temperature sensor is not a part of VTS offer.

Control applications

Supply-exhaust AHUs: cross-flow exchanger



Control

- Control of room temperature (CG UPC, OPTIMA), optionally supply air temperature (CG UPC, OPTIMA) or exhaust air temperature (CG UPC).
- Control of the energy recovery level – first stage of heating/cooling.
- Air flow control.
- Operation according to calendar – temperature, efficiency, operation mode (OPERATION, STAND-BY, STOP).
- STAND-BY – maintaining the minimum, set indoor temperature.
- * Initial heating of external air.

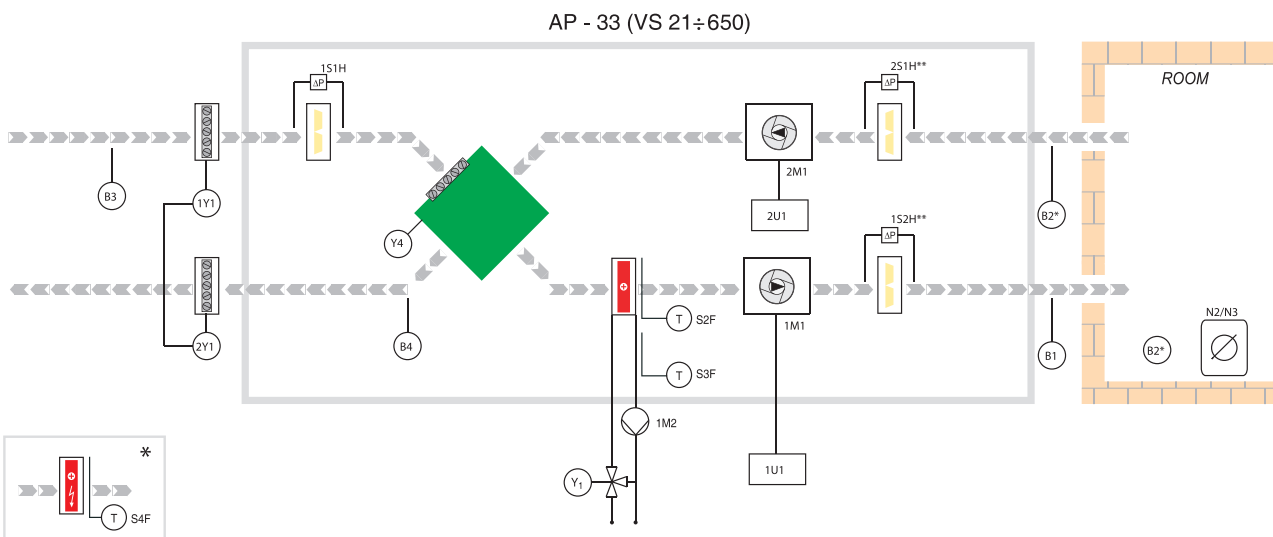
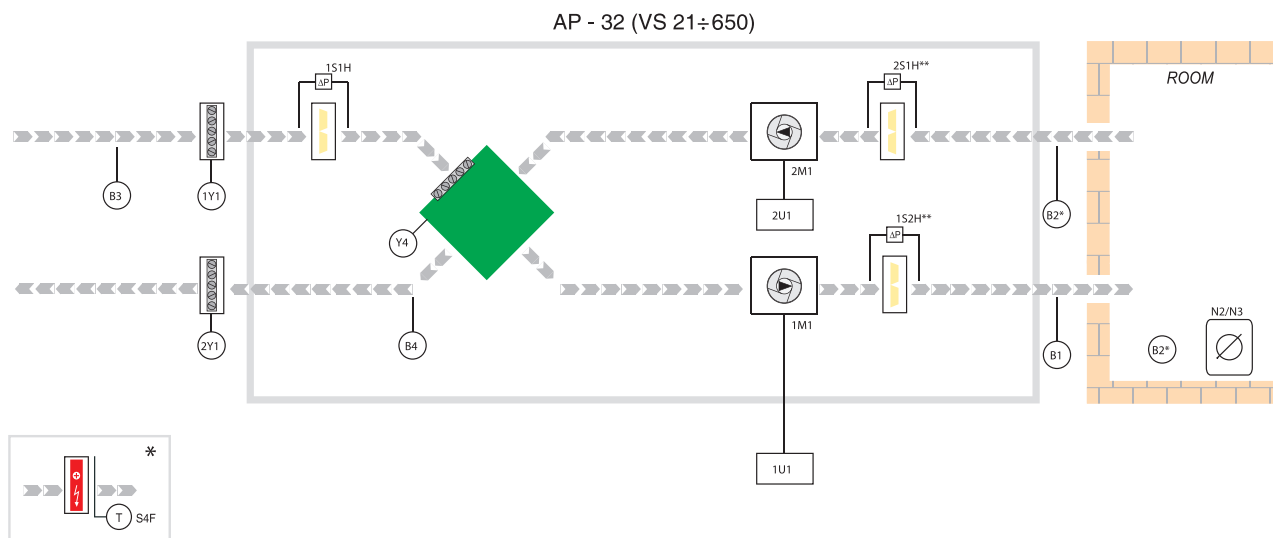
Information

- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

Protection

- Limiting the allowed supply air temperature.
- Fan unit protection – the function is active:
 - if an electric heater is applied.
- Overload protection of a drive unit.
- Anti-frost protection of a water heater.
- Protection against overheating of an electric heater.
- Anti-frost protection of an energy recovery exchanger.
- Optional protection against minimal and maximal temperature of medium returning from the water heater with use of Strap-on temperature sensor, standard NTC 10 (UPC) or PT 1000 (OPTIMA).

- ❗ The control application layouts have been prepared on the basis of water exchangers.
- ❗ The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).
- ❗ Optional Strap-on temperature sensor is not a part of VTS offer.



Control

- Control of room temperature (CG UPC, OPTIMA), optionally supply air temperature (CG UPC, OPTIMA) or exhaust air temperature (CG UPC).
- Control of the energy recovery level – first stage of heating/cooling.
- Air flow control.
- Operation according to calendar – temperature, efficiency, operation mode (OPERATION, STAND-BY, STOP).
- STAND-BY – maintaining the minimum, set indoor temperature.
- * Initial heating of external air.

Information

- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

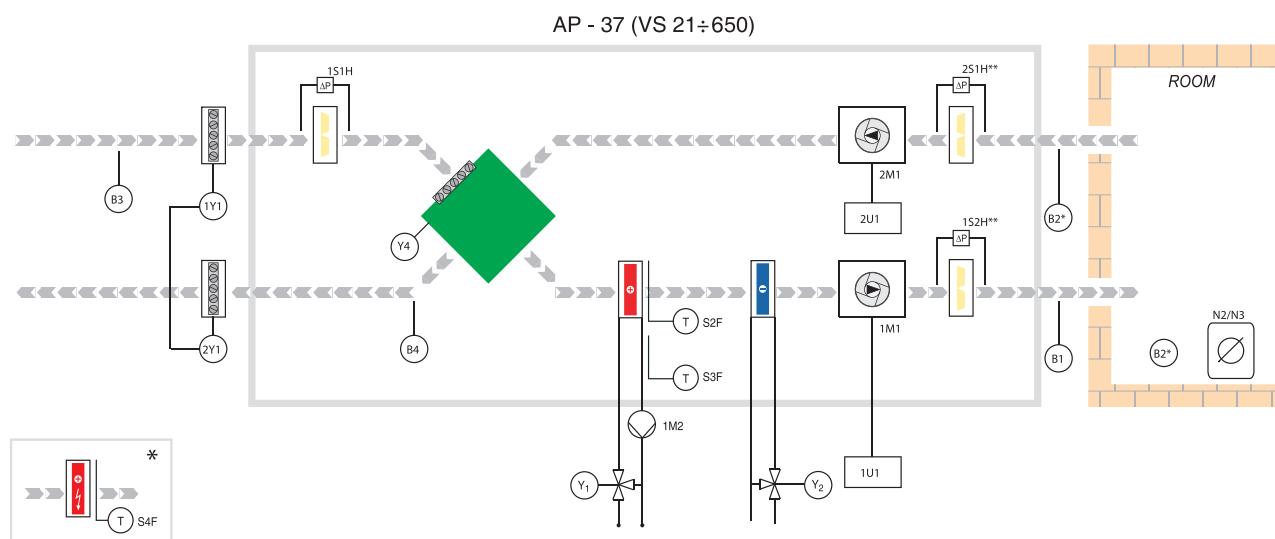
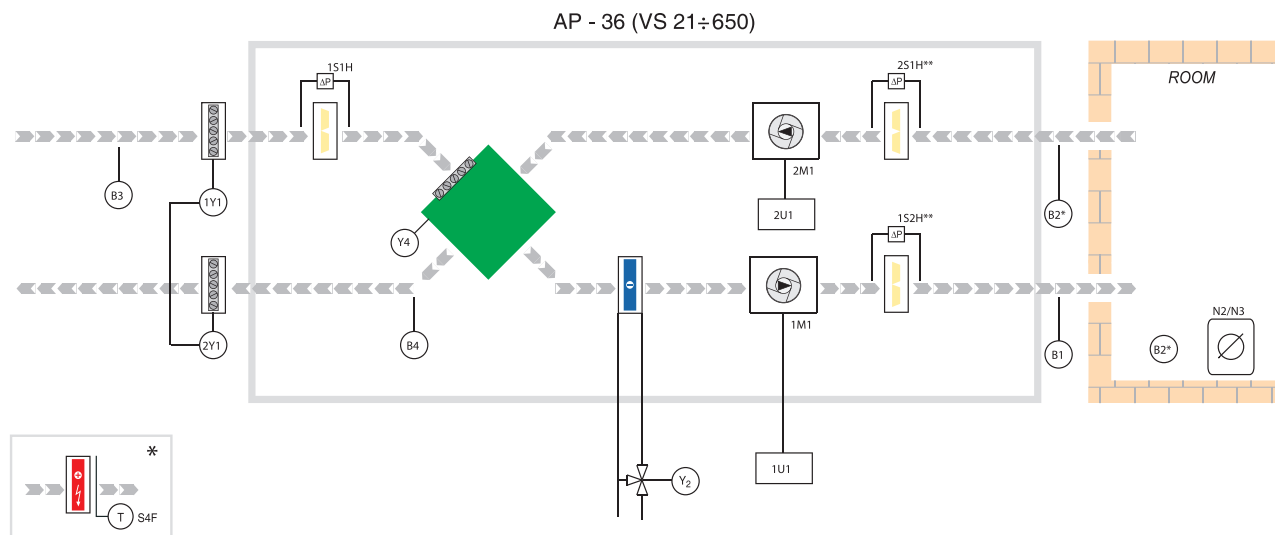
Protection

- Limiting the allowed supply air temperature.
- Fan unit protection – the function is active:
 - if an electric heater is applied.
- Overload protection of drive unit.
- Anti-frost protection of a water heater.
- Protection against overheating of an electric heater.
- Anti-frost protection of an energy recovery exchanger.
- Optional protection against minimal and maximal temperature of medium returning from the water heater with use of Strap-on temperature sensor, standard NTC 10 (UPC) or PT 1000 (OPTIMA).

- The control application layouts have been prepared on the basis of water exchangers.
- The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).
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Control applications

Supply-exhaust AHUs: cross-flow exchanger



Control

- Control of room temperature (CG UPC, OPTIMA), optionally supply air temperature (CG UPC, OPTIMA) or exhaust air temperature (CG UPC).
- Control of the energy recovery level – first stage of heating/cooling.
- Air flow control.
- Operation according to calendar – temperature, efficiency, operation mode (OPERATION, STAND-BY, STOP).
- STAND-BY – maintaining the minimum, set indoor temperature.
- * Initial heating of external air.

Information

- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

Protection

- Limiting the allowed supply air temperature.
- Fan unit protection – the function is active:
 - if an electric heater is applied.
- Overload protection of a drive unit.
- Anti-frost protection of a water heater.
- Protection against overheating of an electric heater.
- Anti-frost protection of an energy recovery exchanger.
- Optional protection against minimal and maximal temperature of medium returning from the water heater with use of Strap-on temperature sensor, standard NTC 10 (UPC) or PT 1000 (OPTIMA).

- ❗ The control application layouts have been prepared on the basis of water exchangers.
- ❗ The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).
- ❗ Optional Strap-on temperature sensor is not a part of VTS offer.

AR - Applications for supply – exhaust AHUs with rotary regenerator energy recovery system

Applications intended for VS 21-650 equipped with frequency converters

Application code	Functions available in particular applications									
	HW	HE	CW	DX	CWHW	PRC. BPS	MIX. CMBR	SUM. ER	PHT. HW	FAST. HTG
*AR 0										
*AR 1										
*AR 2										
*AR 4										
AR 5										
AR 6										
*AR 8										
AR 9										
AR 10										
*AR 16										
AR 128										
AR 129										
AR 130										
*AR 132										
AR 133										
AR 134										
*AR 136										
AR 137										
AR 138										
*AR 144										
AR 256										
AR 257										
AR 258										
AR 260										
AR 261										
AR 262										
AR 264										
AR 265										
AR 266										
AR 384										
AR 385										
AR 386										
AR 388										
AR 389										
AR 390										
AR 392										
AR 393										
AR 394										

Application code	Functions available in particular applications									
	HW	HE	CW	DX	CWHW	PRC. BPS	MIX. CMBR	SUM. ER	PHT. HW	FAST. HTG
AR 512										
AR 513										
AR 514										
AR 516										
AR 517										
AR 518										
AR 520										
AR 521										
AR 522										
AR 528										
AR 640										
AR 641										
AR 642										
AR 644										
AR 645										
AR 646										
AR 648										
AR 649										
AR 650										
AR 656										
AR 768										
AR 769										
AR 770										
AR 772										
AR 773										
AR 774										
AR 776										
AR 777										
AR 778										
AR 896										
AR 897										
AR 898										
AR 900										
AR 901										
AR 902										
AR 904										
AR 905										
AR 906										

AG - control applications for air supply-exhaust unit arrangements with glycol recuperation systems

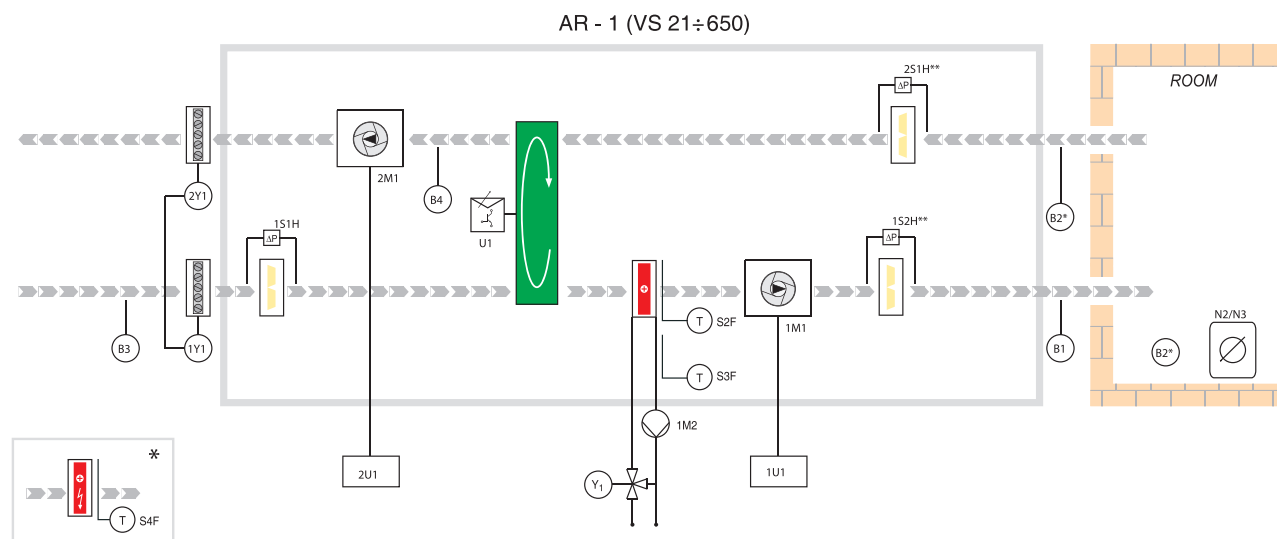
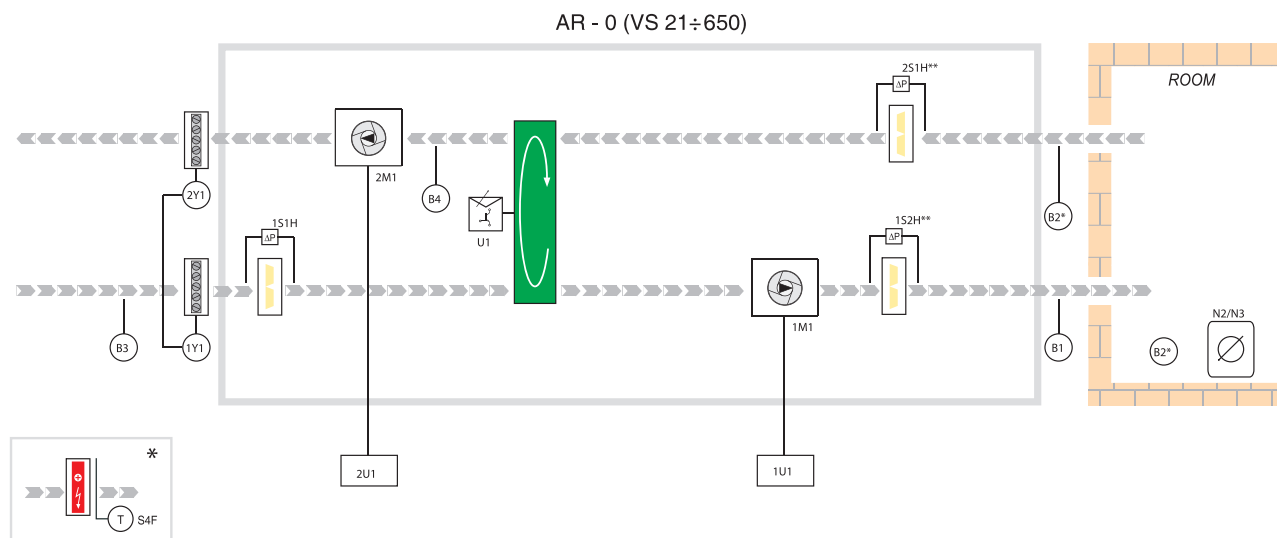
Applications intended for VS 21-650 equipped with frequency converters

Application code	Functions available in particular applications									
	HW	HE	CW	DX	CWHW	PRC. BPS	MIX. CMBR	SUM. ER	PHT. HW	FAST. HTG
AG 1										
AG 2										
AG 5										
AG 6										
AG 9										
AG 10										
AG 129										
AG 130										
AG 133										
AG 134										

Application code	Functions available in particular applications									
	HW	HE	CW	DX	CWHW	PRC. BPS	MIX. CMBR	SUM. ER	PHT. HW	FAST. HTG
AG 137										
AG 138										
AG 257										
AG 258										
AG 265										
AG 266										
AG 385										
AG 386										
AG 393										
AG 394										

Control applications

Supply-exhaust AHUs: rotary exchanger



Control

- Control of room temperature (CG UPC, OPTIMA), optionally supply air temperature (CG UPC, OPTIMA) or exhaust air temperature (CG UPC).
- Control of the energy recovery level – first stage of heating/cooling.
- Air flow control.
- Operation according to calendar – temperature, efficiency, operation mode (OPERATION, STAND-BY, STOP).
- STAND-BY – maintaining the minimum, set indoor temperature.
- * Initial heating of external air.

Information

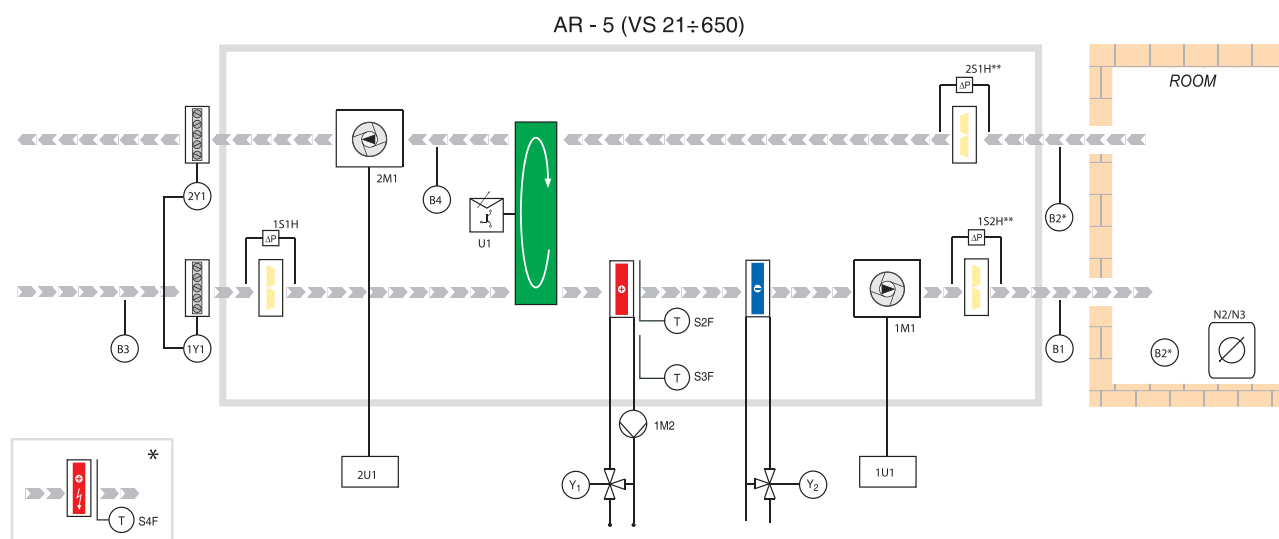
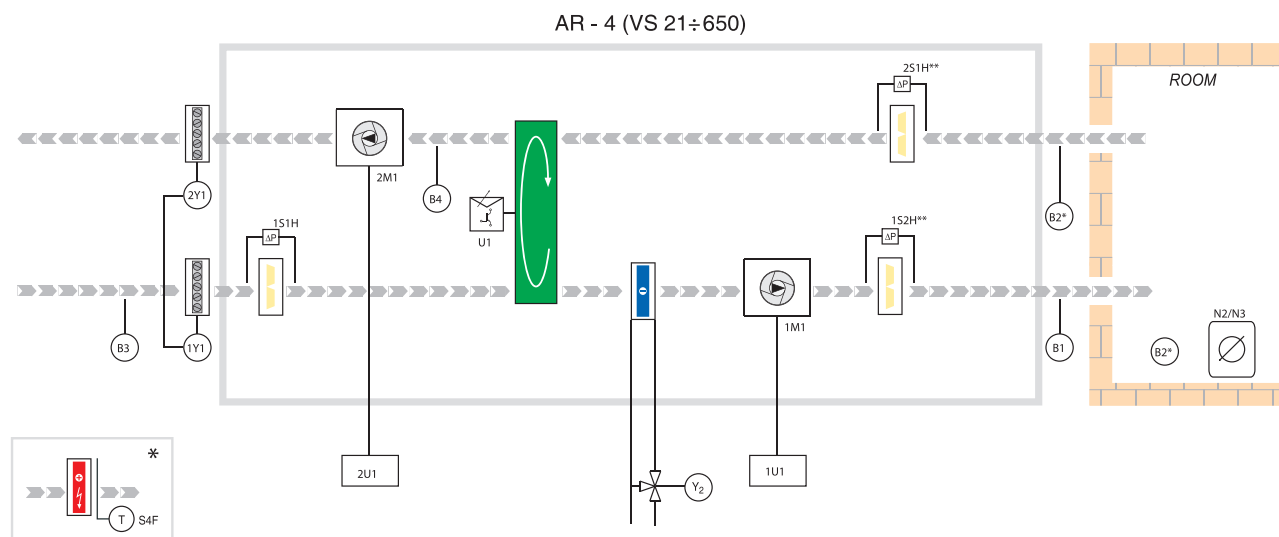
- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

Protection

- Limiting the allowed supply air temperature.
 - Fan unit protection – the function is active:
 - if an electric heater is applied.
 - Overload protection of drive unit.
 - Anti-frost protection of a water heater.
 - Protection against overheating of an electric heater.
 - Anti-frost protection of an energy recovery exchanger.
 - Optional protection against minimal and maximal temperature of medium returning from the water heater with use of Strap-on temperature sensor, standard NTC 10 (UPC) or PT 1000 (OPTIMA).
- The control application layouts have been prepared on the basis of water exchangers.
 ● The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).
 ● Optional Strap-on temperature sensor is not a part of VTS offer.

Control applications

Supply-exhaust AHUs: rotary exchanger



Control

- Control of room temperature (CG UPC, OPTIMA), optionally supply air temperature (CG UPC, OPTIMA) or exhaust air temperature (CG UPC).
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- STAND-BY – maintaining the minimum, set indoor temperature.
- * Initial heating of external air.

Information

- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

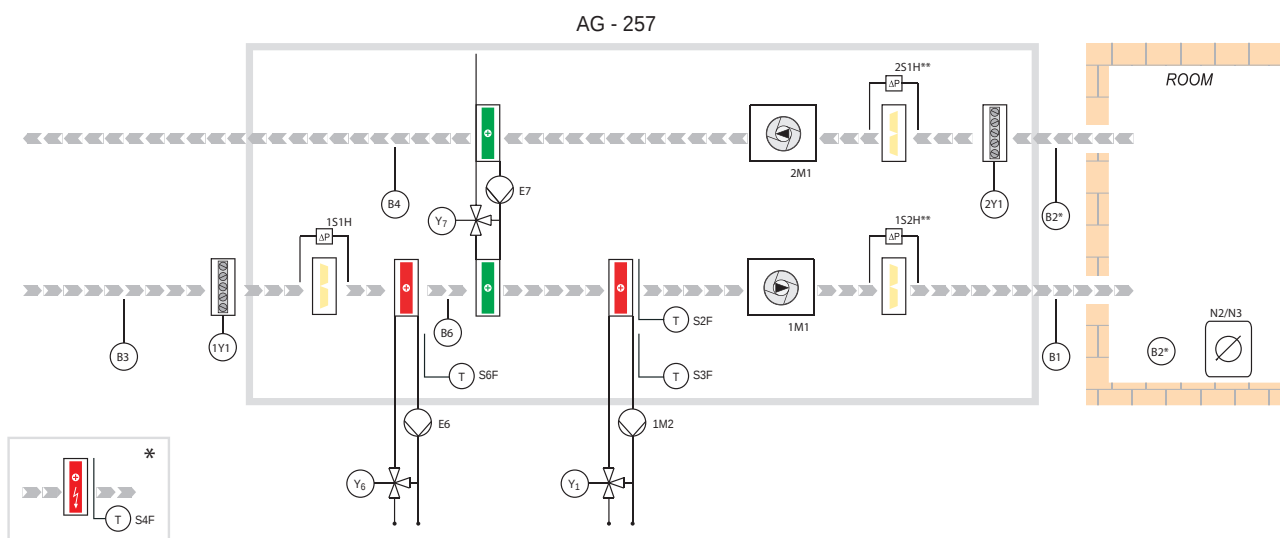
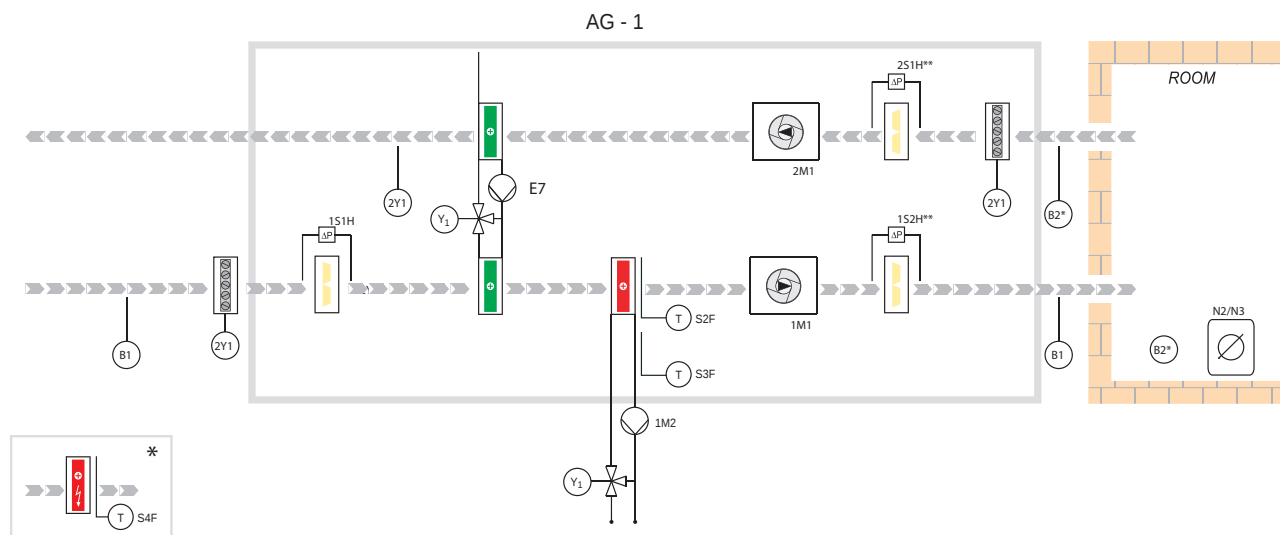
Protection

- Limiting the allowed supply air temperature.
- Fan unit protection – the function is active:
 - if an electric heater is applied.
- Overload protection of a drive unit.
- Anti-frost protection of a water heater.
- Protection against overheating of an electric heater.
- Anti-frost protection of an energy recovery exchanger.
- Optional protection against minimal and maximal temperature of medium returning from the water heater with use of Strap-on temperature sensor, standard NTC 10 (UPC) or PT 1000 (OPTIMA).

- The control application layouts have been prepared on the basis of water exchangers.
- The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).
- Optional Strap-on temperature sensor is not a part of VTS offer.

Control applications

Supply-Exhaust AHUs: Glycol System (Run-around coil)



Control

- Control of room temperature (CG UPC, OPTIMA), optionally supply air temperature (CG UPC, OPTIMA) or exhaust air temperature (CG UPC).
- Control of the energy recovery level – first stage of heating/cooling.
- Air flow control.
- Operation according to calendar – temperature, efficiency, operation mode (OPERATION, STAND-BY, STOP).
- STAND-BY – maintaining the minimum, set indoor temperature.
- * Initial heating of external air.

Information

- Information on outdoor, supply, exhaust and indoor air temperatures.
- Filter contamination info.
- Alarm status info.
- Analog and digital input and output status info.

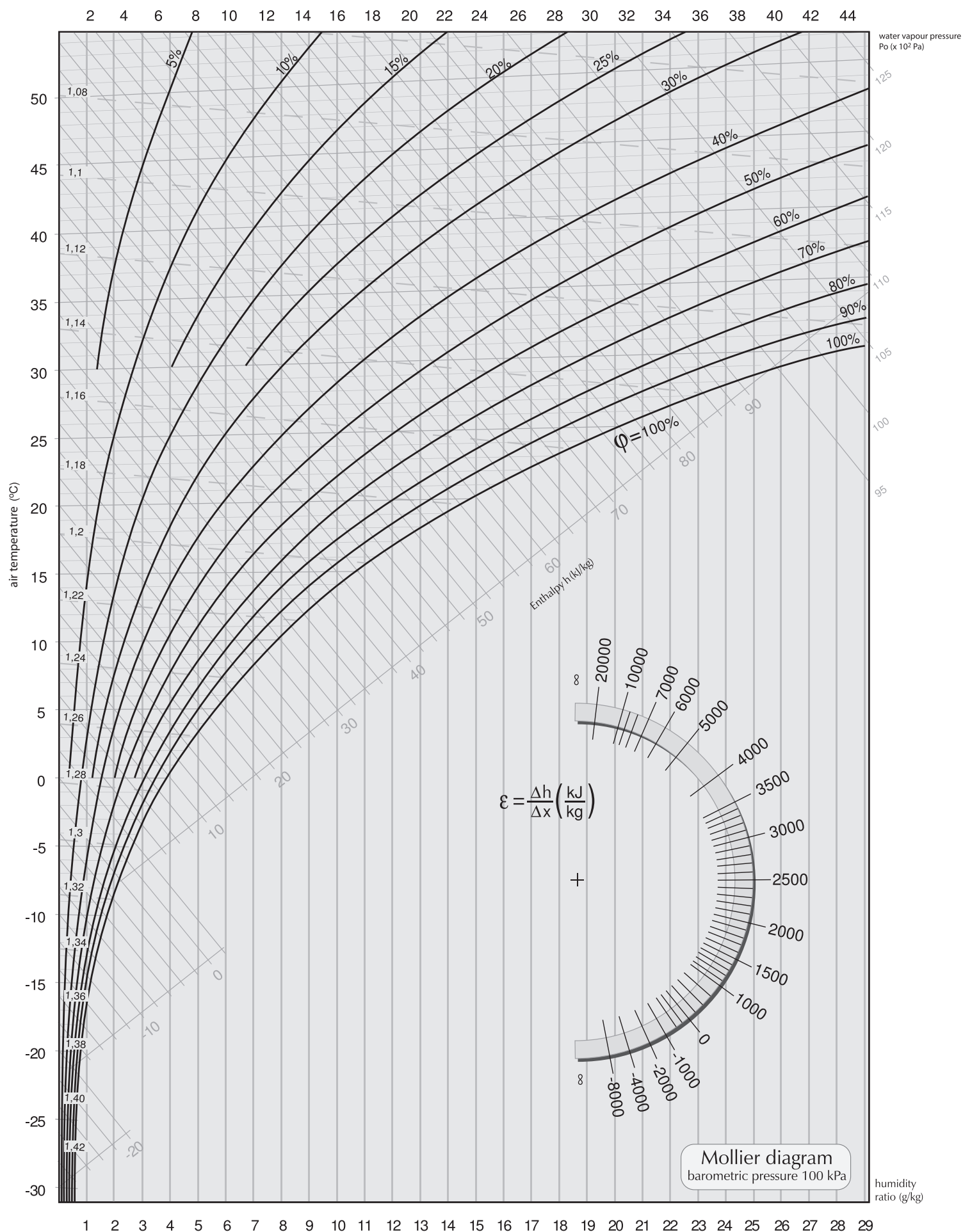
Protection

- Limiting the allowed supply air temperature.
- Fan unit protection – the function is active:
 - if an electric heater is applied.
- Overload protection of a drive unit.
- Anti-frost protection of a water heater.
- Protection against overheating of an electric heater.
- Anti-frost protection of an energy recovery exchanger.
- Optional protection against minimal and maximal temperature of medium returning from the water heater with use of Strap-on temperature sensor, standard NTC 10 (UPC) or PT 1000 (OPTIMA).

- ❗ The control application layouts have been prepared on the basis of water exchangers.
- ❗ The quantity of applied pressure switches for filters depends on the filters' configuration (p. 57).
- ❗ Optional Strap-on temperature sensor is not a part of VTS offer.

Psychrometric chart

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Notes

Notes