4 seasons Air

SWISS AG

FOUR SEASONS Air Handling Units are manufactured in 28 different sections. Volume flow rate in units for cooling and ventilation is 900-133.000 m³ / h and 900-177.000 m³ / h only for heating units.

FOUR SEASON Air Handling Units are modular and have double-walled panels. It can be produced by using panels of 50 mm or 60 mm thickness with rock wool, glass wool or polyurethane insulation, depending on demand and application. The outer surfaces are painted sheet metal in standard RAL 9002 color, and the inner surfaces can be galvanized, painted or stainless steel according to the request and application. It is easy to clean with its smooth inner surface and dust accumulation is prevented. **FOUR SEASON** air handling units form a strong structure with specially designed aluminum profiles with electrostatic furnace painted and plastic corner fasteners. EPDM-based seals are used to ensure impermeability. Filter selections are made taking into account the needs of the environment and the process in which the unit operates. With special designs, leaks that may occur during air flow are prevented, and high efficiency is achieved in coils and filters. Optionally, plate, rotor or coil type heat recovery units are used for energy efficiency, which is of great importance today. The fan-motor group is selected in the most efficient way, taking into account the air flow and total static pressure. Fans are selected according to the intended use and desired design criteria, with forward curved dense blades, backward inclined sparse blades, airfoil or plug types. Fans with approved performance tests are used. The motors are in IP55 class as standard and comply with CE norms. Dampers used in Air Handling Units are manufactured using aluminum profiles, aluminum blades and plastic-based gears. The gears are out of the air stream. It provides sealing between specially shaped plastic gaskets and damper blades.

AIR HANDLING UNITS SELECTION PROGRAM

The technical report containing the selection, sizing and performance data sheet of FOUR SEASONS brand air handling units can be created easily with FOUR DKS air handling unit selection program. Thanks to the air handling unit selection program: According to the desired air flow rate, you can see the air velocities in different unit sections and on the coil surface and determine the most suitable cross section. You can create the unit you want by bringing the elements you have determined side by side. For every element you can specify the accessories. In the selection of each element, you can see the brand model alternatives together with their price rates, you can choose the most suitable option in terms of parameters such as efficiency and price. You can determine how many parts the unit will consist of and the maximum cell size. You can see the dimensions and weights of the parts that make up the unit. You can see the technical report of the unit you choose, including its price, its sized picture and the necessary information.

Model	Air Handling Unit Internal Section	Heating / Cooling / Ventilation		Heating / Ventilation Flow
	W x H	Flow Rate m³/h		Rate m³/h
	(mm) x (mm)	Minimum	Maximum	Maximum
DKS-S 062 - 046	620 x 465	926	1852	2469
DKS-S 062 - 062	620 x 620	1296	2592	3456
DKS-S 093 - 062	930 x 620	2160	4321	5761
DKS-S 124 - 062	1240 x 620	3024	6049	8065
DKS-S 093 - 093	930 x 930	3395	6789	9053
DKS-S 124 - 093	1240 x 930	4753	9505	12674
DKS-S 155 - 093	1550 x 930	6110	12221	16295
DKS-S 124 - 124	1240 x 1240	6481	12962	17282
DKS-S 155 - 124	1550 x 1240	8332	16665	22220
DKS-S 186 - 124	1860 x 1240	10184	20368	27158
DKS-S 155 - 155	1550 x 1550	10554	21109	28145
DKS-S 186 - 155	1860 x 1550	12900	25800	34400
DKS-S 217 - 155	2170 x 1550	15245	30491	40654
DKS-S 186 - 186	1860 x 1860	15610	31221	41628
DKS-S 217 - 186	2170 x 1860	18449	36897	49196
DKS-S 248 - 186	2480 x 1860	21287	42574	56765
DKS-S 217 - 217	2170 x 2170	21671	43341	57789
DKS-S 248 - 217	2480 x 2170	25005	50009	66679
DKS-S 279 - 217	2790 x 2480	28339	56677	75570
DKS-S 310 - 217	3100 x 2480	31673	63345	84460
DKS-S 248 - 248	2480 x 2480	27775	55550	74066
DKS-S 279 - 248	2790 x 2480	31478	62956	83942
DKS-S 310 - 248	3100 x 2480	35182	70363	93817
DKS-S 341 - 248	3410 x 2480	38885	77770	103693
DKS-S 403 - 248	4030 x 2480	44440	88880	118506
DKS-S 465 - 248	4650 x 2480	51846	103693	138257
DKS-S 527 - 248	5270 x 2480	59253	118506	158008
DKS-S 589 - 248	5890 x 2480	66660	133320	177759

CASSETTE STRUCTURE

Special extrusion aluminum profiles, intermediate profiles and panels are used in the Four Seasons framed Air Handling Unit. Aluminum profiles are electrostatic powder painted, resistant to corrosion. Profiles are combined with each other specially designed plastic corners. Panels are produced in standard sizes, with double walls and rock wool, glass wool or polyurethane are used as insulation material between them. Panel thickness is 50 mm or 60 mm. The outer sheet of the panels is painted as standard in RAL 9002 color, coated with protective polyfilm, and the inner surfaces are made of galvanized, stainless or painted sheet. Sheet thickness is in the range of 0.8-1.2 mm. Panels are removable from outside of the air handling unit. The internal surfaces of the unit are designed to be completely smooth. Panels are fastened directly to the profiles with special self-drilling screws. EPDM-based sealing gaskets are used between panels and profiles. Intermediate profiles are used between the panels. The intermediate profiles are also filled with insulation material. Leak-proof sealed service doors are installed at required places on the power plant. Service doors can also be manufactu- red with sight glass on request or according to the purpose of application (hygienic, etc.). Air handling unit base can be in one piece or in pieces on the basis of cells, depending on the size of the unit. Air handling units are placed on a 141 mm base at low pressures and 200 mm at high pressures. There are lifting holes in the base for easy transportation. In outdoor units, the unit is protected from external weather conditions by a specially designed roof. Air Handling Unit can be shipped in modular or disassembled form and assembled on site in order to provide ease of transportation. It can be connected to each other with special connection elements in cell assembly. Special EPDM gasket is used to seal the joint interface.

ACCESSORIES

In Four Seasons Air Handling Units, optional lighting, sight glass, mano-meter, flexible connection in the throw and suction nozzles, siphon, maintenance switch, damper motor and rain protection are used.

FILTERS

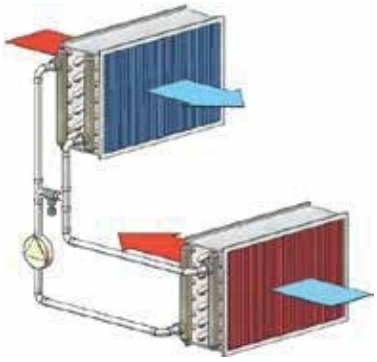
The entire cross section of Four Seasons Air Handling Units is used as a filter transition area in accordance with internatio- nal standards. The filters are cassette type and can be easily attached and detached. Air leaks are prevented with suitable designs. There are maintenance and replacement service doors for filter cells. Optionally, manometer, illumination and sight glass are used. Considering the importance of indoor air quality in air handling units, filters of different types and efficiency are used. Generally, filter types are panel filter, bag filter, metal filter, active carbon filter, compact filter, hepa filter. Panel filters are used as pre-filters. The filter material is synthetic or metallic. Metal filters have the feature of holding oil. The filter classes we use are; for synthetic material: G2, G3, G4, for metallic material: G2, G3. Bag filters are used for high efficiency air filtration. Their dust holding capacity is high. They should be used in conjunction with a pre-filter to increase their life. Bag lengths vary as 305 mm, 508 mm, 635 mm according to air flow. The filter classes we use are G4, F5, F6, F7, F8. Compact filters are high efficiency filters. They must be used in conjunction with a pre-filter. Since their depth is 292 mm, they occupy less space in the air handling unit. Due to the filter structure, it is possible to distribute the air evenly over the entire filter surface. The filter classes we use are F6, F7, F8, F9. Hepa filters are used for hygienic environments. Their efficiency is very high. These filters are installed after the fan and must be used with a pre-filter. The filter classes we use are H10, H12, H13, H14. Activated carbon filters are used to absorb malodorous gas or vapor molecules from the air (such as exhaust fumes, rubber odor, alcohol, hydrocarbon, chlorine, and odors from other chemical production processes). An alternative model is available to absorb odors from other industrial processes such as hydrogen sulfide, sulfur dioxide, and they must be used with a pre-filter to increase their life.

ASPIRATOR-MIXTURE-VENTILATOR CELLS

DAMPERS

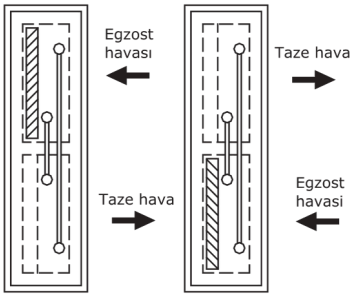
Damper sections are sized in accordance with the air velocity. Dampers with opposed blades in aerofoil structure are used as standard. The material of the damper frame and blades is aluminum. Air leakage has been minimized by using gaskets on the wing edges. Dampers are manufactured in accordance with manual or servo motor control. Optional servo motor, rain protection and flexible connection can be attached. Damper dimensions are standard according to the type of plant and are designed to pass 100% air flow rate.

HEAT RECOVERY SYSTEM



Today, energy efficiency is of great importance. For this reason, the use of heat recovery units has started to be preferred in air handling units. Serpentine, plate and rotor heat recovery elements are used in Four Seasons Air Handling Units. Generally, efficiency varies between 30-50% in serpentine type heat recovery units, 40-60% in plate type, and 60-80% in rotor type.

SERPENTINE HEAT RECOVERY



With double coil heat recovery, heat transfer between fresh air and exhaust air is realized by the fluid circulating in the coils in a closed circuit. Heat transfer is carried out from air to water - from water to air. There is no mixing of fresh air and exhaust air. Ethylene glycol is used in areas with risk of freezing. There is a need for a circulation pump and balance tank in the system. A condensation pan is used on the exhaust side.

PLATE HEAT RECOVERY

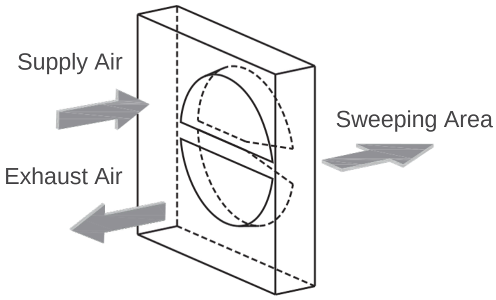
Cross flow plate type heat recovery elements allow heat transfer between fresh air and exhaust air without moving parts. It is possible to provide full sealing even in high pressure differences. It can operate between -30°C and 90°C. Plates are made of aluminum, epoxy-coated aluminum or stainless steel. They are manu- factured with by-pass dampers to prevent freezing at low temperatures. In the exhaust part, a condensation pan is installed against condensation that may occur.

PLATE HEAT RECOVERY

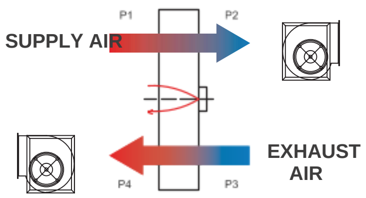
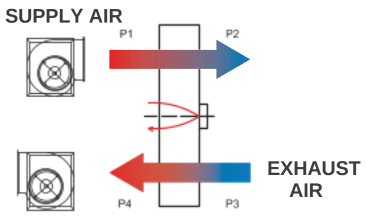
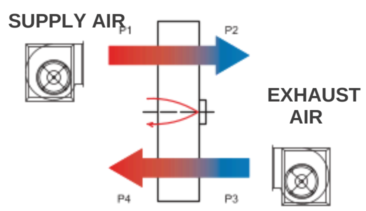
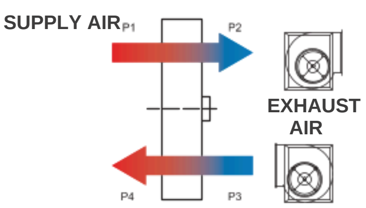
They have a compact structure and high thermal performance. Heat transfer is performed with the wavy sheet-like alumi- num plates placed inside the rotor. Rotor rotation is provided by a belt-pulley driven electric motor. It can generally be grouped into 3 types: 1-Condensing heat wheels: In standard comfort ventilation, it is a low cost solution that provides heat recovery by condensing and draining the water vapor in the air. 2-Dehumidifying heat wheels: It transfers moisture with its special surface at appropriate temperature ranges in standard comfort ventilation applications. 3-Enthalpic heat wheels: It is preferred in climatic conditions with high temperature and humidity. It transfers higher amounts of moisture thanks to the filling surfaces coated with desiccant materials. With its pre-cooling and dehumidification feature, it reduces the energy spent for cooling. Therefore, as chillers are used in smaller capacities, it provides significant energy savings. The filling diameter is between 250-5000 mm. It takes up less space due to its compact structure. The temperature efficiency of the heat wheels has been optimized for a rotational velocity of 12 rpm per minute. It is increased according to the application situation. If capacity control is required according to variable climate conditions, velocity control can be done with a frequency converter. Capacity control request must be notified in the order. There is no risk of freezing.

DETERMINATION OF THE FAN POSITION IN AIR HANDLING UNITS WITH ROTARY TYPE HEAT RECOVERY SYSTEM

While determining the fan rotor positions on the heat wheel, attention should be paid to the sweeping zone that occurs. Allowable contamination-leakage amount in heat wheel according to EN308 and ARI 1060 is maximum 3%. Leakage is below 0.5% on a correctly configured, pressurized and manufactured heat wheel with a standard sweeping chamber. Sweep zone angle according to fan positions and pressure difference is given in the table.



AIR HANDLING UNITS SELECTION PROGRAM

Fan Position	Δ P<200 Pa	Δ P 200 ~500 Pa	Δ P 500~800 Pa	800 Pa<ΔP
	Sweep Zone Not Necessary	Sweep Zone Not Necessary	2.5°	Sweep Zone Not Necessary
	Sweep Zone Not Necessary	Sweep Zone Not Necessary	2.5°	Sweep Zone Not Necessary
	Sweep Zone Not Necessary	Sweep Zone Not Necessary	2.5°	Sweep Zone Not Necessary
		Not Recommended		

Note:
$\Delta P = P1 - P3$ (Pressure difference between supply air and return air)

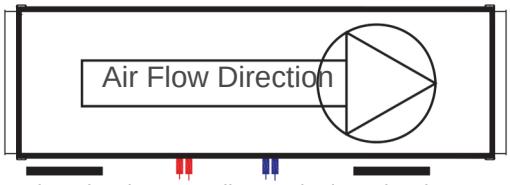
HEAT RECOVERY SYSTEM

Electric heater is used optionally in Four Seasons Air Hand- ling Units. It is used at the entrance of the power plant in areas with high risk of freezing. It is also used at the exit of the power plantin sensitive systems that require instant heating. The electric heater frame is optionally manufactu- red from galvanized or stainless steel. Its elements are stainless material. Protection class is IP43. It can be made gradually or proportionally. It has CE certificate. As standard, there are automatic reset limit thermostats and manual reset safety thermostats in the heaters. If the heater is over 30 kW, it is recommended to run the air handling unit's fan for another 2-3 minutes after the power is cut off. If there is an electric heater in the air handling unit, precautions must be taken to deactivate the electric heater in cases where the fan does not operate or operates at very low speeds (less than 1.5 m/s).

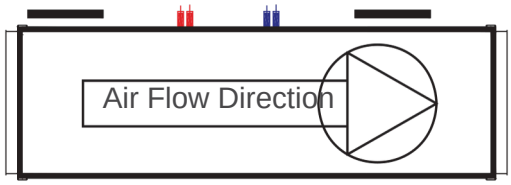
HEATING AND COOLING SERPENTINS

Heating and cooling processes are carried out with coils. Serpentine pipes can be copper or steel, blades can be aluminum, copper, steel, epoxy coated aluminum or epoxy coated copper. Direct expansion coils are manufactured as copper tube-alu- minum fins and collectors are copper. Serpentine frame is made of galvanized steel plates. Test pressure is 20 bar. Pipe inlet-outlet openings in hot and cold water coils are threaded; In superheated and steam coils, pipe inlet-outlet openings are flanged. It is designed to be easily taken out for maintenance. Air is only allowed to pass through the serpentine surface with special by-pass plates. Air and water are designed as counter flow in order to provide high efficiency. In hot and cold water coils, the water inlet is from the bottom and the water outlet is from the top. In the cooling coils, thanks to the condensation pan that is embedded in the panel, the surface area of the coil is used efficiently. The condensation pan is made of stainless steel with double slope. A separator is used to keep the condensed water in the air after the cooling coil.

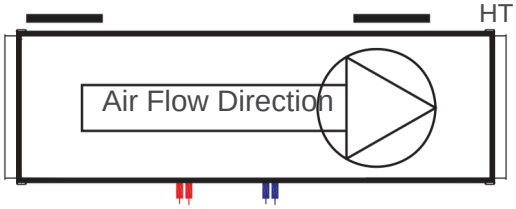
Serpentine and Service Directions



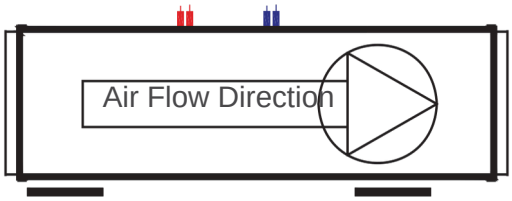
Serpentine Direction According to Air Flow Direction RIG HT
Service Direction According to Air Flow Direction RIG HT



Serpentine Direction According to Air Flow Direction LEFT
Service Direction According to Air Flow Direction LEFT



Serpentine Direction According to Air Flow Direction RIGHT
Service Direction According to Air Flow Direction LEFT



Hava Akış Yönüne Göre LEFT
Serpantin Service Direction RIGHT
According to Air Flow Direction

HUMIDIFIER

The desired humidity rate in the location is provided by humidifiers. Steam type, filled type, isothermal gas burning and atomizer humidification units are used in Four Seasons Air Handling Units.

STEAM HUMIDIFIER

It generates steam from water with electrical energy. It is microprocessor controlled. The steam taken from the humidifier unit is humidified with the help of steam distribution pipes in the air handling unit. There are many models in the range of 1.5-130 kg/h that operate with On-Off or proportional control.

FILLER TYPE HUMIDIFIERS

It is evaporative humidification in which the air is passed over the wet filling. The filling is wetted by the circulation pump system. The efficiency of the humidifiers used is 65% -85% -95%. A separator is placed in the humidifier section at air veloci- ties above 3.5 m/s.

ISOTHERMIC GAS BURNING HUMIDIFIERS

Isothermal gas-burning humidifiers can produce isothermal steam by burning gas thanks to their compact structure. It can burn natural gas (G20 or G25), propane (G30) or butane (G31) without changing parts during assembly. Isothermal steam humidifiers are installed outside the unit and the generated steam is directed into the air handling unit through steam distri- bution pipes.

ATOMIZER HUMIDIFIERS

They are devices that produce high amount of steam by consuming very low energy. There are models ranging from 100 to 600 kg/h. These devices, which operate proportionally, have the ability to be connected to more than one air handling unit. It works with demineralized water. It sprays and pulverizes the water at a pressure of up to 75 bar, thus allowing it to mix with air completely. It consumes approximately 4 watts of energy for each liter / hour humidification. The system complies with DIN 1946 hygiene standards. This type of humidifier is also used for adiabatic cooling. Equipments:

- A frequency controlled pump
- Control unit
- Distribution pipes
- Automatic column valves
- Drain valves
- Stainless steel sprayers
- Drop holder

SILENCERS

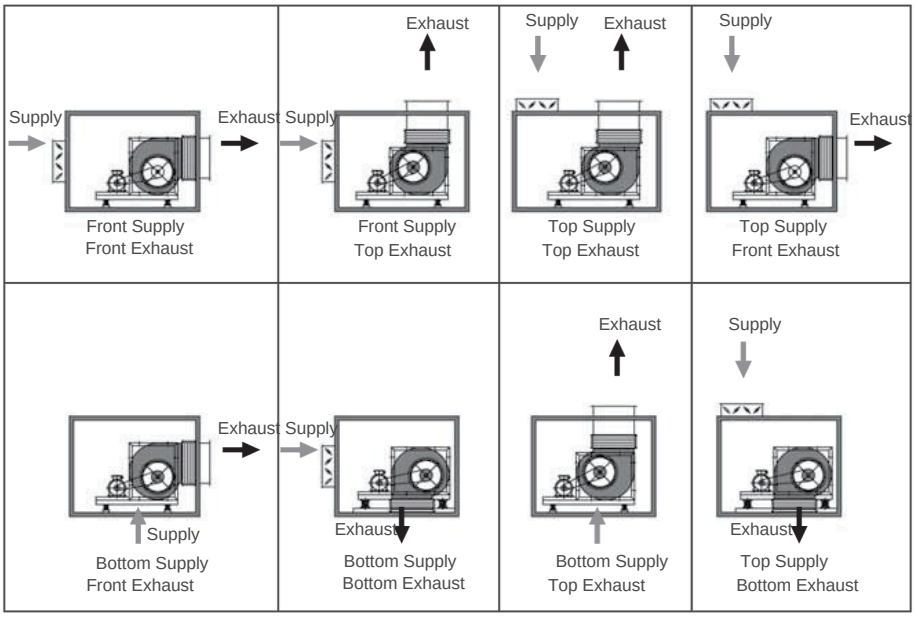
The noise level, which is of great importance in ventilation systems, is reduced to an acceptable sound level in the room with the help of silencers. The sound absorption coefficient of the silencers varies according to the silencer size used. The silencer cell consists of coulettes in which rock wool is placed in galvanized or stainless sheet metal. Silencer elements are designed not to be deformed at 20m / s air speed. 6 different silencer lengths are offered in Four Seasons Air Handling Units. Sound absorption capacities are given in the following tables according to the silencer sizes.

SILENCER LENGTH (mm)	SOUND ABSORPTION CAPACITY (dB)							
	63 hz	125 hz	250 hz	500 hz	1000 hz	2000 hz	4000 hz	8000 hz
600	5	9	15	16	16	11	8	8
900	6	12	21	22	23	16	11	11
1200	7	15	27	28	29	20	12	12
1500	9	19	33	34	36	25	17	17
1800	10	22	39	40	42	29	20	20
2100	11	25	45	46	48	33	23	23

FANS AND MOTORS

Various fan types are presented in accordance with the air flow rate and total pressure drop in each section. Static and dynamically balan- ced fans in accordance with international standards can be forward curved, backward inclined or airfoil blades, depending on the purpose of use and customer demand. Fan motor group is selected conside- ring high efficiency, low noise level and minimum energy consumpti- on, depending on the air flow and total static pressure. In order to prevent vibration, the fan-motor group is connected to the device with spring insulators. In our units, bushed, fixed diameter pulleys are used as standard. It is possible to use variable diameter pulleys optionally. SPZ, SPA, SPB and SPC belt types are available. The belt is tensioned by a special mechanism. There is a safety guarded service door in the fan cell for service and maintenance. In special cases, plug type fans are used and they are directly coupled to the motor. The motors are in IP55 protection class as standard and comply with CE norms. The motors are single-speed as standard and double-speed motors can be used optionally. A frequency converter for motor speed control is available as an accessory.

Fan Operating Modes



ATOMIZER HUMIDIFIERS

Diffusers are used to ensure a homogeneous distribution of air over these elements in case there are elements such as filters, serpentines, and silencers after the fan.

AIR HANDLING UNITS SELECTION PROGRAM

FUNCTION-EQUIPMENT	DEFINITION	STANDARD - ST OPTIONAL - OP
Emergency stop button	Emergency stop button that stops the system in an emergency Motor	**ST**
External links are made terminal board.	terminals are moved to an easily accessible panel outside the unit.	**ST**
AUTOMATIC CONTROL **Electronic control panel** **Duct type temperature sensor** **Duct type humidity sensor** **Valve servomotors** **Damper servomotors** **Frequency Converters**	Air temperature control at the desired point or points. Humidity control at the desired point or points. Control of two-way or three-way valves. Control of dampers. Air pressure control.	**OP** **OP** **OP** **OP** **OP**
MICROPROCESSOR CONTROL **Microprocessor** **Duct type temperature sensor** **Duct type humidity sensor** **Differential pressure switches** **Valve servomotors** **Damper servomotors** **Frequency Converters**  	- Air flow is controlled. Pressure control between two spaces can be made. Generating alarm information in case the desired flow cannot be achieved (blockage, malfunction, contamination). - Adjustable ventilator flow rate according to operating altitude and temperature. - Preheating, heating and cooling algorithms optionally input, output or according to preheating temperatures. Blowing temperature limit control can be made. - Detecting the pollution of all filters used separately and generating alarm information. - Efficient working conditions are obtained by controlling DX coils. - It is possible to see and change all parameters with the terminal on it. - All exchanges can be communicated as a network. - Operation and configuration parameters can be encrypted. - Audible and visual alarm information can be given. - Daily, weekly work-stop time can be adjusted. - Turkish and English options - The entire system can be connected to a central computer with additional hardware, managed and accessed over the internet. - When the unit configuration changes, a new configuration can be easily defined parametrically (adding humidification or dehumidification, valve and damper control changes, changing the fan control type, etc.) - Temperature control can be done parametrically, proportional, propor- tional + integral or proportional + integral + derivative. - Compensation can be made according to outdoor temperature and can be adjusted parametrically. - The control of the fans can be done parametrically, thermostatic, contin- uously, gradually or proportionally. - The way the fan motors start up (direct, star, triangle) is parametrically adjustable. - Each piece of equipment can be tested by running it individually. - All kinds of alarm information are kept in memory (Differential pressure switches, thermal, sensor, emergency stop, etc.). - It can be integrated into the building automation system with all known communication languages (Modbus, BACnet, Lon-ECHELON, LAN TCP / IP, SNMP) with an additional hardware.	**OP**


10.2021
FOUR SEASONS


We make the difference with
180 different types of products.
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