

LIQUID DESICCANT AIR CONDITIONING



The latest generation of advanced liquid desiccant air-conditioner system is supplied by a high-tech enterprise located in Jiangsu Province, China with R&D collaboratively conducted in the Nanjing engineering project center established with the Nanjing Aviation and Aeronautics University,

Successful leading-tech products have been launched for environmental technology, air quality products, development of mobile mine rescue capsule, horizontal laminar flow shield in the operating rooms, liquid desiccant dehumidifier, wind power generation, cooling systems and advanced for refrigeration, air conditioning, purification.

The factory has an area of 80,000 square meters with the plant area of 40,000 square meters and has advanced manufacturing and processing equipments, environmental laboratories, and with ISO9001 quality management and ISO14001 environment system certification.

Key technological discoveries, in collaboration with China Sustainable Energy Technology Association and University of Nottingham in U.K, which have been patented are the development of a series of patented core bodies, including: **non-liquid indirect liquid desiccant-pin IDC, efficient internal cooling liquid desiccant core ICDC, liquid regeneration core IHDC, heat and mass recycling and energy recovery core MHM3C and the dew point dehumidification core PEC.**

The key achievements of these important patented technologies are:

1. Dehumidification liquid is non-corrosive, non-toxic, biodegradable of food-grade standard with good thermal performance;
2. System does not entrain the liquid desiccant and there are no carryover particulates in the processed air.

CERTIFICATIONS AND AWARDS

资质与荣誉



Range of Large Liquid Desiccant Air Conditioning units (Y series) - Customisable to suit various operating environments

Heat-driven liquid desiccant dehumidification unit (YR series):

This series of products is applicable where there is low-grade heat source and 'high temperature cold water' (14°C/19°C) supply to cool the liquid desiccant. Can recycle and reuse heat from Industrial waste heat power generation, waste heat, solar and other low-grade heat source. Being truly low-carbon, energy saving environmental protection, can help solve the energy shortage problem.

Heat driven Liquid Desiccant Unit (YR series)



Heat pump fresh air solution, humidity unit (YKX series):

This series of products has the most advanced liquid dehumidification solution. The unit has an integrated compressor/condenser to provide the hot and cold source with Total Heat Exchanger in one system, with air cooling, dehumidification and heating, where applicable. Humidification, purification and other functions, truly a "more than one" new air handling units. To bring a new choice for the majority of users of air conditioning



Heat pump air liquid desiccant unit (YK Series)

This product can completely replace the traditional all-air modular air conditioning units, widely used in Public buildings, shopping malls, stadiums and factories. Through a unique temperature, humidity regulation technology, can achieve independent control of the air temperature, humidity, with precision. Highly efficient energy-saving, constant temperature and humidity regulation, easy to install

Air Liquid desiccant unit (YK series)



Pre-Cool All-Air Liquid Desiccant Air Conditioner – YKY series



Pre-cool All-air Liquid Desiccant Air Conditioner (YKY)

- ◆ Air volume: 10000~100000m³/h
- ◆ Refrigerating capacity: 85.9~720kw
- ◆ Heating capacity: 71~459kw
- ◆ Dehumidifying capacity: 64~426kg/h
- ◆ Humidification capacity: 19.2~120kg/h



Working principle:

Summer working conditions, the fresh air with high temperature/humidity and return air enter into the all heat recovery unit via the liquid as the medium for thorough heat exchange, the fresh air is primarily cooled down and dehumidified then goes into the dehumidification unit for further dehumidification, the fresh air with low temperature/humidity mixed with the return air to lower the temperature with the externally supplied high temperature cold water (14 /19?) to reach to the air supply state point. The humidity and temperature of the supply air are controlled respectively by the dehumidification unit and post surface cooler. During the dehumidification process, the liquid gets less concentrated by absorbing the water content from the fresh air. In order to restore its dehumidification capability, the diluted liquid is sent into the regeneration unit for regenerating by the fresh air; the regenerated concentrated liquid is sent into the dehumidification unit for the next cycle.

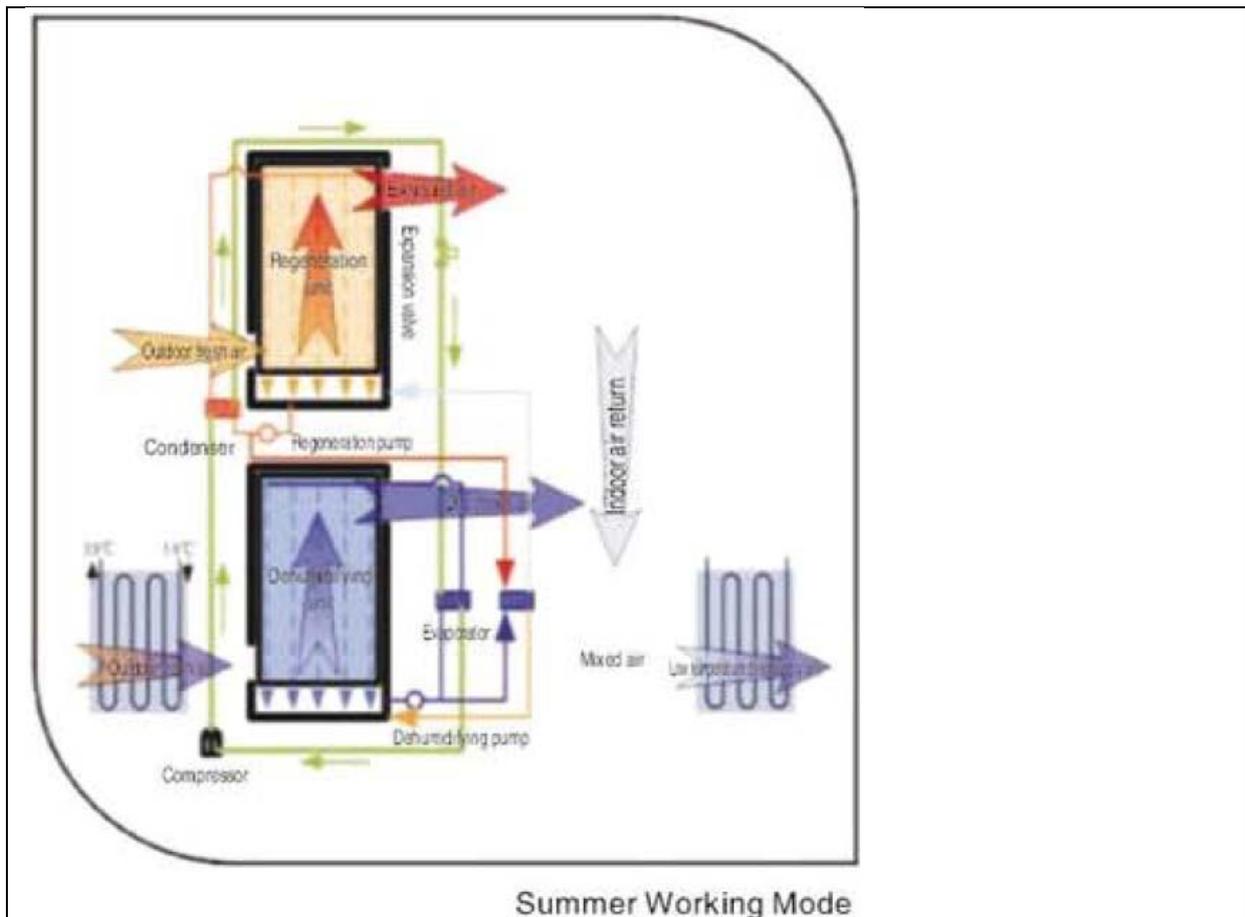
The dehumidification unit comes with its own heat pump system; the refrigerating capacity created by the heat pump circulation is used to decrease the liquid temperature to enhance liquid dehumidifying capability, whereas the condensed heat is used for regenerating the liquid, high efficiency of energy utilization.

WORKING PROCESS (SUMMER CONDITIONS)

YKY units comprise: dehumidification unit + regeneration unit

	<p>Dehumidification Unit</p> <p>The liquid desiccant is pumped from the liquid pool to the cold source MHM3C heat and mass exchanger (cooled by external supply of 'high-temperature cold water') for heat exchange purpose and the cooled-down liquid desiccant is sent and evenly dispatched into the liquid channel of the Gas-Liquid Indirect Contact (IDC) with the liquid Core.</p> <p>On the surface of the air channel in the IDC Core, the water molecules of the fresh airstream (higher pressure) diffuse through the proprietary membrane to the liquid desiccant (lower pressure) under differential vapour pressure conditions. Concurrently, the air is cooled by heat conduction into the cold liquid desiccant and the processed dry and cooler air is supplied to the rooms.</p>
	<p>Total heat recovery unit (MHM3C)</p> <p>Fresh air and return air goes into different channels of the heat recovery core(MHM3C) respectively, the heat mass loops on the countless infinitesimal on both sides of the wall of each channel, to complete the process of the heat mass transfer to meet the heat recovery in loops.</p>
	<p>Gas-Liquid InDirectCore (IDC) dehumidifying core body</p> <ul style="list-style-type: none"> ◆ No liquid entrainment risk – Zero carryover ; ◆ Gas liquid contact is controllable as diffusion occurs through the proprietary membrane. ◆ The gas-liquid contact is good, heat and mass transfer efficiency is high ◆ Dust and other impurities in the airstream cannot easily enter the liquid desiccant.
	<p>Regeneration unit</p> <p>The liquid desiccant drawn from the liquid pool is heated up after the heat exchanging with the hot source heat-exchanger and delivered into the liquid distribution trough evenly distributed in the liquid channel of the IDC's core body. On the surface of the air tunnel in the IDC Core, the water molecules of the fresh airstream diffuse through the proprietary membrane to the liquid desiccant under differential vapour pressure conditions. Concurrently, the air is heated up by the liquid desiccant through heat conduction and the processes high temperature and humid air is discharged and the liquid desiccant is concentrated and regenerated.</p>

SUMMER WORKING MODE



Summer working conditions, the outdoor fresh air mixed with the indoor return air comes into contact with the low temperature liquid from the evaporator of the compressed system for heat and mass transfer, the processed air is dehumidified and reaches to the air supply point.

In the dehumidification process, the liquid desiccant becomes less concentrated after absorbing the water content from the air. In order to restore the dehumidifying function, the diluted liquid desiccant is recycled into the regeneration unit for regeneration by the heat source; the regenerated concentrated liquid is sent into the dehumidification unit for the next cycle. The liquid dehumidification unit comes with its own heat pump system; the heat pump cooling capacity is used to cool down the temperature of the liquid desiccant to increase the dehumidification capability, whereas the condensing heat is for the concentration and regeneration of the liquid desiccant.

SUMMARY OF BENEFITS AND KEY FEATURES

(A) High efficiency and energy saving

- Built in heat pump system of the liquid dehumidification unit, with the very high energy utilization efficiency, COP (Coefficient of Performance) of the unit with the heat pump system is above 4.0.
- No need to reheat the cooled air, can be directly addressed to the requirements of the air supply point, avoidance of the 'overcooling cycle' of excessive cooling and reheating in the conventional freezing dehumidification method which results in energy waste
- To remove the entire latent heat load, thereby raising the chilled water temperature of the chillers, handling only the sensible heat load now, from the conventional 7/12°C to 14/19°C, the natural cold source can be directly used with such temperature, and the COP is also enhanced by more than 30% even with the existing chiller.

(B) Precise control

- ✓ Can accurately control the air temperature, humidity, and constantly maintain the indoor environmental control requirements.
- ✓ Without reheat, lower humidity of the air supply (< 70%, maintaining the appropriate temperature of the air supply)
- ✓ Adaptable with the other air conditioning terminal devices (such as dry fan coil, the radiation end, etc.) to achieve the independent regulation of the indoor temperature and humidity, improving the human comfort
- ✓ Intelligent operation, can realize remote monitoring
- ✓ Modular design, suitable for field assembly
- ✓ Simple operation, normal pressure operation, safe and reliable

TECHNICAL SPECIFICATIONS



All-air Series

Products Features

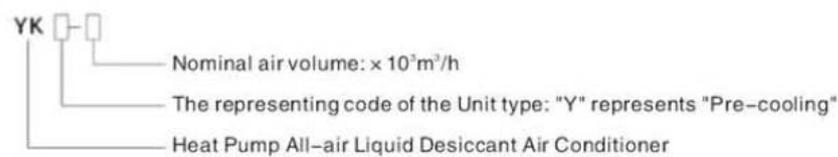
High efficiency and energy saving

- ◆ Built-in heat pump system in the liquid dehumidification unit, with the very high energy utilization efficiency, unit's COP (Coefficient of Performance) is above 4.0.
- ◆ Without reheat, can be directly addressed to the required air supply point, avoid excessive cooling and reheating witch resulting in the energy waste incurring by the conventional freezing dehumidification.
- ◆ Can bear the entire latent heat load, makes the sensible heat load processing chilled water temperature from regular 7 / 12 °C to 14/19 °C , the natural cold source can be directly used at such temperature, and the COP also enhanced up more than 30% even with the electric refrigerator.

Precise control

- ◆ Can accurately control the humidity, temperature of the supply air, and always meet the indoor environmental control requirements.
- ◆ No need reheat, low relative humidity of the supply air (< 70%) , maintaining the appropriate temperature of the supply air.
- ◆ Adaptable with the other air conditional terminal devices (such as dry fan coil, the radiation end, etc.) to achieve the independent regulation of the indoor temperature and humidity, improve the human comforts
- ◆ Intelligent operation, can realize remote monitoring
- ◆ Modular design, suitable for field assembly
- ◆ Simple operation, operation with normal pressure, safe and reliable

Type specification



Performance parameters

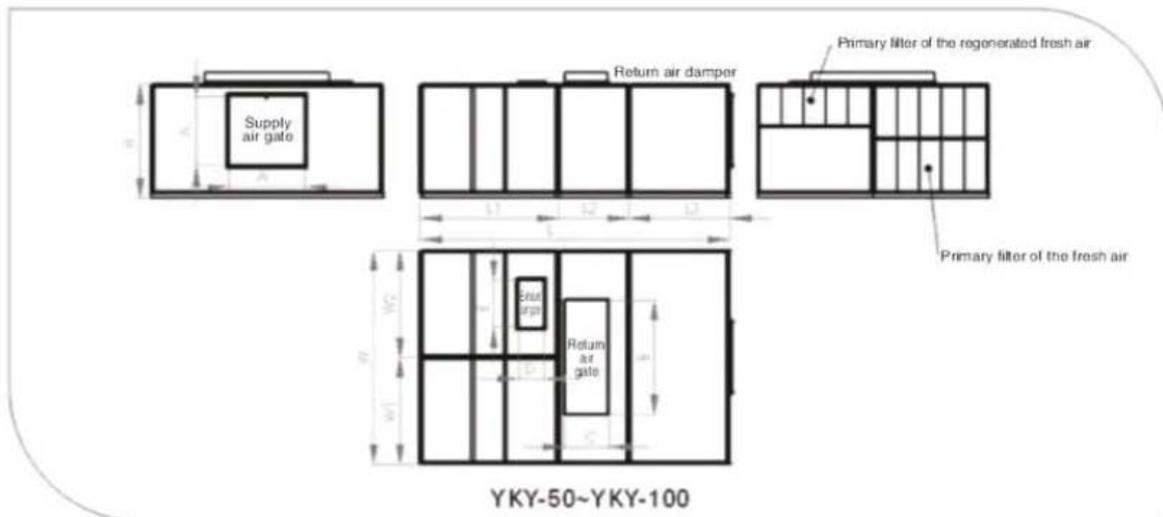
Type	Rated air volume	Fresh air volume	Refrigerating capacity	Dehumidifying capacity	Heating Capacity	Humidifying capacity	Cold water flow rate	Hot water flow rate	Installed power	Residual pressure	Noise	Weight
	m³/h	m³/h	kW	kg/h	kW	kg/h	kW	kW	kW	Pa	dB (A)	kg
YKY-10	10000	3000	85.9	64	71	19.2	11.1	10.2	15.44	300	64	3300
YKY-12	12000	3600	103	76.8	82.8	23	13.4	12.2	16.7	300	64	3600
YKY-15	15000	4500	129	96	100	29	16.7	15.3	26.5	350	68	4000
YKY-20	20000	6000	172	128	130	38.4	22.2	20.4	29.7	350	68	4200
YKY-30	30000	9000	257.8	192	197	57.6	33.4	30/6	43.5	350	70	5300
YKY-40	40000	12000	343.6	256	260	76.8	44.5	40.8	60.6	350	70	6600
YKY-50	50000	15000	430	320	297	96	69.5	50.9	76.2	400	73	7800
YKY-60	60000	12000	432	297	282	72	77.6	60.5	79.1	400	73	9000
YKY-80	80000	16000	576	396	376	96	103	80.6	85.6	400	74	11000
YKY-100	100000	20000	720	426	459	120	124	78.8	140	400	74	12000

- Note:
1. Rated cooling and dehumidifying working conditions: Fresh air dry bulb temperature 36°C, relative humidity 65%; return air dry bulb temperature 26°C, relative humidity 60%; air supply dry bulb temperature 17°C, relative humidity 90%;
 2. Rated heating and humidifying working conditions: Fresh air dry bulb temperature -5°C, relative humidity 50%; return air dry bulb temperature 20°C, relative humidity 50%; supply air dry bulb temperature 26°C, relative humidity 34%;
 3. Supply air parameters setting: cooling and dehumidifying conditions: temperature: 16-22°C, air moisture 9-12 g/kg; heating and humidifying conditions: temperature: 24-30°C, air moisture 5-9 g/kg;
 4. Chilled supply/return water temperature 14/19°C, hot supply/return water temperature 40/35°C;
 5. The return air volume equals 70% of the supply air volume;
 6. A small amount of softened water is required for running unit;
 7. Optional with air gates shape, size and the residual pressure of the supply air; the installed power of the unit varies with the external residual pressure;
 8. Datum in the table are the standard unit performance parameters, please advice to the company for the non standard unit performance parameters;
 9. The ratio between the unit distribution power and installed power remains 10%-30% as the safety measure is recommended;
 10. Electric parameter: 50Hz, 380V, single phase, please consult to the company for others.

Outline of the YKY Unit and the dimensions of the air gates (YKY10~YKY-100)



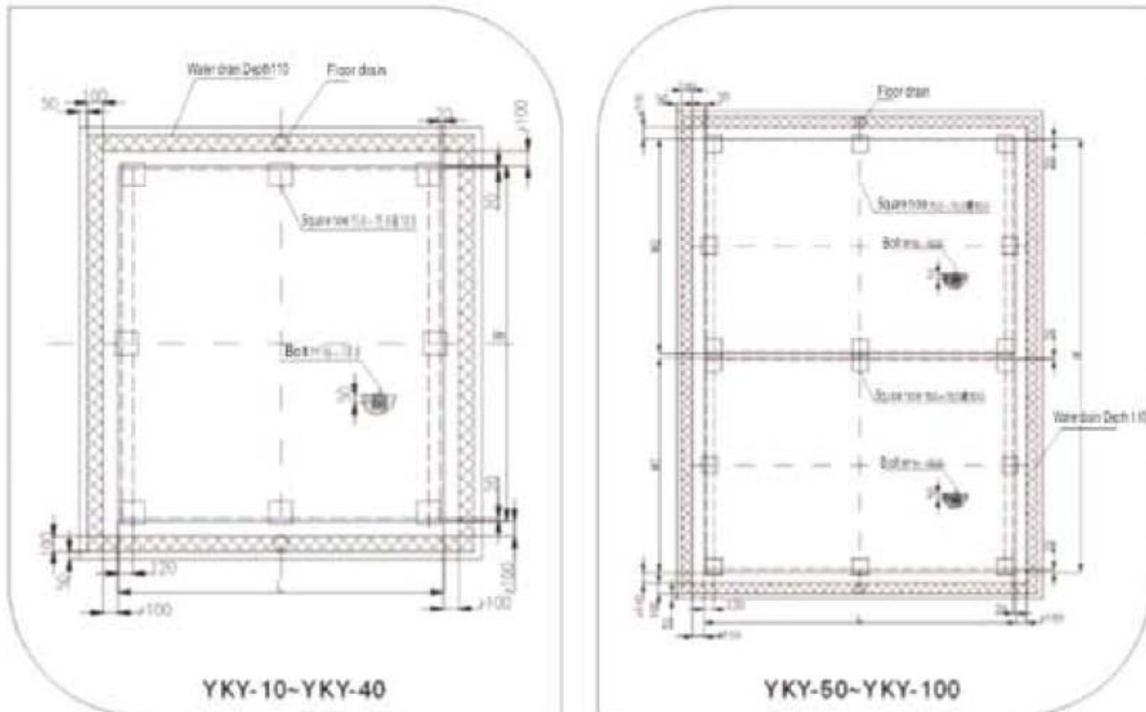
YKY-10~YKY-40



YKY-50~YKY-100

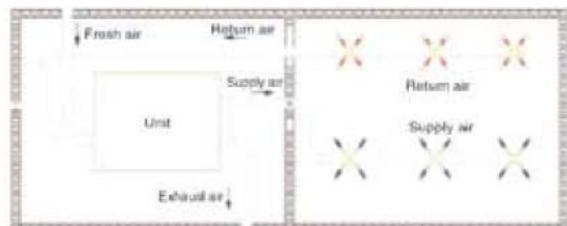
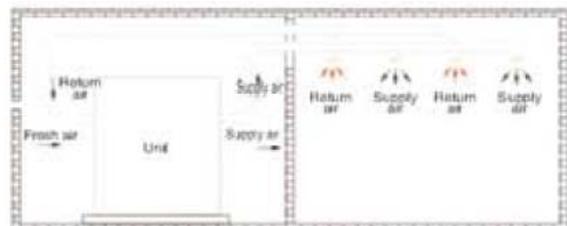
Type	Nominal air volume	L	W	W ₁	W ₂	H	H1	A	B	C	D	E
	m ³ /h											
YKY-10	10000	4230	2340	—	—	2300	1230	630	800	300	500	900
YKY-12	12000	4230	2340	—	—	2300	1230	630	800	300	500	900
YKY-15	15000	5430	2340	—	—	2300	1230	800	800	300	500	900
YKY-20	20000	5430	2340	—	—	2300	1230	800	800	300	500	900
YKY-30	30000	5830	2340	—	—	2300	1700	800	2000	500	600	900
YKY-40	40000	6230	2340	—	—	2300	1700	800	2000	500	600	900
YKY-50	50000	6450	4600	2300	2300	2400	2400	1000	2000	800	800	1000
YKY-60	60000	6450	4600	2300	2300	2400	2400	1000	2000	800	800	1000
YKY-80	80000	6800	4600	2300	2300	2400	2400	1250	2000	1250	900	1000
YKY-100	100000	6800	4600	2300	2300	2400	2400	1250	2000	1250	900	1000

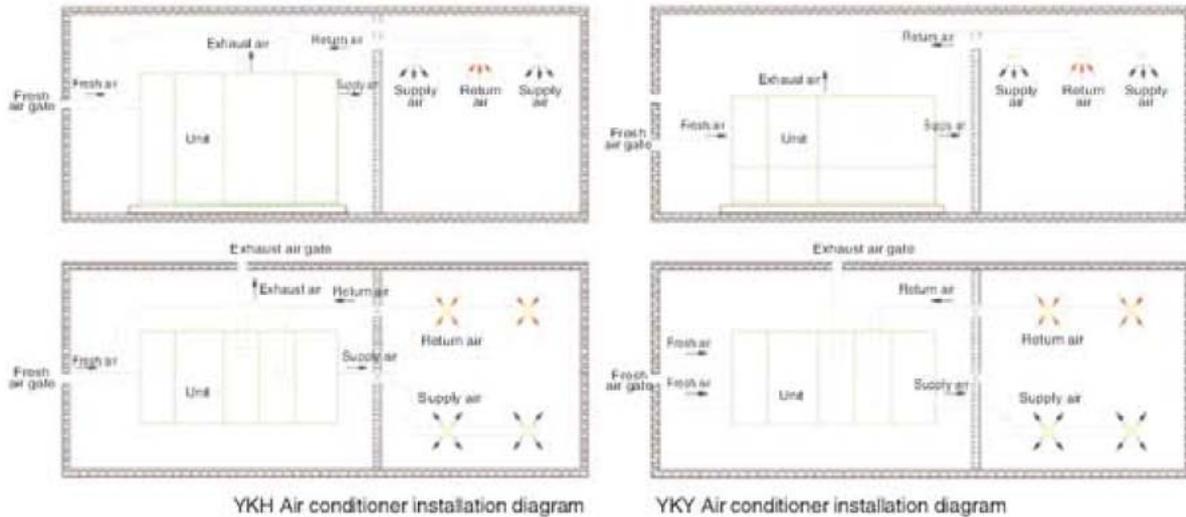
YKY Foundation Drawing (YKY10~YKY100)



Installation instructions

1. The height of the machine room is not less than 3m (not be less than 3.3m is recommended);
2. Units need to setup the air ducts for the fresh air, supply air, return air and exhaust air, air inlet/outlet and air ducts should be connected with the soft connectors;
3. The temperature insulation of the unit's exhaust air duct should be prepared;
4. Floor drain in the machine room is recommended in order to discharge the sewage in repairing or cleaning of unit;
5. The sufficient space should be reserved around the unit especially in the direction of the manipulating area to facilitate the unit maintenance;
6. The unit should be placed on the flat base; the base can be concrete or steel structure, and the base surface should be level and polished when installed;
7. The concrete base should have sufficient strength with flat surface; the base should be 100mm higher than the ground, the drainage channel should be reserved to release the water in repairing;
8. Softened water need to be supplemented during the unit operation, nominal external diameter of water pipe is DN15;
9. The waterproof floor in the machine room is suggested to avoid the sewage leakage in repairing or cleaning.
10. Unit must be reliably grounded;





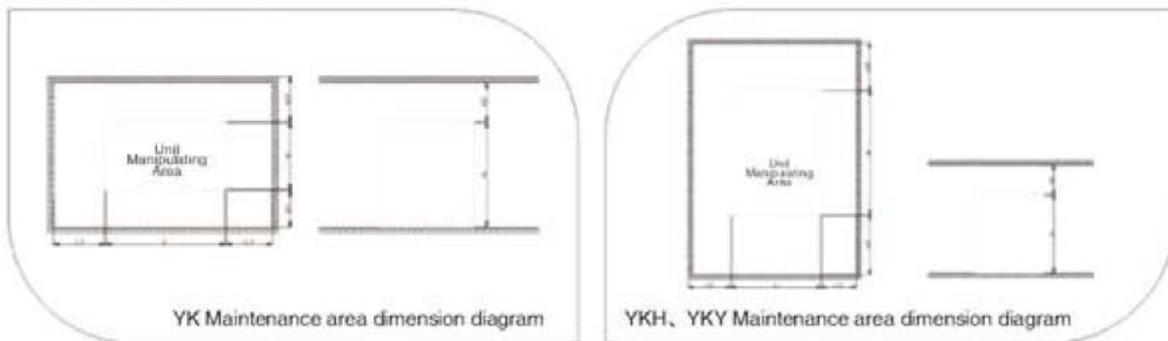
Instructions of usage

- 1、 Before the unit trial running, the cleaning of the unit, the interior cleaning of the air ducts and pipelines should be done;
- 2、 Before the fan running, should manually check for the friction, stuck, or other abnormalities;
- 3、 Unit power supply is the three-phase AC 380V/50Hz; phase sequence and the voltage should be checked before starting the machine;
- 4、 Operation should be stable, no obvious vibration, noise, or should stop the machine to check;
- 5、 The return air volume in the real run-time should not less than 80% of air supply volume;
- 6、 Unit should be maintained by the appointed personnel, regular inspection of the unit's operation, and the abnormalities should be immediately removed if any;

Maintenance instructions

- 1、 The cleaning or replacement of the air filter, liquid filtering mesh should be done frequently;
- 2、 The maintenance of unit should be required after three to five years of the unit operation;

Unit Maintenance Area



Type	Nominal air volume(m ³ /h)	L ₁	W ₁	W ₂	H ₁
YK	3000-10000	Depending on the installation of the air ducts	≥1000	≥600	Depending on the installation of the air ducts
YKH	10000-40000		≥1000	≥600	
YKY	50000-100000		≥1000	≥600	

Note: L, W, H in the figure respectively represents the dimension of unit length, height and the direction of height.

韩威溴液调湿空调自动控制系统

Summarization

Unit provides the comprehensive, advanced automatic control system; users do not need additionally provide any DDC controller, unit control system realizes the parameter settings, controls of the air supply in accordance with the algorithm; complete the diagnosis process of abnormality, faulty in the operation; provide the local display of the operating parameters and control parameter settings; and provide access to the automatic control terminals in the buildings.

Advanced intelligent control system

The automatic control system of the unit using our newly developed microcomputer controller (SRAC-CU), combined with advanced adaptive fuzzy control algorithm, which enables the controller has a "learning" function to automatically control and adjust the algorithm parameters with best fit to ensure the unit running in the optimal mode, improves the control accuracy, lower the operating costs.

The control system detects the real-time temperature, humidity parameters of the fresh air, supply air, return air, exhaust air; the inlet/outlet liquid temperature of the evaporator, condenser, monitoring the operation status of various controlled electrical components, providing the interlock protection and fault detection. Accumulating the running time of each compressor and automatically switching between the master/ slave compressors.

Convenient and friendly man-machine interface

The man machine interface using a large size true color touch screen with intuitive, easy operation features, compared to the conventional LED or text display interface, it greatly reduces the using difficulty. Meanwhile combined with the well-designed configuration interface to achieve the query of the operating parameters, control parameters setting, the historic curves display, fault diagnosis and the alarm system information display.

1、 Operation parameter query

- ◆ The temperature and humidity parameters of unit fresh air, supply air, return air, exhaust air;
- ◆ The inlet/outlet liquid temperature of evaporator, condenser;
- ◆ The working status of the controlled electrical components in the unit ;
- ◆ Accumulated working time of the compressor.

2、 Control parameters setting

- ◆ Unit operation mode(Manual/Automatic mode, cooling dehumidification/heating humidification/ all fresh air)
- ◆ Supply air volume of unit(only supported by the unit with frequency conversion)
- ◆ The algorithm parameters

3、 Historical curves show

- ◆ Historical curves of fresh air, air supply, return air, exhaust air.

High sensitivity of intelligent fault diagnosis system

The unit can automatically diagnose the various anomalies and failures during the operation and provides the corresponding protections.

- ◆ Power failure;
- ◆ Heat pump system high pressure failure;
- ◆ Heat pump system low pressure failure;
- ◆ Heat pump system exhaust air temperature failure;
- ◆ Evaporator, condenser block protection;
- ◆ Communication failure;
- ◆ Sensor failure;
- ◆ Liquid level failure, etc.

In the event of unit failure, the fault information and fault time automatically pop-up in the man-machine interface, the user clicks the fault information, pop-up with the description of the fault diagnosis and troubleshooting, makes it convenient for the user maintenance.

Access to the automatic controls in the buildings

Unit provides the MODBUS protocol RS485 interface, enabling the unit can be easily accessed to the buildings' automation systems by one twisted pair cable, to achieve centralized control of multiple devices and enable the remote real-time monitoring of the unit operating parameters and remote modification of the control algorithm parameters.

Electrical installation

- ◆ power supply is three-phase five-wire system, users need to install the circuit breaker to cut off the power supply of the unit;
- ◆ Reliable power supply grounding;
- ◆ Except for the unit power supply provided by the user, the other connections have been well prepared in the factory; the users can not make any alterations.