



Westinghouse



Double Skin Air Handling Units WAHU Series Standard / District Cooling / DX Applications

TECHNICAL CATALOGUE

Air Flow Range: 2,250 to 77,800 m³/hr

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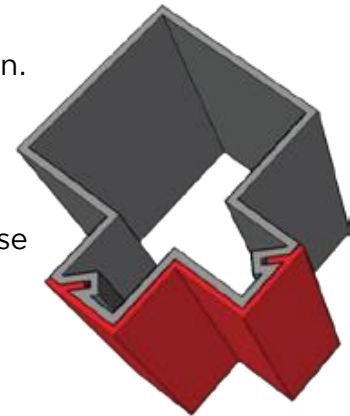
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DESIGN

Casing:

The frames are made of extruded heavy aluminum profiles, anodized for extra anti corrosion protection and with THERMAL BARRIER (a full peripheral PVC thermal break is incorporated to ensure no thermal bridge occurs from any internal to external surface) The profiles are connected by means of special plastic corner pieces, to form the AHU sections. (Penta post design) This type of construction has the following advantages:

- Excellent mechanical strength Flexibility of construction.
- Perfect appearance and precise dimensions.
- Quick and precise installation of interior components.
- The possibility of completely dismantling the unit in case of difficult access and reassemble on site at minimum time and cost.



The panels are of the double-skin type with a rigid insulation layer consisting of a factory applied polyurethane layer injected between the panels, having a density of 38-40 kg/m³. This type of material has excellent

thermal insulation and noise reduction properties and adds extra mechanical strength and rigidity to the panels and meet NFPA-90A Flame spread and Smoke generation requirements.

The panel thickness shall be 50 mm.

The construction of the panels is made with G90 galvanized sheet metal 0.8 mm thickness outer skin and painted with RAL 9002 polyester epoxy paint, and 0.6 mm inner skin which optionally can be made from SS (304 or 316) sheet metal.

Options available are;

1. Double skin sandwich panel 30/50 mm.
2. GI Sheet 0.6 to 1.2 mm

The mechanical performance of the unit as per EN 1886 / Eurovent 6C/005-2009 are as under.

1. *Thermal transmittance - 1.3 W/m²K;
Classification of the casing : T3*
2. *Thermal bridging of the casing Thermal bridging factor kb 0.62;
Classification of the casing : TB2*
3. *Acoustic insulation of the casing*

Octave band Hz	125	250	500	1000	2000	4000	8000
Sound insertion Loss dB	14.5	15	16.8	15.3	19.6	30.2	38.8

4. *Mechanical strength of casing*

Deflection of the casing per meter at -1000 Pa	Deflection of the casing per meter at +1000 Pa	Permanent Deflection of the casing per meter at ± 2500 Pa	Classification of the casing
0.7 MM /M	0.7 MM /M	NONE	D1 (M)

5. *Casing air leakage (after determination of the strength of the casing)*

TEST	RESULT	CLASSIFICATION
Air leakage rate at -400 Pa	0.21 L/ SQM	L2 (M)
Air leakage rate at +700 Pa	0.31 L/ SQM	L2 (M)

6. *Filter bypass leakage*

TEST	RESULT	PERCENTAGE LEAKAGE	USABLE FILTER CLASS
Filter Bypass leakage at -400 Pa	40.7 CMH	0.50%	G1-F9
Filter Bypass leakage at +400 Pa	7.7 CMH	0.10%	G1-F9

VARIOUS SECTIONS (MODULES)

AIR HANDLING UNITS SECTION DETAILS

The proper operation of the AHU is achieved by combining structural modules of different function each one. The modules of the AHU's are;

- Fan Section
- Coil Section
- Bag Filter Section
- Mixing Box Section
- Heat Recovery Section
- Plenum Section

The unit selection is carried out with Eurovent checked and Approved software.

All the sections are equipped with G90 sheet metal base ,150 mm height, as a standard feature. Rain canopy can also be installed as an optional feature.

Analytically below are information for the various sections (modules).

• **Fan Section**

The Fans are double width, double inlet, with forward or backward curved impellers or airfoil type centrifugal fan which are statically and dynamically balanced after manufacturing, thus eliminating any possibility of vibrations.

The fan capacities are verified according to AMCA 210.

The fan motors are totally enclosed fan cooled type (TEFC) with class F insulation. Transmission is carried out via V-belts and pulleys. The pulleys are selected with taper lock bush facility for easy installation and maintenance. The fan motor assembly is placed on a common base and is elastically suspended inside the unit, thus eliminating the need of external vibration isolators.

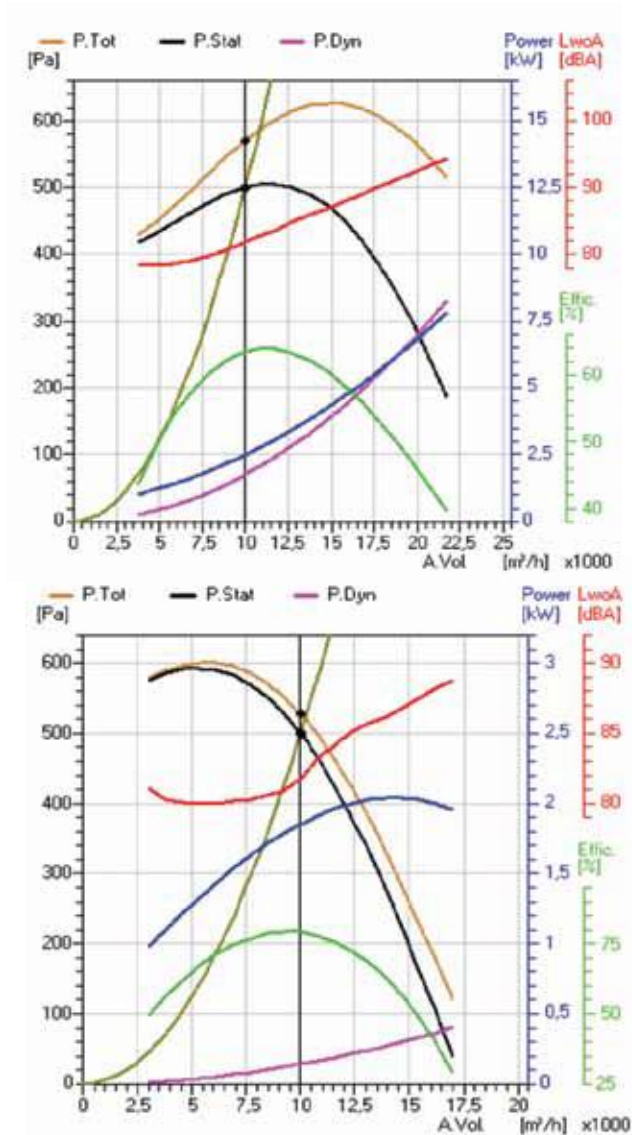
The fan outlet is connected to the unit panel by means of a special canvas fabric, to avoid any transmission of vibration to the unit panel.

Access door is provided for maintenance purposes with the option of sight glass to be fitted on the door. The door is suspended on high quality aluminum hinges and has locks operating with tool as per machinery safety directive 2006/42/EC.

Optional Features for the Fan Section:

- Belt Guard.
- External Power Switch for the Motor with Padlock.
- VFD.
- Light with External Switch.
- Spring Isolators Instead of Rubber Type.





• Chilled Water Coil Section

The chilled water coils are manufactured from seamless copper tubes 3/8" O.D and 0.35 mm thickness, with aluminum fins with thickness from 0.12 mm up to 0.15 mm depending on the FPI used. The standard for our calculations is 12 FPI and 0.12 mm aluminum fin thickness. The fins can either be mil finish as standard or anti corrosion coated optional. Coil headers are made of seamless steel tubes to DIN 2440 and have parallel male threads according to DIN 2999. Optionally the headers can be made from seamless copper pipe according to ASTM 280 with male threaded bronze fittings. The coil casing is made of heavy gauge galvanized steel.

All coils are factory tested at dry air pressure of 30 bar (441 psi) under warm water.

- **DX Coil Section**

The evaporators are manufactured of inner grooved seamless copper tubes 3/8" O.D mechanically bonded to louvered aluminum fins to ensure optimum heat transfer. Seamless copper tube suction headers and properly sized distributor at the refrigerant inlet along with the thermostatic expansion valve ensures smooth and reliable operation. All the evaporators are rated as per AHRI 410 standard. The coils are leak pressure tested by dry air pressure 35 bar (508 psig) under water.

The capacity of the coil is software calculated according to ARI 410 procedure and from an appropriate software.

The drain pan is fabricated of G90 1.5 mm thickness sheet metal, epoxy painted as standard or by SST (304 or 316), 1.2 mm thickness as an option. The drain pan has a threaded connection 1-1/2 "BSP for the proper siphon to be connected.

When the face velocity on the coil is above 2.5 m/s a droplet eliminator is installed in the coil section.

Theoretically the need of eliminator, depends on the sensible heat factor of the coil and the maximum velocity for various SHF as given in the table below.

Sensible Heat Factor	1	0.9	0.8	0.7	0.6
Max. Face Velocity (M/S)	3	2.9	2.8	2.65	2.5

The eliminator is made from a special plastic profile secured on an epoxy painted sheet steel frame.

The eliminator assembly can be removed from the unit through an access door, to facilitate the maintenance and cleaning of the coil.



• Bag Filter Section

This section is equipped with bag filters type F 8 as per EN779, 635 mm long, as standard. Other type of bag filters can be installed optionally. In this section pre filters, type F4 as per EN779, of removable type can also be installed.

The final permissible pressure drop for F8 bag filters is 450 Pa while for F4 pre filters the limit is 250 Pa, as per EN779.

Differential pressure manometers can be installed optionally to indicate the above pressure drop through filters.

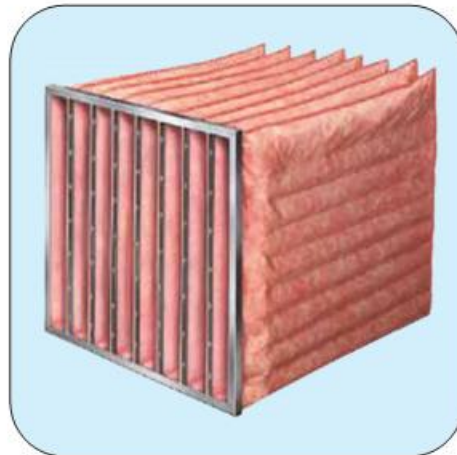
The calculation of the unit is made with pressure drop 300 Pa for the bag filters and 150 Pa for the pre filters.

The frame of the bag filters as a whole assembly can be, either by sliding removable, or fixed in the unit, whereby an extra space is given for filter removal which is always done in the dusty air side of the unit.

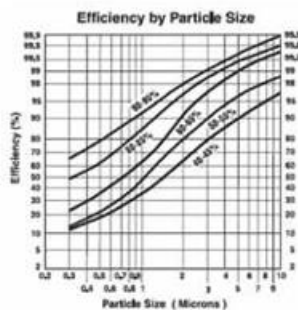
The frame of the pre filters is fixed in the unit and the filter renewal is made by sliding them out.

EUROVENT 4/5 STANDARD

<65%	•EU1	PREFILTERS
65-80%	•EU2	
80-90%	•EU3	
>90%	•EU4	



BAG FILTERS



40-60%	•EU5
60-80%	•EU6
80-90%	•EU7
90-95%	•EU8
>95%	•EU9

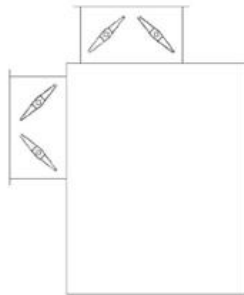


• Mixing Box Section

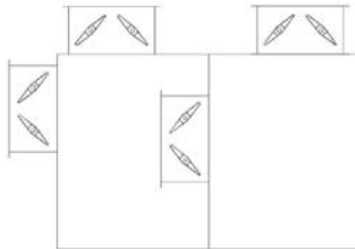
The mixing box can either be single or double type depending on the operational design of the unit. The dampers which are installed in the unit are selected with maximum velocity 5 m/s, when the full air flow is passing through each of them.

The operation of the dampers is made through independent handles for each of them. As an option the movement of the dampers can be made motorized as per customer request.

SINGLE MIXING BOX



DOUBLE MIXING BOX

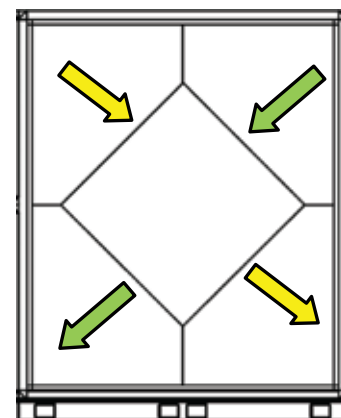
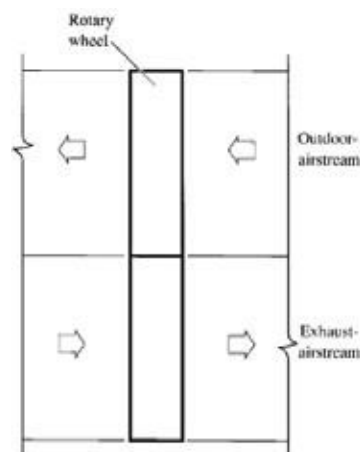


• **Heat Recovery Section**

This section is for air-to-air plate heat exchangers or rotary heat exchangers to be installed.

In case of plate heat exchanger, epoxy painted drain pan is installed in both supply and return side of the unit, whereby face and bypass damper can be installed optionally in the supply section of the unit.

The calculation of the performance of the heat exchanger is made with special software from the manufacturer (e.g: Hoval, Heatex, etc.) and the selection is made to a maximum face velocity on the exchanger 4 m/s.



AIR TO AIR PLATE HEAT EXCHANGER

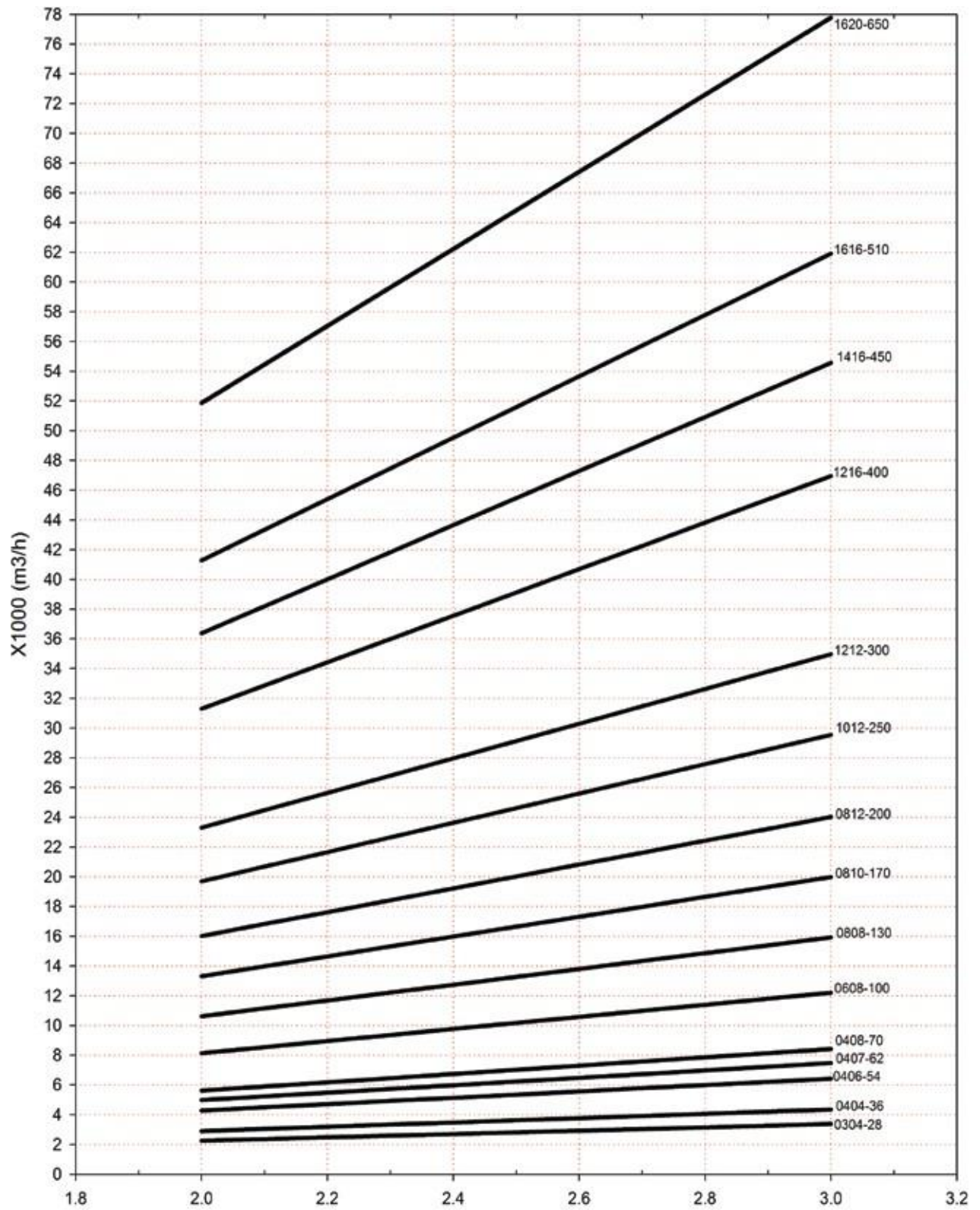
• **Plenum Section**

This section is for various purposes according to the operational design of the AHU and a variety of items like steam humidifiers, laminar humidifiers, HEPA filters etc. can be installed.

MODELS & QUICK SELECTION TABLE

Sl. No.	Models	Cross Section Dimensions (mm)				Nominal Air Flow (m3/hr)	Flow Range (m3/hr)	
		External		Internal				
		Height	Width	Height	Width	2.5 m/s	2 m/s	3 m/s
1	WAHU 0304-28	705	855	605	755	2800	2250	3350
2	WAHU 0404-36	855	855	755	755	3600	2900	4350
3	WAHU 0406-54	855	1155	755	1055	5400	4250	6400
4	WAHU 0407-62	855	1305	755	1205	6200	4950	7450
5	WAHU 0408-70	855	1455	755	1355	7000	5600	8400
6	WAHU 0608-100	1155	1455	1055	1355	10000	8100	12200
7	WAHU 0808-130	1455	1455	1355	1355	13000	10600	15900
8	WAHU 0810-170	1455	1755	1355	1655	17000	13300	19900
9	WAHU 0812-200	1455	2055	1355	1955	20000	16000	24000
10	WAHU 1012-250	1755	2055	1655	1955	25000	19650	29550
11	WAHU 1212-300	2055	2055	1955	1955	30000	23300	34950
12	WAHU 1216-400	2055	2655	1955	2555	40000	31300	46950
13	WAHU 1416-450	2355	2655	2255	2555	45000	36350	54550
14	WAHU 1616-510	2655	2655	2555	2555	51000	41250	61900
15	WAHU 1620-650	2655	3255	2555	3155	65000	51850	77800

AHU QUICK SELECTION CHART



DIMENSIONAL DATA

Fan Section							
Sl. No.	Models	Height (mm)	Width (mm)	Double Inlet Centrifugal (N/H)			Plug Fan
				Length (mm)			
1	WAHU 0304-28	705	855	1155(N/H250)			1155
2	WAHU 0404-36	855	855	1305(N/H280)			1305
3	WAHU 0406-54	855	1155	1305(N/H315)			1305
4	WAHU 0407-62	855	1305	1305(N/H315)	1455(N/H355)		1305
5	WAHU 0408-70	855	1455	1455(N/H355)			1455
6	WAHU 0608-100	1155	1455	1455(N/H400)	1605(N/H450)	1755(N/H500)	1455
7	WAHU 0808-130	1455	1455	1605(N/H450)	1755(N/H500)	1905(N/H560)	1605
8	WAHU 0810-170	1455	1755	1755(N/H500)	1905(N/H560)	2055(N/H630)	1755
9	WAHU 0812-200	1455	2055	1905(N/H560)	2055(N/H630)		1905
10	WAHU 1012-250	1755	2055	2055(N/H630)	2205(N/H710)		2055
11	WAHU 1212-300	2055	2055	2055(N/H630)	2205(N/H710)	2205(N/H800)	2055
12	WAHU 1216-400	2055	2655	2205(N/H800)	2475(N/H900)		2205
13	WAHU 1416-450	2355	2655	2205(N/H800)	2505(N/H900)	2805(N/H1000)	2205
14	WAHU 1616-510	2655	2655	2505(N/H900)	2805(N/H1000)		2505
15	WAHU 1620-650	2655	3255	2805(N/H1000)			2805

N: Forward Curved

H: Backward Curved

Coil Section							
Sl. No.	Models	Height (mm)	Width (mm)	Length (mm)			
				1 Coil	1 Coil + Eliminator	2 Coils	2 Coils + Eliminator
1	WAHU 0304-28	705	855	705	855	1005	1155
2	WAHU 0404-36	855	855	705	855	1005	1155
3	WAHU 0406-54	855	1155	705	855	1005	1155
4	WAHU 0407-62	855	1305	705	855	1005	1155
5	WAHU 0408-70	855	1455	705	855	1005	1155
6	WAHU 0608-100	1155	1455	705	855	1005	1155
7	WAHU 0808-130	1455	1455	705	855	1005	1155
8	WAHU 0810-170	1455	1755	705	855	1005	1155
9	WAHU 0812-200	1455	2055	705	855	1005	1155
10	WAHU 1012-250	1755	2055	705	855	1005	1155
11	WAHU 1212-300	2055	2055	705	855	1005	1155
12	WAHU 1216-400	2055	2655	705	855	1005	1155
13	WAHU 1416-450	2355	2655	705	855	1005	1155
14	WAHU 1616-510	2655	2655	705	855	1005	1155
15	WAHU 1620-650	2655	3255	705	855	1005	1155

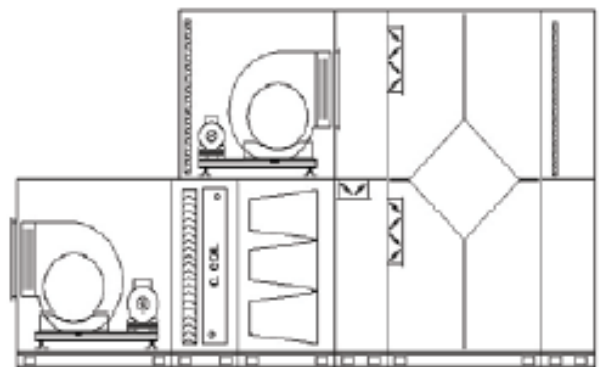
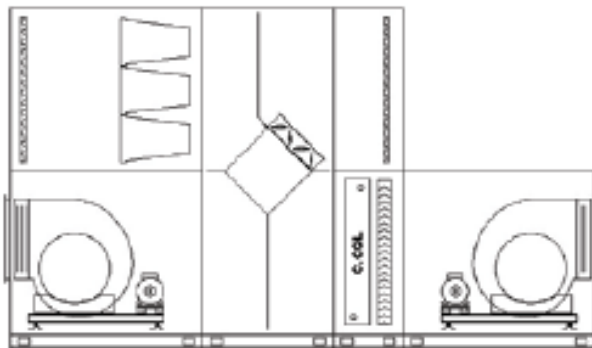
Filter Section							
Sl. No.	Models	Height (mm)	Width (mm)	Length (mm)			
				Without Prefilter in the Section		With Prefilter EU4 in the Section	
				Bag Filter with Sliding Frame	Bag Filter with Fixed Frame	Bag Filter with Sliding Frame	Bag Filter with Fixed Frame
1	WAHU 0304-28	705	855	855	1305	1155	1605
2	WAHU 0404-36	855	855	855	1305	1155	1605
3	WAHU 0406-54	855	1155	855	1305	1155	1605
4	WAHU 0407-62	855	1305	855	1305	1155	1605
5	WAHU 0408-70	855	1455	855	1305	1155	1605
6	WAHU 0608-100	1155	1455	855	1305	1155	1605
7	WAHU 0808-130	1455	1455	N/A	1305	N/A	1605
8	WAHU 0810-170	1455	1755	N/A	1305	N/A	1605
9	WAHU 0812-200	1455	2055	N/A	1305	N/A	1605
10	WAHU 1012-250	1755	2055	N/A	1305	N/A	1605
11	WAHU 1212-300	2055	2055	N/A	1305	N/A	1605
12	WAHU 1216-400	2055	2655	N/A	1305	N/A	1605
13	WAHU 1416-450	2355	2655	N/A	1305	N/A	1605
14	WAHU 1616-510	2655	2655	N/A	1305	N/A	1605
15	WAHU 1620-650	2655	3255	N/A	1305	N/A	1605

Mixing Box Section						
Sl. No.	Models	Height (mm)	Width (mm)	Length (mm)		
				Single Mixing Box	Double Mixing Box	
					Horizontal	Vertical
1	WAHU 0304-28	705	855	555	1155	555
2	WAHU 0404-36	855	855	555	1155	555
3	WAHU 0406-54	855	1155	555	1155	555
4	WAHU 0407-62	855	1305	705	1455	705
5	WAHU 0408-70	855	1455	705	1455	705
6	WAHU 0608-100	1155	1455	705	1455	705
7	WAHU 0808-130	1455	1455	855	1755	855
8	WAHU 0810-170	1455	1755	855	1755	855
9	WAHU 0812-200	1455	2055	1005	2055	1005
10	WAHU 1012-250	1755	2055	1005	2055	1005
11	WAHU 1212-300	2055	2055	1155	2355	1155
12	WAHU 1216-400	2055	2655	1155	2355	1155
13	WAHU 1416-450	2355	2655	1305	2655	1305
14	WAHU 1616-510	2655	2655	1305	2655	1305
15	WAHU 1620-650	2655	3255	1455	2955	1455

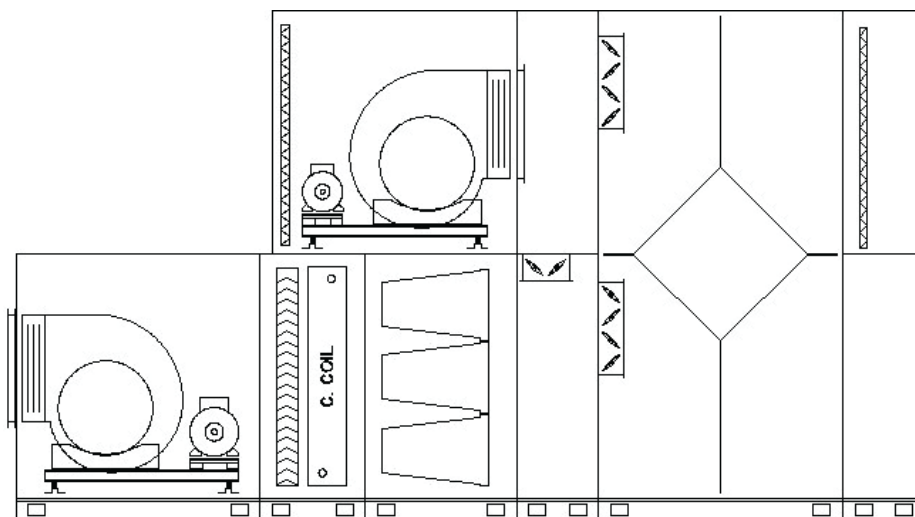
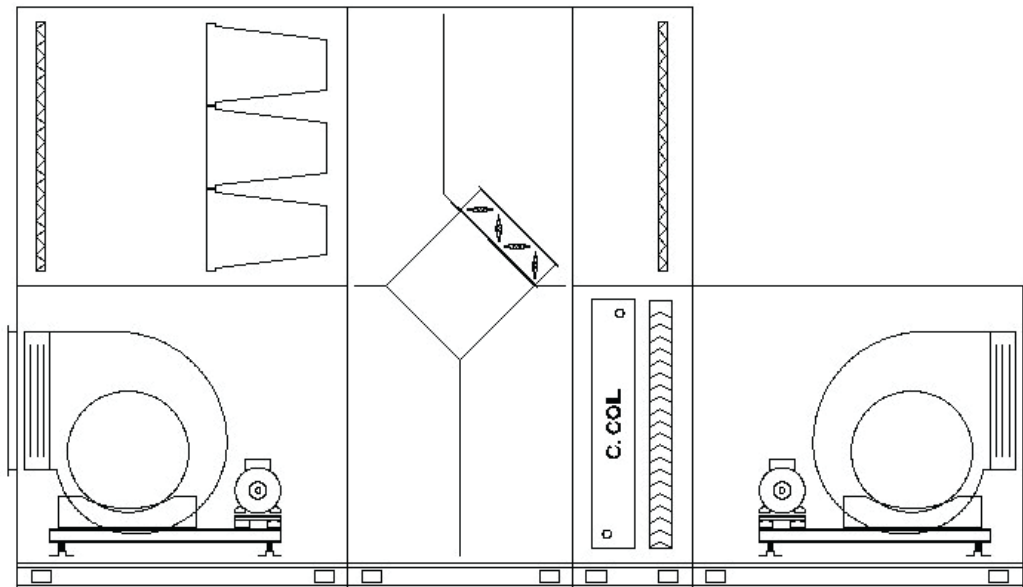
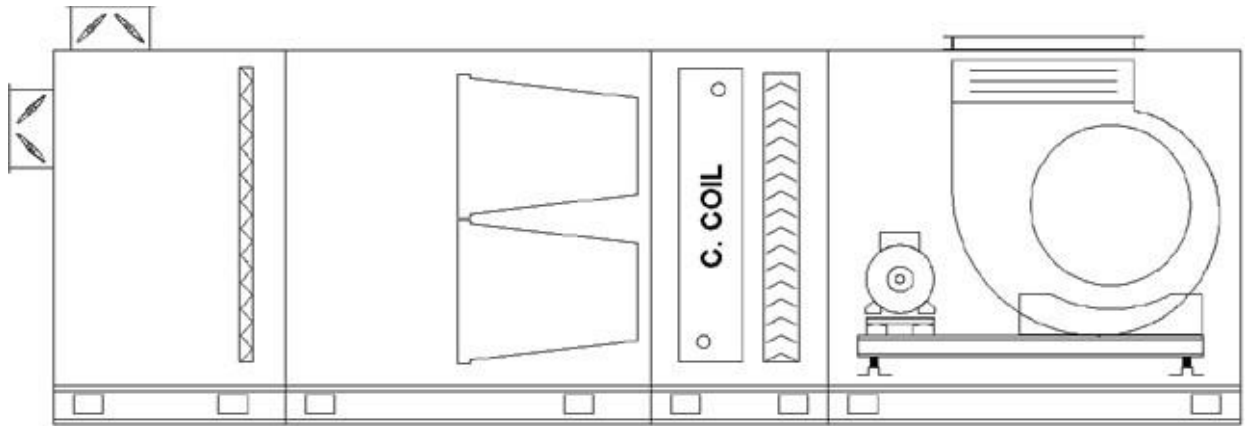
Plenum Box Section								
Sl. No.	Models	Height (mm)	Width (mm)	Length (mm)				
				Type A	Type B	Type C	Type D	Type E
1	WAHU 0304-28	705	855	555	705	855	1005	1155
2	WAHU 0404-36	855	855	555	705	855	1005	1155
3	WAHU 0406-54	855	1155	555	705	855	1005	1155
4	WAHU 0407-62	855	1305	555	705	855	1005	1155
5	WAHU 0408-70	855	1455	555	705	855	1005	1155
6	WAHU 0608-100	1155	1455	555	705	855	1005	1155
7	WAHU 0808-130	1455	1455	555	705	855	1005	1155
8	WAHU 0810-170	1455	1755	555	705	855	1005	1155
9	WAHU 0812-200	1455	2055	555	705	855	1005	1155
10	WAHU 1012-250	1755	2055	555	705	855	1005	1155
11	WAHU 1212-300	2055	2055	555	705	855	1005	1155
12	WAHU 1216-400	2055	2655	555	705	855	1005	1155
13	WAHU 1416-450	2355	2655	555	705	855	1005	1155
14	WAHU 1616-510	2655	2655	555	705	855	1005	1155
15	WAHU 1620-650	2655	3255	555	705	855	1005	1155

Heat Recovery Section									
Sl. No.	Models	Height (mm)	Width (mm)	Plate Heat Exchanger				Rotary Heat Exchanger	
				Section Length (mm)	Max. H.E. Width (mm)	Double Deck AHU	Side by Side AHU	Section Length (mm)	Wheel Diameter (mm)
						Max. H.E. Length (mm)	Max. H.E. Length (mm)		
1	WAHU 0304-28	705	855	1155	600	705	555	555	600
2	WAHU 0404-36	855	855	1155	600	705	705	555	600
3	WAHU 0406-54	855	1155	1155	600	1005	705	555	900
4	WAHU 0407-62	855	1305	1305	750	1155	705	555	1100
5	WAHU 0408-70	855	1455	1305	750	1305	705	555	1200
6	WAHU 0608-100	1155	1455	1305	750	1305	1005	555	1200
7	WAHU 0808-130	1455	1455	1755	1000	1305	1305	555	1200
8	WAHU 0810-170	1455	1755	1755	1000	1605	1305	555	1500
9	WAHU 0812-200	1455	2055	2055	1200	1905	1305	555	1800
10	WAHU 1012-250	1755	2055	2055	1200	1905	1605	555	1800
11	WAHU 1212-300	2055	2055	2055	1200	1905	1905	555	1800
12	WAHU 1216-400	2055	2655	2055	1200	2505	1905	555	2400
13	WAHU 1416-450	2355	2655	2505	1500	2505	2205	555	2400
14	WAHU 1616-510	2655	2655	2505	1500	2505	2505	555	2400
15	WAHU 1620-650	2655	3255	2505	1500	3105	2505	555	2500

- The length is reduced by 80% in case of face and bypass damper



UNIT ARRANGEMENT EXAMPLES



CHW COIL CAPACITIES

MODEL	COIL ROWS	AIR FLOW	TOTAL CAPACITY	SENSIBLE CAPACITY	WATER PRESSURE DROP	AIR PRESSURE DROP	WATER FLOW	OFF COIL TEMPERATURE
		<i>m³/h</i>	<i>kw</i>	<i>kw</i>	<i>kpa</i>	<i>pa</i>	<i>m³/h</i>	<i>°C</i>
0304-28	4 rows	2800	16.3	12	42	144	2.8	14.1
	6 rows	2800	20.2	14.2	43	220	3.5	11.7
	8 rows	2800	21.7	15.1	18	313	3.7	10.8
0404-36	4 rows	3600	19.4	14.5	17	130	3.4	14.9
	6 rows	3600	26	18.3	42	219	4.5	11.7
	8 rows	3600	28.9	20	32	310	5	10.4
0406-54	4 rows	5400	29.8	22.2	22.6	135	5.1	14.7
	6 rows	5400	36.3	25.9	15	224	6.2	12.6
	8 rows	5400	42.9	29.7	26.7	323	7.4	10.5
0407-62	4 rows	6200	35.6	26.4	34.9	132	6.1	14.2
	6 rows	6200	43.3	30.7	22.8	219	7.5	12.1
	8 rows	6200	50.4	34.7	40	315	8.7	10.2
0408-70	4 rows	7000	41.2	30.3	49.5	133	7.1	14
	6 rows	7000	50	35.3	32.3	221	8.6	11.9
	8 rows	7000	57.7	39.6	56	317	9.9	10
0608-100	4 rows	10000	58.9	43.3	46.6	129	10.1	14
	6 rows	10000	71.5	50.5	30.9	215	12.3	11.8
	8 rows	10000	82.5	56.6	53.5	308	14.2	10
0808-130	4 rows	13000	76.5	56.3	44.8	128	13.2	14
	6 rows	13000	92.9	65.6	30	213	16	11.8
	8 rows	13000	107.3	73.6	52	306	18.4	10
0810-170	4 rows	17000	94.5	70.4	24.6	138	16.2	14.6
	6 rows	17000	124.6	87.6	60.9	232	21.4	11.5
	8 rows	17000	138.4	95.2	45.4	332	23.4	10.2
0812-200	4 rows	20000	116.7	85.9	41.9	133	20	14.1
	6 rows	20000	142.2	100.6	29	221	24.4	11.9
	8 rows	20000	166.6	114.1	73.8	318	28.6	9.9

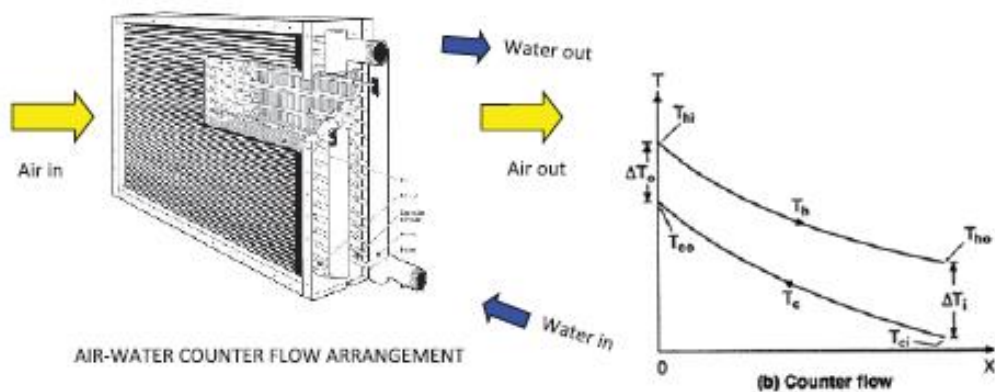
The above data are based on the following conditions:

- Air Inlet on the coil 27°C DB / 19°C WB.
- Water In 7°C and Water Out 12°C.
- Coil Calculation as per ARI 410 and Wet conditions in counter flow arrangement.

MODEL	COIL ROWS	AIR FLOW	TOTAL CAPACITY	SENSIBLE CAPACITY	WATER PRESSURE DROP	AIR PRESSURE DROP	WATER FLOW	OFF COIL TEMPERATURE
		<u>m³/h</u>	<u>kw</u>	<u>kw</u>	<u>kpa</u>	<u>pa</u>	<u>m³/h</u>	<u>°C</u>
1012-250	4 rows	25000	144.8	106.9	41.7	138	24.9	14.2
	6 rows	25000	176.7	125.2	29	229	30.3	12
	8 rows	25000	196.5	136.2	21	326	33.7	10.7
1212-300	4 rows	30000	172.7	127.6	41.3	141	29.6	14.2
	6 rows	30000	211	149.6	28.8	235	36.2	12
	8 rows	30000	234.8	162.8	20.9	335	40.3	10.7
1216-400	4 rows	40000	242.4	177.2	97.8	140	41.6	13.7
	6 rows	40000	294.9	207	67.6	233	50.6	11.5
	8 rows	40000	326.9	224.7	48.8	333	56.1	10.1
1416-450	4 rows	45000	275.5	201	94	132	47.3	13.6
	6 rows	45000	334.2	234.3	64.7	219	57.4	11.4
	8 rows	45000	369.8	253.9	46.6	312	63.5	10.1
1616-510	4 rows	51000	312.2	227.8	92.7	131	53.6	13.6
	6 rows	51000	378.7	265.5	63.8	218	65	11.4
	8 rows	51000	419	287.7	46	311	71.9	10.1
1620-650	4 rows	65000	407.4	295.8	182.9	136	69.9	13.3
	6 rows	65000	493.4	344.3	125.4	225	84.7	11.1
	8 rows	n/a						

The above data are based on the following conditions:

- Air Inlet on the coil 27°C DB / 19°C WB.
- Water In 7°C and Water Out 12°C.
- Coil Calculation as per ARI 410 and Wet conditions in counter flow arrangement.





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