AIR HANDLING UNITS

EUROVENT CERTIFIED PERFORMANCE

TÜV SÜD

KAS ISO 9001

KAS ISO 14001

KAS OHSAS 18001

TSEK

CE

AIR HANDLING UNITS

Contents

General Information

Modular type air handling units are built in double skin construction, with 40 or 60mm thick rock wool insulated panels, within the capacity range of 1.000 – 125.000 m^3/h. Outer surfaces of the units are made of PVC covered pre-painted sheet metal to RAL 9002 color, while the inner surfaces may be galvanized or pre-painted sheet metal or of stainless steel, depending on application or demand.
KLS air handling units have a skeleton made of specially shaped aluminum profiles and corner pieces that are electrostatic powder coated. To ensure air tightness, EPDM type gaskets are used between panels and profiles.

To ensure high efficiency of filters and coils, bypass around these elements have been eliminated through a special design. Selection of most suitable filters for the application and the unit are properly made.
Dampers used in the air handling units and cabinet fans are made of aluminum profiles and aluminum damper blades with plastic driving gears. Gears are placed out of the air stream. To prevent leakage, plastic gaskets are used on the damper blades.
In accordance with energy efficiency regulations, plate type, rotary type or run-around-coil type heat recovery units are employed.
To meet the required air flow and static pressure requirements, electric motor driven fans in forward curved, backward inclined or airfoil construction, or plug fans selected in accordance with application requirements, are used. Only fans with certified performance values are employed. Electric motors are of IP55 class and are CE approved.

AHU selection program

By using the selection program, the most economic unit meeting the required conditions, can be easily selected. This program has been prepared using the technical data and the selection programs of the components used within the AHU. Through the user friendly interface of the program, selection and dimensioning of the unit can easily be made and the technical outputs can be obtained.

TABLE 1 - AHU selection table

AHU TYPE			AHU INNER DIMENSIONS		SECTION	AIR FLOW (m³/h)								
						AIR SPEED ACROSS COIL VELOCITY								
			W (mm)	H (mm)	m²	2 m/s	2.25 m/s	2.5 m/s	2.75 m/s	3 m/s	3.25 m/s	3.5 m/s	3.75 m/s	4 m/s
KSA-	1	(6-3)	620	390	0,242	926	1042	1157	1273	1389	1504	1620	1736	1852
KSA-	2	(9-3)	930	390	0,363	1543	1736	1929	2122	2315	2507	2700	2893	3086
KSA-	3	(12-3)	1240	390	0,484	2160	2430	2700	2970	3240	3510	3780	4051	4321
KSA-	4	(6-4,5)	620	505	0,313	1234	1389	1543	1697	1852	2006	2160	2315	2469
KSA-	5	(9-4,5)	930	505	0,470	2057	2315	2572	2829	3086	3343	3600	3858	4115
KSA-	6	(12-4,5)	1240	505	0,626	2880	3240	3600	3960	4321	4681	5041	5401	5761
KSA-	7	(15-4,5)	1550	505	0,783	3703	4166	4629	5092	5555	6018	6481	6944	7407
KSA-	8	(6-6)	620	660	0,409	1646	1852	2057	2263	2469	2675	2880	3086	3292
KSA-	9	(9-6)	930	660	0,614	2743	3086	3429	3772	4115	4458	4801	5144	5486
KSA-	10	(12-6)	1240	660	0,818	3840	4321	4801	5281	5761	6241	6721	7201	7681
KSA-	11	(9-9)	930	970	0,902	4460	5018	5576	6133	6691	7248	7806	8363	8921
KSA-	12	(12-9)	1240	970	1,203	6245	7025	7806	8586	9367	10147	10928	11709	12489
KSA-	13	(15-9)	1550	970	1,504	8029	9032	10036	11039	12043	13047	14050	15054	16057
KSA-	14	(18-9)	1860	970	1,804	9813	11039	12266	13493	14719	15946	17173	18399	19626
KSA-	15	(21-9)	2170	970	2,105	11597	13047	14496	15946	17396	18845	20295	21744	23194
KSA-	16	(12-12)	1240	1280	1,587	8641	9721	10801	11881	12962	14042	15122	16202	17282
KSA-	17	(15-12)	1550	1280	1,984	11110	12499	13887	15276	16665	18054	19442	20831	22220
KSA-	18	(18-12)	1860	1280	2,381	13579	15276	16974	18671	20368	22066	23763	25460	27158
KSA-	19	(21-12)	2170	1280	2,778	16048	18054	20060	22066	24072	26078	28084	30089	32095
KSA-	20	(24-12)	2480	1280	3,174	18517	20831	23146	25460	27775	30089	32404	34719	37033
KSA-	21	(27-12)	2790	1280	3,571	20985	23609	26232	28855	31478	34101	36725	39348	41971
KSA-	22	(15-15)	1550	1590	2,465	14201	15976	17751	19526	21301	23076	24852	26627	28402
KSA-	23	(18-15)	1860	1590	2,957	17357	19526	21696	23865	26035	28205	30374	32544	34713
KSA-	24	(21-15)	2170	1590	3,450	20512	23076	25641	28205	30769	33333	35897	38461	41025
KSA-	25	(24-15)	2480	1590	3,943	23668	26627	29585	32544	35502	38461	41419	44378	47336
KSA-	26	(27-15)	2790	1590	4,436	26824	30177	33530	36883	40236	43589	46942	50295	53648
KSA-	27	(31-15)	3100	1590	4,929	29980	33727	37475	41222	44970	48717	52465	56212	59959
KSA-	28	(34-15)	3410	1590	5,422	33135	37277	41419	45561	49703	53845	57987	62129	66271
KSA-	29	(18-18)	1860	1900	3,534	19626	22079	24532	26985	29439	31892	34345	36798	39252
KSA-	30	(21-18)	2170	1900	4,123	23194	26093	28993	31892	34791	37690	40590	43489	46388
KSA-	31	(24-18)	2480	1900	4,712	26762	30108	33453	36798	40144	43489	46834	50180	53525

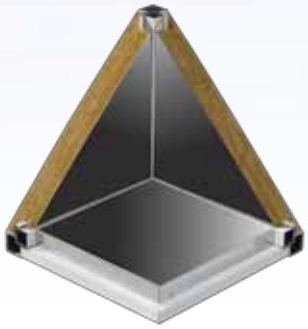
Not: 1- For air handling units with a cooling coil, the dark dark blue colored portion of the selection table must be used

TABLE 1 - AHU selection table

AHU TYPE			AHU INNER DIMENSIONS		SECTION	AIR FLOW (m3/h)								
						AIR SPEED ACROSS COIL VELOCITY								
			W (mm)	H (mm)	m²	2 m/s	2.25 m/s	2.5 m/s	2.75 m/s	3 m/s	3.25 m/s	3.5 m/s	3.75 m/s	4 m/s
KSA-	32	(27-18)	2790	1900	5,301	30331	34122	37913	41705	45496	49287	53079	56870	60661
KSA-	33	(31-18)	3100	1900	5,890	33899	38136	42374	46611	50849	55086	59323	63561	67798
KSA-	34	(34-18)	3410	1900	6,479	37467	42151	46834	51518	56201	60884	65568	70251	74935
KSA-	35	(37-18)	3720	1900	7,068	41036	46165	51295	56424	61554	66683	71812	76942	82071
KSA-	36	(21-21)	2170	2210	4,796	28529	32095	35662	39228	42794	46360	49926	53492	57059
KSA-	37	(24-21)	2480	2210	5,481	32918	37033	41148	45263	49378	53492	57607	61722	65837
KSA-	38	(27-21)	2790	2210	6,166	37308	41971	46634	51298	55961	60625	65288	69952	74615
KSA-	39	(31-21)	3100	2210	6,851	41697	46909	52121	57333	62545	67757	72969	78181	83393
KSA-	40	(34-21)	3410	2210	7,536	46086	51846	57607	63368	69129	74889	80650	86411	92172
KSA-	41	(37-21)	3720	2210	8,221	50475	56784	63094	69403	75712	82022	88331	94640	100950
KSA-	42	(40-21)	4030	2210	8,906	54864	61722	68580	75438	82296	89154	96012	102870	109728
KSA-	43	(43-21)	4340	2210	9,591	59253	66660	74066	81473	88880	96286	103693	111100	118506
KSA-	44	(24-24)	2480	2520	6,250	37033	41662	46292	50921	55550	60179	64808	69437	74066
KSA-	45	(27-24)	2790	2520	7,031	41971	47217	52464	57710	62956	68203	73449	78696	83942
KSA-	46	(31-24)	3100	2520	7,812	46909	52772	58636	64499	70363	76227	82090	87954	93817
KSA-	47	(34-24)	3410	2520	8,593	51846	58327	64808	71289	77770	84251	90731	97212	103693
KSA-	48	(37-24)	3720	2520	9,374	56784	63882	70980	78078	85176	92274	99372	106470	113568
KSA-	49	(40-24)	4030	2520	10,156	61722	69437	77153	84868	92583	100298	108014	115729	123444
KSA-	50	(43-24)	4340	2520	10,937	66660	74992	83325	91657	99990	108322	116655	124987	
KSA-	51	(46-24)	4650	2520	11,718	71598	80547	89497	98447	107396	116346	125296		
KSA-	52	(27-27)	2790	2830	7,896	48966	55087	61208	67328	73449	79570	85691	91811	97932
KSA-	53	(31-27)	3100	2830	8,773	54727	61568	68409	75249	82090	88931	95772	102613	109454
KSA-	54	(34-27)	3410	2830	9,650	60488	68049	75609	83170	90731	98292	105853	113414	120975
KSA-	55	(31-31)	3100	3140	9,734	59939	67431	74924	82416	89908	97401	104893	112385	119878
KSA-	56	(34-31)	3410	3140	10,707	66248	74529	82810	91091	99372	107653	115934	124216	
KSA-	57	(37-31)	3720	3140	11,681	72558	81627	90697	99767	108836	117906			
KSA-	58	(34-34)	3410	3450	11,765	74889	84251	93612	102973	112334	121695			
KSA-	59	(37-34)	3720	3450	12,834	82022	92274	102527	112780	123033				
KSA-	60	(40-34)	4030	3450	13,904	89154	100298	111443	122587					
KSA-	61	(37-37)	3720	3760	13,987	89921	101161	112401	123641					
KSA-	62	(40-37)	4030	3760	15,153	97740	109958	122175						

Not: 1- For air handling units with a cooling coil, the dark dark blue colored portion of the selection table must be used

TECHNICAL SPECIFICATIONS



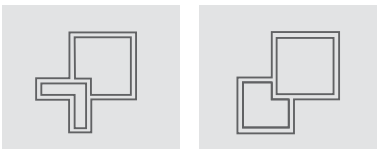
Casing Construction

In KLS air handling units, casings are made of specially shaped extruded aluminum profiles, aluminum middle profiles and double skin panels. Profiles are connected to each other by aluminum corner pieces. All aluminum profiles and corner pieces are electrostatic powder coated. Air tightness of panels and profiles are provided by EPDM gaskets. Unit are supplied with asteel base frame of 120 mm or 200 mm (on request) height. Base frames are equipped with lifting lugs.

Units designed to operate outdoors are equipped with a roof. To enable easy transportation, units can be shipped in sections or completely knocked down. EPDM gaskets are used in connecting sections to each other, to ensure air tightness.

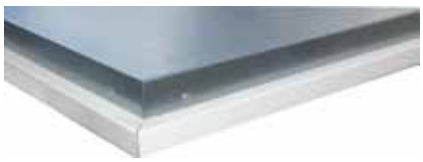
Profiles

Specially extruded aluminum profiles are of 1,8mm thick and thus can withstand high pressures. To prevent corrosion, profiles are electrostatic powder coated. On request, units with steel profiles can also be built.



Panels

Panels of the air handling units are built in standard sizes, in double skin construction, 40 or 60mm thick, with rock wool insulation. Outer surfaces of the panels are made of PVC coated sheet metal painted to RAL 9002 color, while inner surfaces may be of galvanized sheet metal, pre-painted sheet metal or stainless steel. Metal thickness varies between 0,5mm to 1,2mm. Panels can be removed from the outer side of the unit. Inner surfaces of the units are free from any obstructions.



Doors

Double skin service doors are installed on filter, fan, humidifier and empty sections, to enable access and servicing. Lockable access doors are used on all fan sections. Air tightness is provided by special gaskets. Optionally, doors may be equipped with inspection window and lighting inside the section.

Insulation

Density of rockwool used is 70kg/m^3.

Dampers

Dampers are made of airfoil shaped aluminum blades housed in an aluminum casing in an opposed blade configuration. Gaskets are placed on the edges of the damper blades to ensure air tightness. Plastic gears that operate the damper blades are placed within the damper casing, outside of the air stream. Dampers can be manual or motor operated. Optionally, servomotors, flexible connections and rain hoods are available.

Accessories

Standard accessories: an emergency stop, syphon

Optional accessories: internal lighting, inspection window, damper motors, flexible connections on inlet and discharge sides, manometer, service switch and rain protection.

Filters

The total cross section of KLS air handling units are used as filtering area, in accordance with international standards. Filters have their own casings and are placed inside the units through a system that allows easy installation and dismantling. Filter sections are equipped with service door. Inspection window, internal lighting and manometer are optional. Filter types like coarse filter, bag filter, metal filter, active carbon filter, compact filter and HEPA filter are available.

Panel filter	G2, G3, G4, F5
Zig-zag filter	G2, G3, G4
Metal filter	G4
Bag filter	G4, F5, F6, F7, F8
Compact filter	F6, F7, F8, F9
HEPA filter	H10, H12, H13, H14
Active carbon filter	F5, F7

Heat Recovery Systems

In consideration of energy efficiency principles, plate type, rotary type and run-around-coil type heat recovery systems are being used.

Plate type heat recovery system

The plate type heat exchangers used in this system consist of a number of specially shaped, highly conductive aluminum plates, arranged in a cross flow shape and enable transfer of heat between exhaust air and return air, without mixing the two air streams with each other. This system can operate between -30°C and 90°C temperatures. Depending on application, plates may be of corrosion proof aluminum or stainless steel. To prevent freezing at low temperatures, systems with a bypass damper, are used. On the exhaust side, a double slope, stainless steel drain pan is installed. Water collected in the drain pan is discharged through the drain pipe. Efficiencies are between 40% and 60%

No electric connection is necessary

Long life

Low operating cost

Plates can be epoxy coated or stainless steel

Rotary type heat recovery system

Rotor is made of specially shaped aluminum sheets and is driven by an electric motor through a v-belt drive.

In general, they can be classified in three groups:

• Condensation rotors; is the economic solution used in ordinary air conditioning applications. These rotors condense and thus remove the excess humidity in the air.

• Hygroscopic rotors; are used to transfer humidity from one air stream to the other, within certain temperature limits, in comfort air conditioning applications. Surfaces of the rotor have the characteristic of absorbing humidity.

• Sorption rotors; can transfer high amounts of humidity from one air stream to the other, through the desiccant coated material of the rotor. They are most effective in high temperature and high humidity conditions. Through their ability of pre-cooling and de-humidification, they tend to decrease the total cooling requirement of the system, resulting in application of a smaller size chiller.

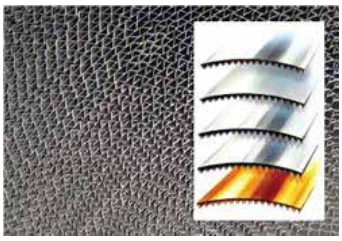
In high pressure applications, abrasive atmospheres, marine applications, etc., specially coated rotors are used.

Rotor diameters vary between 200 – 5000 mm.

Heat transfer efficiency of the rotors are optimized for a rotation speed of 12 rpm. Based on application, rotation speed may be increased up to 20 rpm.

Through control of the rotation speed by a frequency converter, capacity can be adjusted based on varying climactic conditions. Capacity control requirement must be clearly specified while ordering.

Based on EN 308 and ARI 1060 standards, the maximum leakage allowed in rotors is 3%. In properly configured and pressurized rotors equipped with a sweeping zone, the leakage rate is below 0,5%. Angle of the sweeping zone is indicated in the table for different fan positions.



• Efficiencies vary between 60% and 80%

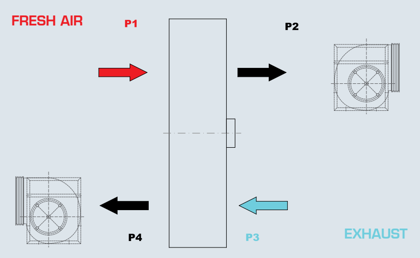
• Electric connection is required. Capacity can be adjusted through variable speed controlled motor (optional)

• Compact construction; occupies minimum amount of space

• No risk of freezing

• Capable of transferring humidity (and sorption)

Fan Position, Pressure Differential and Sweeping Zone

<table>
<tr><th>Fan Position</th><th>ΔP < 200 Pa</th><th>ΔP 200~500 Pa</th><th>ΔP 500~800 Pa</th><th>800 Pa < ΔP</th></tr>
<tr><td> 
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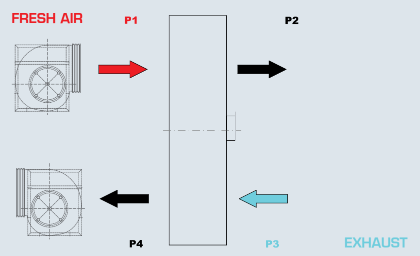
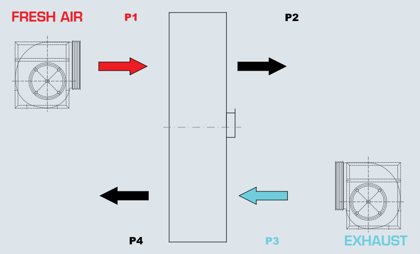
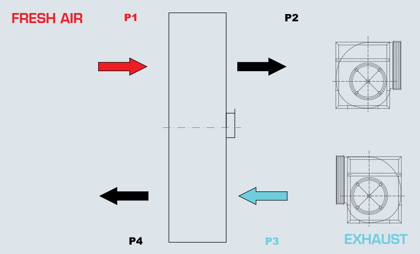
Not necessary</td><td>Sweeping Zone
Standard 5°</td><td>2.5°</td><td>Sweeping Zone
Not necessary</td></tr>
<tr><td> 
</td><td>Sweeping Zone
Not necessary</td><td>Sweeping Zone
Standard 5°</td><td>2.5°</td><td>Sweeping Zone
Not necessary</td></tr>
<tr><td> 
</td><td>Sweeping Zone
Not necessary</td><td>Sweeping Zone
Standard 5°</td><td>2.5°</td><td>Sweeping Zone
Not necessary</td></tr>
<tr><td> 
</td><td colspan="4">Not recommended</td></tr>
</table>

ΔP = P1 - P3 (DIFFERANTIAL PRESSURE BETWEEN FRESH AIR AND EXHAUST)

Run-around-coil type heat recovery systems

These are low efficiency systems since the heat transfer is from air to water and from water to air. Water circulating in a closed loop is used to transfer the heat between the exhaust air and the fresh air streams. There is a circulating pump and a balancing tank in the system. A double slope, stainless steel drain pan is used on the exhaust side.

- Efficiencies vary between 30% and 50%
- Electric connection is required (circulation pump)
- Standard plumbing equipment is used
- Due to danger of freezing, glycol mixture is used in cold climates
- Exhaust and fresh air streams can never mix with each other.

Electric Heaters

Electric heaters are used in air handling units when there is no heating medium available or it is not reachable, at the inlet of the air handling units when there is a risk of freezing or at the outlet of air handling units when there is a need of instant heating in accurate systems.

In systems that use after-cooling for humidity removal, electric heaters are installed after the cooler. Elements of the electric heater are made of stainless steel, while the casing can be galvanized or stainless steel, depending on request. They can be step controlled or proportional. Heaters that are CE approved are used. As standard, electric heaters are equipped with an auto-reset type limit thermostat and a manual reset type safety thermostat. Protection class is IP 43. Electric heaters should only be energized when the fan is running. Necessary precautions to turn off the electric heater should be taken, when the fan is turned off. In electric heaters over 30 kW capacity, it is suggested that fan should be kept running for 2-3 minutes after the electric heater is turned off.

Heating and Cooling Coils

Coils are selected to match the fluid to be used. Coil tubes may be of copper or steel, while fins may be of aluminum, copper or steel. Aluminum or copper fins may be epoxy or hydrophilic coated. Collectors may be of steel or copper. Coils are pressure tested at 20 bars, while testing at 30 bars is optional. They are placed on slide rails to enable easy removal from the air handling unit. Through installation of special bypass elements, it is ensured that all air flow goes through the coil. In hot and chilled water coils, water inlet is from the bottom and outlet from the top, air and water flow is in a counter flow arrangement to increase the heat transfer efficiency. Unless otherwise specified, pressure drop in heating coils is kept below 25 kPa and in cooling coils, below 40 kPa.

Water coils: Hot and chilled water coils are copper tube and aluminum fin type. Collectors are of copper or steel.

Refrigerant coils: These are copper tube and aluminum fin type, with copper collectors.

Steam coils: In systems up to 3 atg steam pressure, copper tube aluminum fin type coils, in systems over 3 atg steam pressure, steel tube and steel fin type coils are used.

Condensate Trays

In order to drain the condensing water in cooling coils, humidifiers and heat recovery systems, double slope condensate trays in stainless steel are used. Condensate tray is big enough to accommodate the coil, collectors and droplet eliminators. Condensate tray is insulated with rock wool.

Droplet Eliminators

Droplet eliminators are made of specially shaped PVC and are placed downstream of the cooling coils.

Humidifiers

Three types of humidifiers are employed: electrode steam type, mat type and atomizing type.

Electrode steam humidifiers

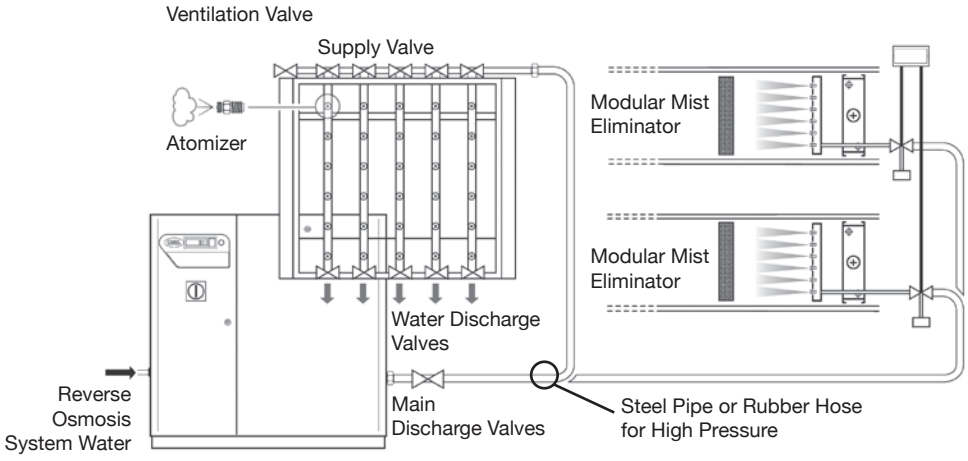
Electrode steam humidifiers consist of a microprocessor controlled steam generating unit and connecting pipes. They generate steam from tap water, using electricity. The generated steam is sent to the air handling unit through a steam distribution pipe and this steam is used to humidify the air. Humidifiers of various capacities, operating on 230 – 400 V power supply, having on-off or proportional control, are used.

Mat type humidifiers

Mat type humidifiers provide evaporative humidification by passing the air through a wet filling material. The filling material (mat) is kept wet by a circulation pump or directly by tap water. The efficiency of these humidifiers can be 65% - 85% or 95%. Casings of the humidifiers are made of stainless steel. In order to prevent clogging of the filling material, air must be filtered prior to humidification. At air speeds of over 3,5 m/s, droplet eliminators must be installed downstream of the humidifier. Service door, inspection window and internal lighting are used

Atomizing type humidifiers

These humidifiers, operating on de-mineralized water, consist of an inverter controlled pump, control panel, distribution pipes, drain valves, stainless steel nozzles and droplet eliminators, pressurize the water to 75 bar and totally pulverize it at the nozzles and thus enable mixing with air completely, can make stepless capacity control between 14% to 100% and they operate on very low electric consumption (4 watts per liter/hour of humidification) providing operating economy. These units comply with DIN 1946 hygienic standards. Atomizing type humidifiers can be used for adiabatic cooing purposes.



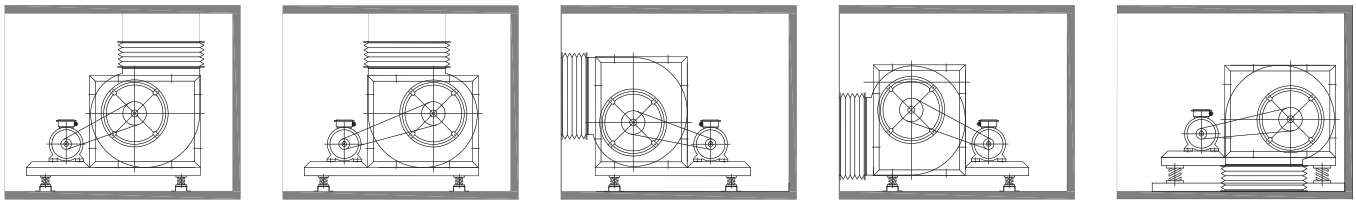
Sound Attenuators

Sound attenuators may be placed at the inlet or outlet sides of the air handling units, depending on request. Attenuators contain splitters of high absorbing capacity. These splitters are made of galvanized or stainless steel with glasswool or rockwool inside. The inlet and exit portions of the splitters have a rounded shape to decrease pressure losses and noise. Splitters are placed vertically inside the attenuator. Splitters are so sized that the air speed between them does not exceed 20 m/s.

SPLITTER LENGTH (mm)	SOUND ABSORPTION CAPACITY (dB)							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
620	5	9	15	16	16	11	8	8
930	6	12	21	22	23	16	11	11
1240	7	15	27	28	29	20	12	12
1550	9	19	33	34	36	25	17	17
1860	10	22	39	40	42	29	20	20
2170	11	25	45	46	48	33	23	23

Fans

Fans are selected to meet the required air flow and pressure at the highest efficiency, minimum electric consumption and lowest sound level. In accordance with international standards, statically and dynamically balanced double inlet centrifugal fans with forward or backward inclined blades are used. Fans are installed on a base frame and are driven through v-belts. In special applications, plug fans are used. Plug fans are direct driven. To prevent transmittance of fan and motor vibration to the air handling unit casing, fan – motor base frame is installed on spring vibration absorbers with high absorbance capacity. Flexible connections are used between fan outlet and unit casing. To minimize vibration and noise, fans are driven through v-belts. For security purposes, service doors on fan sections are equipped with fan guards.



Motors

Electric motors used are asynchronous, three phase, squirrel cage type in IP 55 protection class. Unless otherwise specified, motors are 380V, 50Hz. In accordance with international standards, motors may be single speed, two speed or with frequency controller.

Diffusers

Diffusers are used after the fan sections in cases where there are other sections like filters, sound attenuators, etc. after the fan section, to enable homogenous distribution of air over these elements.

Plenums

Empty plenum sections are used at the end of the air handling units when space is needed for air distribution, when there is more than one suction / discharge, or in special cases where maintenance is required.

Control Panels and Automation

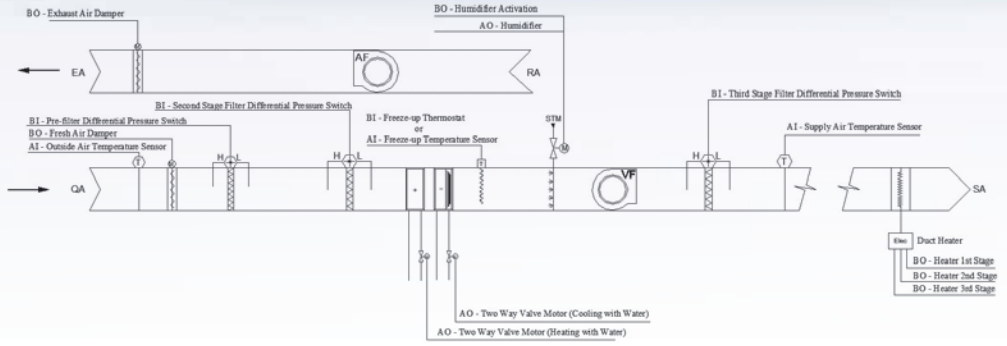
On request, air handling units may be supplied with a control panel or an integrated control + automation (MCC and DDC) panel. These can be installed on the unit or may be supplied separate. Two types of automation are applied. In simple applications, temperature and humidity control, electronic control panel, duct type temperature and humidity sensors, valve and damper actuators are used. Frequency controllers can also be included.

For more accurate applications, microprocessor control systems, with specially developed software, are used. Through this microprocessor, air delivery, temperature, humidity, filter dirtiness, pressure difference between locations, conditions of the conditioned spaces and unit variables can be monitored and controlled and the system can be integrated with the building management system. This control system can manage the following functions:

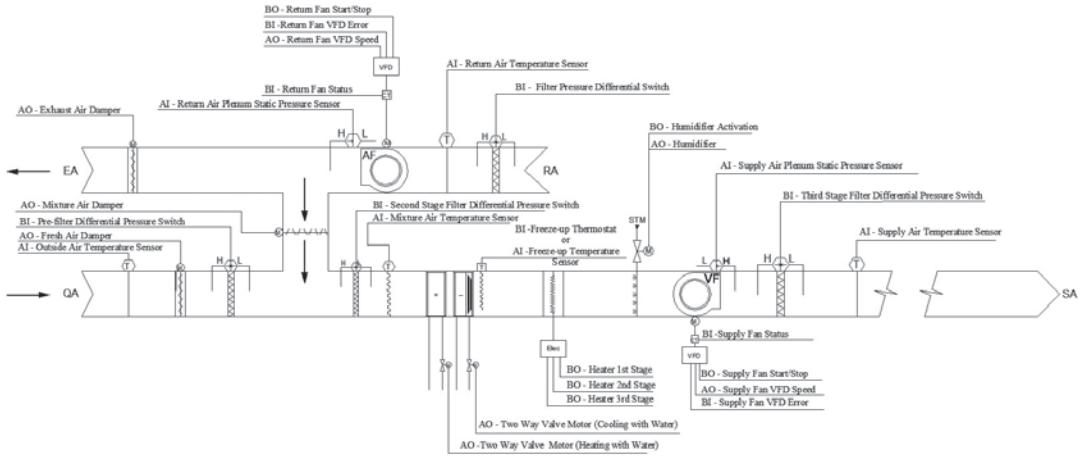
- Selection of DX or chilled water cooling,
- Selection of DX, hot water or electric heating,
- Humidity control,
- De-humidification or increased comfort through an after heater,
- Utilization of hot gas bypass in DX systems to attain extreme comfort conditions,
- Close control of the dirtiness of each filter and generation of alarms,
- Adjustment of fan delivery depending on operation altitude and temperature,
- During operation, adjustment of fan speed in view of present filter dirtiness to keep the air delivery constant,
- Operation of an alarm when the required air delivery can not be met due to a fault or clogging,
- Adjustment of the return fan delivery in parallel to the supply fan delivery, to maintain the required positive or negative pressure,
- Setting of a cleaning mode function for quickly cleaning the conditioned space by increasing the air delivery,
- Programming of (temperature, air delivery, on-off) seven days of a week through 4 different daily programs,
- Adjustment of daily, weekly on – offs, outside air compensation,
- Limit control of supply temperature (comfort temperature, start of condensation temperature),
- Capability of being integrated with building automation systems and communication in all known languages (Modbus, BACnet, Lon-ECHELON, LAN TCP/IP, SNMP) through an additional outfit,
- Capability of being connected to and being controlled by a central computer, accessible through internet,
- All parameters can be seen and can be adjusted through the terminal on the unit,
- All similar equipment can be connected through a network,
- Operation and configuration parameters can be coded,
- Visual and audio alarm information can be generated,
- Capability of selecting between English and Turkish languages,
- In case unit configuration is changed (addition of a humidifier, changes in valve – damper controls, de-humidification, changes in fan control, etc.) new configuration can parametrically be adjusted,
- Unit can be started or stopped through the terminal by using a time differential, through entering a numeric input or through a computer,
- Pre-heating, heating and cooling algo-rhythm can be made based on inlet, outlet or pre-heating temperatures,
- Parametric temperature control can be proportional, proportional + integral or proportional + integral + differential,
- Parametric fan control can be thermostatic, continuous, by steps or proportional,
- The starting of fan motors can parametrically be adjusted (direct on line, star – delta),
- Each component can individually be operated and tested,
- All alarm information is stored (differential pressure switch, thermic, sensor, emergency stop, etc).

SAMPLE AUTOMATIC CONTROL SCHEMES

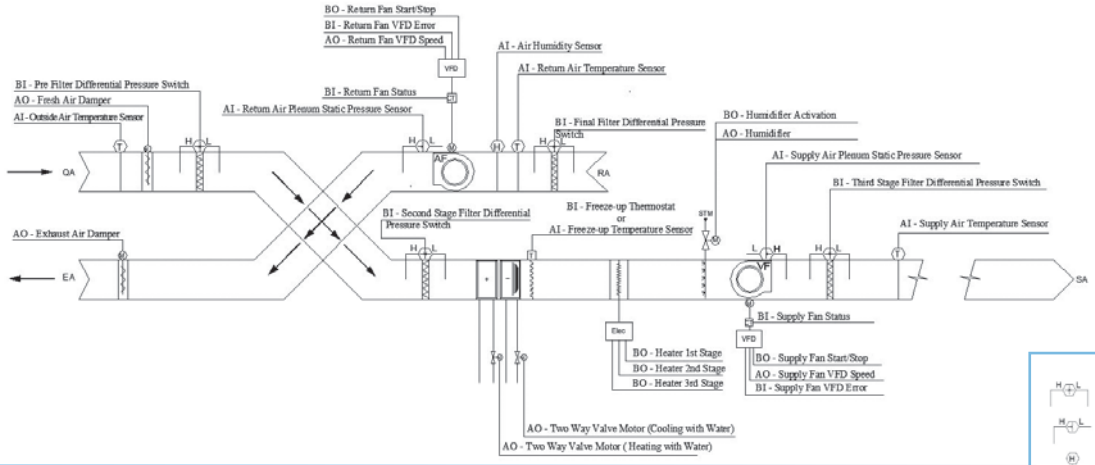
Automatic Control of a 100% Fresh Air Unit



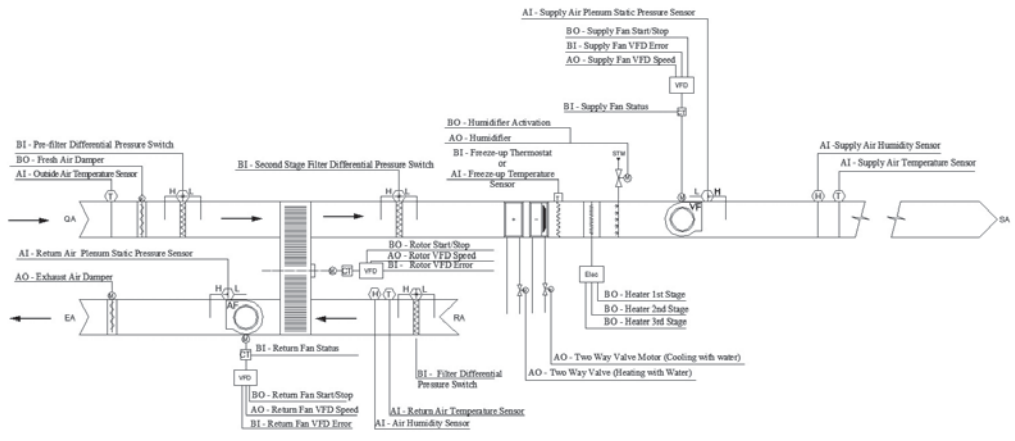
Automatic Control of a Unit with Mixture Air

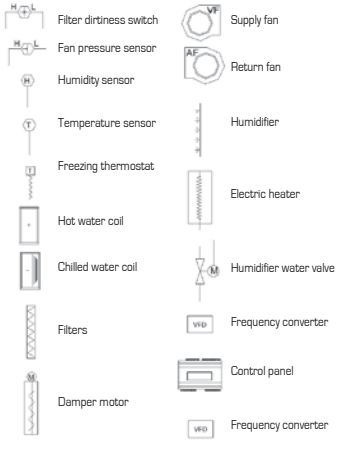


Automatic Control of a Unit with Plate Heat Recovery



Automatic Control of a Unit with Rotary Heat Recovery





QA = Fresh air inlet
EA = Exhaust air outlet
RA = Return air
SA = Supply air

AI = Analogue input
AO = Analogue output
BI = Digital input
BO = Digital output

Klas Isıtma Soğutma Klima San. ve Tic. Ltd. Şti.

Head Office / Factory
İ.A.O.S.B. 10008 Sk. No: 5 35620
Çiğli / İZMİR / TURKEY
Tel: +90.232. 328 10 00 Fax: +90.232. 328 10 80
satis.izmir@klsklima.com.tr
info@klsklima.com.tr
www.klsklima.com.tr

Central Anatolia Branch Office
Ehlibeyt Mah. Ceyhun Atuf Kansu Cad.
127/3 06520 Balgat / ANKARA / TURKEY
Tel : +90.312. 478 08 37 - 38
Fax : +90.312. 478 08 48
satis.ankara@klsklima.com.tr

Marmara Branch Office
Atatürk Mah. Girne Cad. No: 29
34758 Ataşehir / İSTANBUL / TURKEY
Tel : +90.216. 580 91 56
Fax : +90.216. 580 91 55
satis.istanbul@klsklima.com.tr