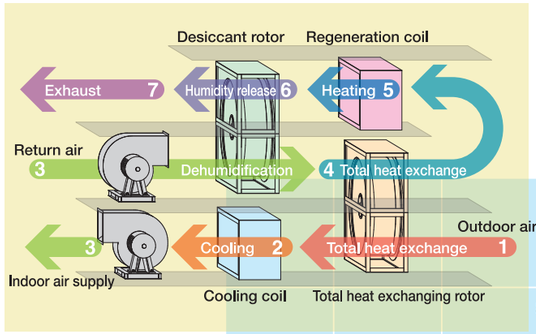
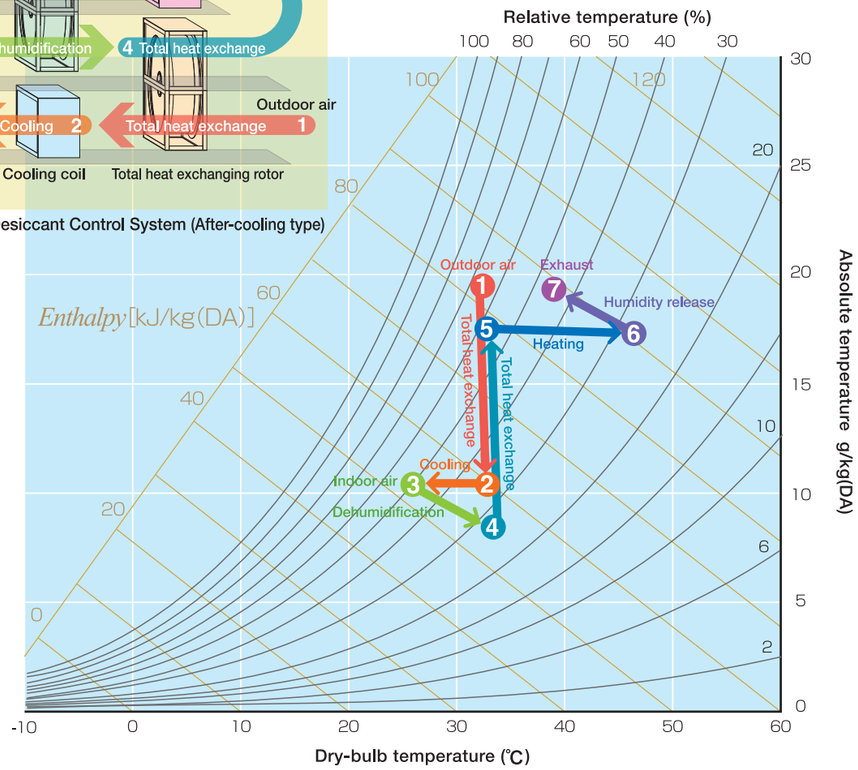
RETURN AIR DESICCANT AIR CONDITIONER Details of Air Flow (YCDR Type)



■Diagram of Return Air Desiccant Control System (After-cooling type)



⚠ Caution

1. Read the operation manual thoroughly before use to operate the equipment properly.
2. Please note that for the purpose of improving the performance of the product, modifications and contents of this catalogue are subject to change without notice.
3. Do not copy any contents of this catalogue without permission.

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SHOWA MANUFACTURING CO., LTD

SHOWA

Newly-developed Dehumidification System of Return Air

RETURN AIR DESICCANT AIR CONDITIONER

CDR Series

Realized a Low-temperature Heat Exhaustion System

Ventilation-type Outdoor Air Treatment Device

Leaders in Energy-saving through our Innovative Ideas !

The Next Generation of Temperature/Humidity Individual Control-type Air Conditioners, Installed with the Newly-developed Dehumidification System of Return Air

Only Showa Technology

RADesC New Desiccant Air Control System

The above logo is used for our desiccant air conditioners using the dehumidification system of return air.

Adopting the innovative idea of the so-called 'Dehumidification System of Return Air', where return air is dehumidified and then total heat is exchanged with outdoor air.

Leaders in Energy-saving Desiccant Air Conditioners!

Patent Pending

Newly-developed Dehumidification System of Return Air

RETURN AIR DESICCANT AIR CONDITIONER

Ensuring better energy efficiency than standard desiccant air conditioners, this system is installed with the Newly-developed Dehumidification System of Return Air adopting totally new outdoor air treatment method. Shifting from the dehumidification of outdoor air to indoor air realizes low-temperature exhaust heat, which is more comfortable, economical and earth-conscious.

CDR Series

LCDR (Compact floor type)
YCDR (Standard floor type)
UCDR (Hanging type)
*The photo shows the YCDR type.

Low-temperature Rotor Regeneration
Super Energy Saving

Hierarchical Layout & Design
Space Saving

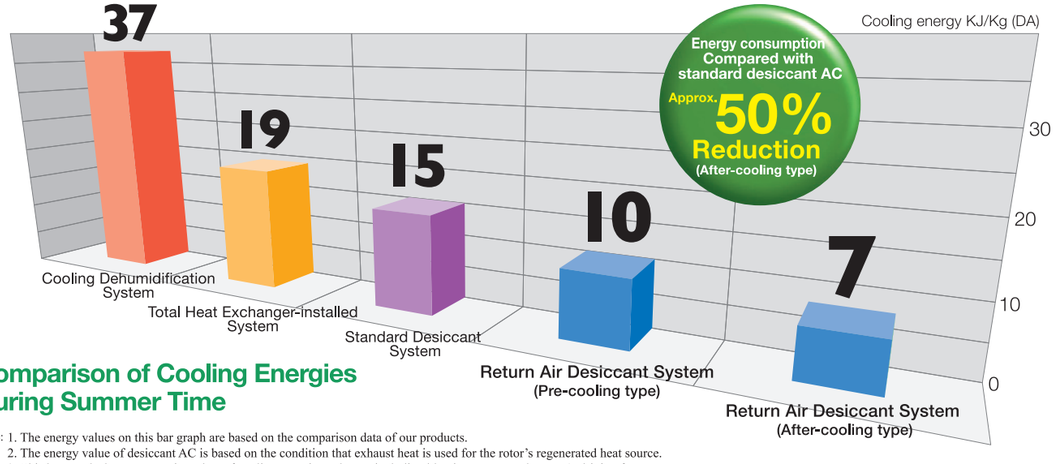
Separate Airflow Path
Odor Control

Humidity (latent heat) processor
Return Air Dehumidification-type Desiccant Air Conditioner
New development!

SHOWA'S Separate Processing System for Sensible Heat and Latent Heat

Temperature (sensible heat) processor × RADESC™ New Desiccant Air Control System

The Return Air Dehumidification System realizes low-temperature regeneration, ensuring better energy saving than standard desiccant air conditioners.



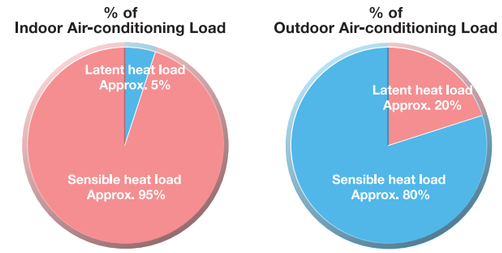
Comparison of Cooling Energies During Summer Time

Note: 1. The energy values on this bar graph are based on the comparison data of our products.
2. The energy value of desiccant AC is based on the condition that exhaust heat is used for the rotor's regenerated heat source.
3. This bar graph shows comparison data of cooling energies only, not including blowing power or the rotor's driving force.

Q1. Why do desiccant air conditioners draw attention now?

There is a growing demand for new air conditioners that are environmentally-friendly, economical, comfortable, and adaptable for various air-conditioning loads.

Although Japanese industrial fields have been making a great effort to reduce CO_2 emissions since the conclusion of the Kyoto Protocol, CO_2 emissions in operational fields, such as commercial and office buildings, have increased by approximately 42% compared to the benchmark year of 1990.* Raising the energy-saving level of air conditioners itself has an immediate effect on tackling global environmental issues and provides companies with cost cutbacks. However, it will be impossible to lift the level of energy-saving with the conventional design of standard air conditioning systems.
Regarding the indoor air-conditioning load at general office buildings today, the wide spread availability of PCs has increased the sensible heat load, on the other hand, the latent heat load has reduced due to the tight air of buildings. Moreover, since a law revision required all buildings to be equipped with an air ventilation system, buildings gained an additional load of outdoor air for treating with air conditioning, which mostly consists of latent heat load. In order to cope with the additional air-conditioning load, there is a growing demand for a totally new air conditioning system, as conventional systems may require more energy.



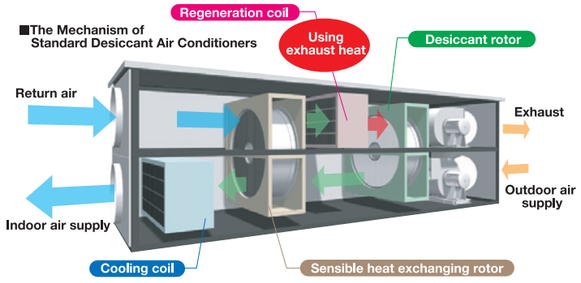
*The volume of greenhouse gas emissions: 2007, Ministry of the Environment (quick estimation)

ANSWER **Because, due to their capacity to effectively use exhaust heat energy, Desiccant Air Conditioners are the most appropriate equipment for efficiently treating humidity (latent heat), that is more prevalent in the air-conditioning load of outdoor air.**

Realized energy-saving equipment by utilizing exhaust heat

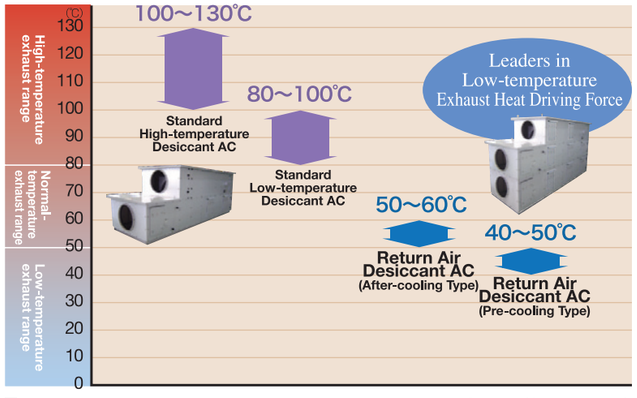
Desiccant Air Conditioner (Standard)

Desiccant air conditioners are drawing great attention today as hybrid outdoor air treatment equipment which incorporates both desiccant and sensible heat exchanging rotors. Due to their capacity to use hot exhaust air for their air conditioning system, desiccant air conditioners ensure 50% or more energy-saving compared to standard models with a cooling dehumidification system.



Q2. Why are desiccant air conditioners more energy-saving than standard air conditioners?

ANSWER **Because low-temperature exhaust air, that used to be waste in conventional air conditioners, can be reused for the desiccant AC system as the desiccant rotor is regenerated at a lower temperature (40-60℃).**



■Desiccant Rotor's Regeneration Temperature Ranges of Each System (Our Products)

■How has the exhaust heat been used till today?

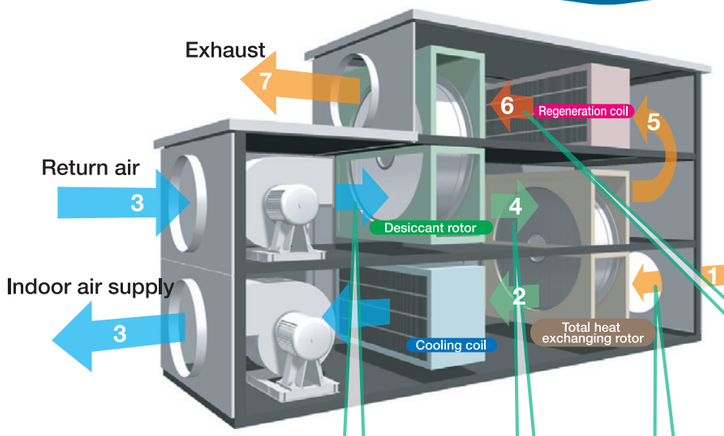
As shown on the left bar graph, the rotor's regeneration temperature range of a standard desiccant air conditioner requires 80℃ or over, the lower-temperature exhaust air can be used only for the hot water supply system, etc. The load of the hot-water supply is large in wintertime and the use of exhaust heat contributes to energy-saving, but on the other hand in summertime, most of the exhaust heat is not used and is actually handled as waste and discarded.

■What happens in the case of the Return Air Desiccant Air Conditioner?

As the rotor can be regenerated at a low temperature, the exhaust air in a low-temperature range, which was previously disposed of, can also be used for the air conditioning system.

Returning indoor air the so-called 'return air' is further dehumidified at desiccant rotor and then total heat of this low-humidity air and outdoor air is exchanged to acquire absolute humidity, which is equal to that of indoor air.

How innovative the idea is?



RADESC
New Desiccant Air Control System

A mechanism of newly-developed dehumidification system of return air and its effect are introduced here, which were not available at conventional desiccant air conditioners. (YCDR After-cooling type)

Return Air Dehumidification System

Innovative Idea

Return air 3 (low-humidity indoor air) is further dehumidified at a desiccant rotor to create 4, in which only a small amount of dehumidification is required.

Return Air Dehumidification System

Innovative Idea

Total heat is exchanged between the lowest-humidity air 4 and outdoor air 1, which make the outdoor air equal to absolute humidity of indoor air 2.

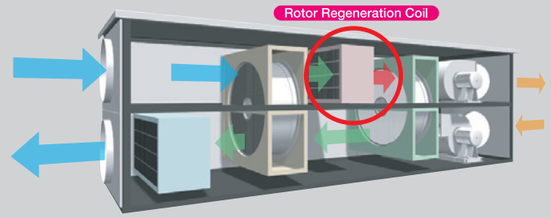
50~60℃

Return Air Dehumidification System

Low-temperature Regeneration

As the only a small amount of return air (from 3 to 4) should be dehumidified at desiccant rotor, low-temperature exhaust air is able to cover the regeneration temperature required for 6.

Low-temperature exhaust air, which was previously disposed of as waste, can be used.



Standard desiccant air conditioners require much higher-temperature heat energy for regenerating desiccant rotor.

As standard desiccant outdoor air treatment equipments directly dehumidify high-humidity outdoor air, it requires high-temperature heat energy (80℃ or over) for regenerating desiccant rotor in order to dehumidify a large amount of air.

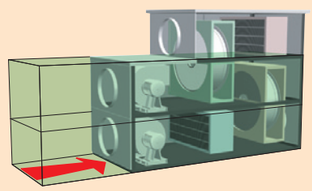
Hierarchical Layout & Design

Space Saving

3-storied return air desiccant is a space-saving design, which requires an average of 34% less space and 17% less volumetric capacity compare to conventional 2-storied layouts.

Installation area Ave. **34% Reduction**

Volumetric capacity Ave. **17% Reduction**



■Comparison of Installation Area and Volumetric Capacity between Standard Model and YCDR Type (our products)

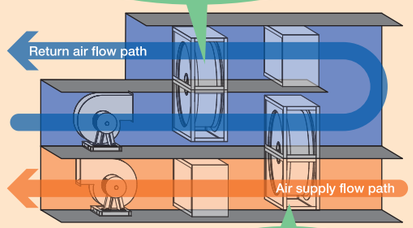
Air volume (m³/h)	Installation area (m²)		% of area reduction	Volumetric capacity (m³)		% of volumetric capacity reduction
	Standard equipment	YCDR		Standard equipment	YCDR	
4000	11.9	7.8	34% ↓	25.1	20.8	17% ↓
6000	13.2	8.8	33% ↓	30.5	25.7	16% ↓
7800	15.0	10.0	33% ↓	37.6	31.7	16% ↓
9600	16.3	10.9	33% ↓	44.3	37.5	15% ↓
12000	17.7	10.9	38% ↓	51.5	40.4	21% ↓

Separate Airflow Path

Odor Control

The airflow paths are separated for air supply and return air, which prevent odor dispersion.

Desiccant rotor
As the air supply flow paths have no desiccant rotors, an odor from hygroscopic materials would not disperse to the supply side, which was often caused at conventional desiccant rotor systems.

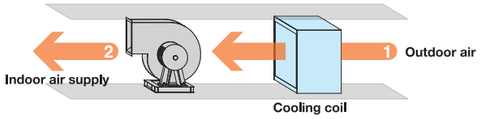


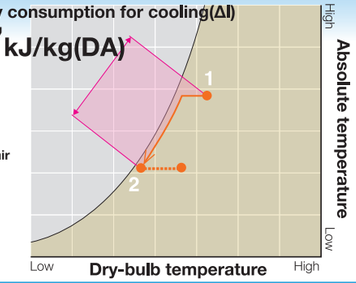
Total heat exchanging rotor
Odor-resistant material is used.

Energy Saving Effect of Return Air Dehumidification System Confirmed on the Airflow Chart!

What happens in the case of cooling dehumidification system?

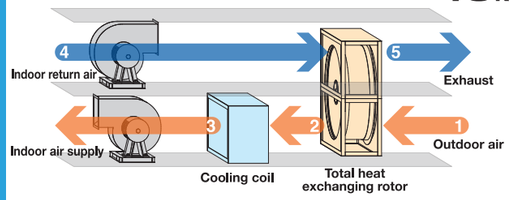
A great amount of energy is required to dehumidify the high-humidity outdoor air using a cooling system.

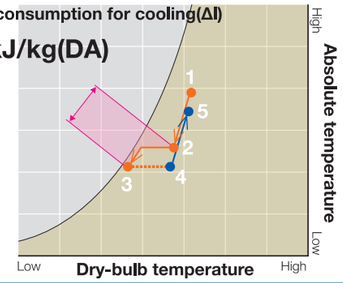




What happens in the case of total heat exchanging system?

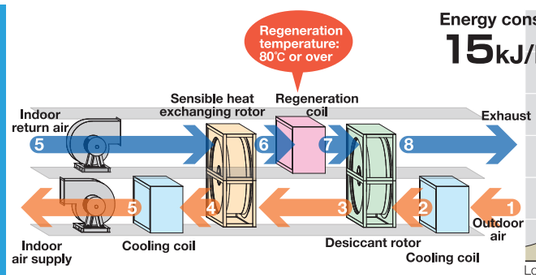
As a total heat exchanger only cannot dehumidify the air thoroughly, it requires a hybrid system, which incorporates a cooling dehumidification system.

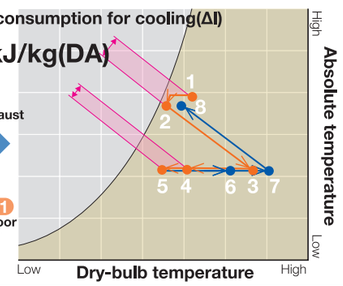




What happens in the case of standard desiccant system?

As exhaust heat, that used to be waste, can be reused for desiccant rotor's regeneration, this system is more energy-saving than the above two systems. However, as regenerating desiccant rotor at low temperature may cause insufficient dehumidification, it requires enough cooling energies to cool down and to dehumidify the outdoor air in advance.

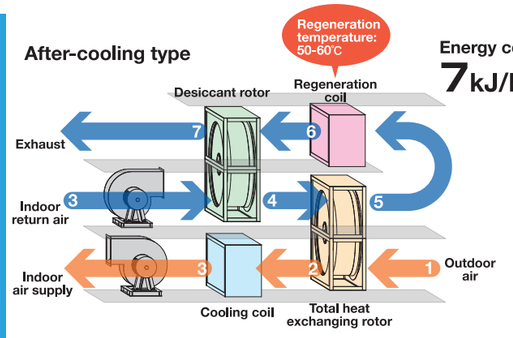


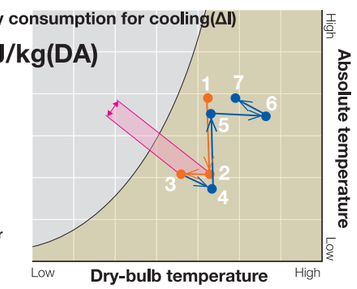


What happens in the case of return air desiccant system?

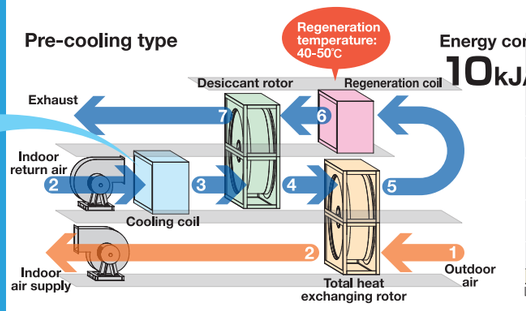
Low-humidity return air is further dehumidified and total heat is exchanged with outdoor air. As most of the exchanging energy is treated at a total heat exchanger, this system requires less cooling energy than others. It is also possible to regenerate desiccant rotor with a low-temperature exhaust heat at 50-60℃.

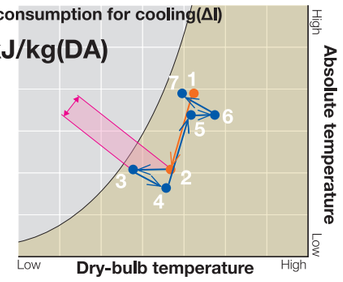
After-cooling type





Pre-cooling type





The pre-cooling type equipment can solve the problem of low-temperature exhaust air (40-50℃)!

Even when the temperature of exhaust heat is low, this system can be used by locating the cooling coil at the desiccant rotor's upstream side.

*Efficiency is not as good as the after-cooling type.

Note: 1. Above graphs show comparison data of cooling energies only.
2. The energy values of desiccant air conditioners are based on the condition that exhaust heat is used for the rotor's regeneration heat source.
3. Actual equipment is to include blowing power or the rotor's driving force.
4. Energy values are all based on our products.

Humidity controls enable the present air conditioning mechanisms to change.

The Return Air Desiccant Air Conditioner puts hybrid equipment into practice in both separate sensible/latent heat air conditioning systems and the dehumidification of outdoor air systems.

Controlling humidity and temperature separately,

Separate Sensible/Latent Heat Air Conditioning System

Humidity (%) is treated by:

RETURN AIR DESICCANT AIR CONDITIONER

Hybrid equipment with separate sensible/latent heat air conditioning systems and the dehumidification system of outdoor air

This is innovative outdoor air treatment equipment, which significantly saves energy compared to standard dehumidification systems.

+

Temperature (℃) is controlled by:

ROOM AIR CONDITIONER

As room air conditioners can specialize in temperature treatment, its refrigerant will be able to raise evaporation temperature and to lower condensation temperature while cooling and heating processes, that will reduce power consumption.

A whole air conditioning system can realize energy saving.

Q. Why do standard AC systems make us feel uncomfortable, especially in summer time?

ANSWER

Because setting a temperature of standard AC system at 28℃, so-called an energy saving AC temperature, cannot thoroughly treat humidity.

Standard air conditioners both dehumidify outdoor air and control indoor temperature at the same time, in which the humidity treatment is linked to lowering the temperature. As all users can do is to set AC temperatures, conventional integral-type air conditioning systems actually cannot treat the humidity contained in outdoor air well.

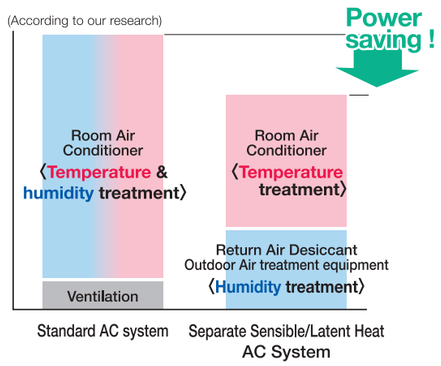
Q. Why do separate sensible/latent heat air conditioning systems save energy?

ANSWER

As thorough dehumidification allows air conditioners to specialize in temperature control, they can be highly efficient pieces of equipment.

Looking back at the operational loads of air conditioners on page 2, a large amount of energy is used for treating humidity, which is contained in outdoor air. On the other hand, Separate Sensible/Latent Heat AC system thoroughly dehumidify outdoor air and make us feel comfortable, as humidity is thoroughly treated by (desiccant) outdoor air treatment equipment. This kind of AC is able to omit the dehumidification function inside the equipment, and makes saving a lot of energy possible.
(In case of high-temperature sensible heat type AC.)

Separate Sensible/Latent Heat AC System Means Big Energy Saving in Summer Time



Product Lines

■Specifications of YCDR (Floor type)

Model No.	Supply air blower				Exhaust air blower				Weight of equipment (kg)
	Air volume (m^3/h)	External static pressure (Pa)	Rated output (kW)	Fan's model No.	Air volume (m^3/h)	External static pressure (Pa)	Rated output (kW)	Fan's model No.	
YCDR-1300G	4000	350	2.20	2BT	4000	350	3.70	2BT	2850
YCDR-1500G	6000	350	3.70	2ET	6000	350	3.70	2ET	3310
YCDR-1700G	7800	350	3.70	2.5B	7800	350	3.70	2.5B	3930
YCDR-1900G	9600	350	3.70	2.5C	9600	350	5.50	2.5C	4470
YCDR-2100G	12000	350	5.50	2.5C	12000	350	7.50	2.5C	4820

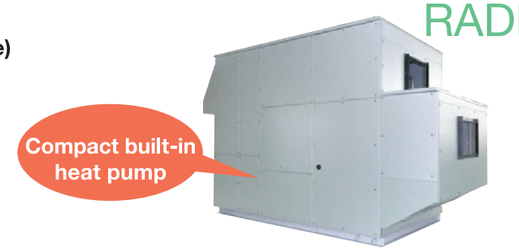
Heat Pump Type

Return Air Desiccant Outdoor Air Treatment Equipment

RADESC

■Specifications of HCDR (Heat pump type)

This self-contained type outdoor air treatment equipment has a built-in heat pump, integrated into return air dehumidification system (RADESC Type) desiccant air conditioners, that utilizes low-temperature exhaust heat.
(40℃~60℃)

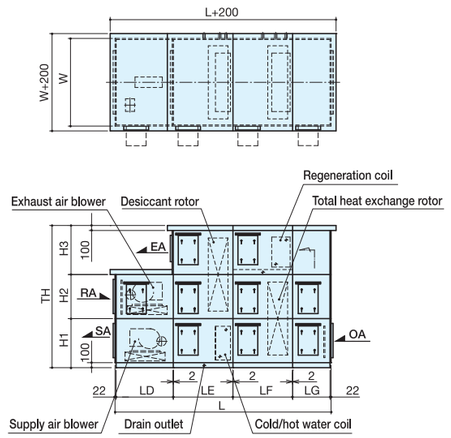


Model No.	Supply air blower				Exhaust air blower				Compressor	Weight of equipment (kg)	Dehumidification & cooling performance(*1)		Humidification & heating performance(*2)	
	Air volume (m^3/h)	External static pressure (Pa)	Rated output (kW)	Fan's model No.	Air volume (m^3/h)	External static pressure (Pa)	Rated output (kW)	Fan's model No.	Rated output 50/60Hz (kW)		Total heating performance (kW)	Dehumidification volume (kg/h)	Total heating performance (kW)	Humidification volume (kg/h)
HCDR-4000G	4000	350	2.2	PFS-40S-17	4000	350	3.7	PFS-40S-17	7.80 / 9.55	1950	49.2	57.9	46.9	30.2
HCDR-6000G	6000	350	2.2	PFS-40S-17	6000	350	5.5	PFS-45S-19	11.70 / 14.10	2400	73.1	86.2	70.5	45.4
HCDR-8000G	8000	350	3.7	PFS-45S-19	8000	350	7.5	PFS-56S-23	13.80 / 16.70	2810	96.8	114.3	94.0	60.6
HCDR-10000G	10000	350	3.7	PFS-56S-23	10000	350	7.5	PFS-63S-26	18.50 / 22.40	3190	121.2	142.3	117.4	75.8
HCDR-12000G	12000	350	5.5	PFS-56S-23	12000	350	11	PFS-63S-26	18.50 / 22.40	3620	145.6	170.5	141.0	90.9

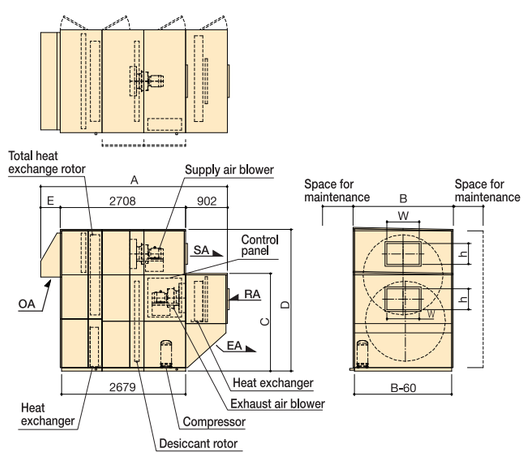
*1 Indoor air: 27°C DB, 19°C WB Outdoor air: 33°C DB, 28°C WB *2 Indoor air: 22°C DB, 50%RH Outdoor air: 0°CDB, 50%RH

Standard dimensional drawing

YCDR type
(Floor type)



HCDR type
(Heat pump type)



External dimension (mm)

Model No.	W	TH	H1	H2	H3	LD	LE	LF	LG	L
YCDR-1300G	1798	2916	1008	904	1004	1154	1204	1204	754	4360
YCDR-1500G	1998	3216	1108	1004	1104	1204	1204	1204	754	4410
YCDR-1700G	2198	3516	1208	1104	1204	1354	1204	1204	754	4560
YCDR-1900G	2398	3816	1308	1204	1304	1354	1204	1204	754	4560
YCDR-2100G	2598	4116	1408	1304	1404	1354	1204	1204	754	4560

Model No.	A	B	C	D	E	w	h
HCDR-4000G	3980	1560	1613	2313	370	500	350
HCDR-6000G	4030	1910	1920	2770	420	600	400
HCDR-8000G	4080	2160	2175	3125	470	700	450
HCDR-10000G	4130	2360	2279	3329	520	800	500
HCDR-12000G	4180	2560	2533	3733	570	900	600

Note: This is a list of standard dimensions. It may be possible to change a part of the design upon customer request. Please ask for more details from our staff. Also, please note that for the purpose of improving our products, standard dimensions and drawings are subject to change without notice.