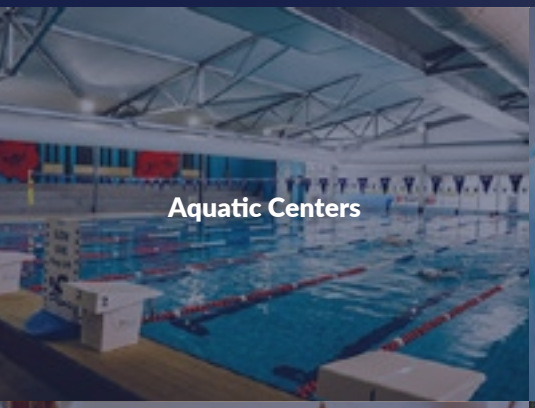
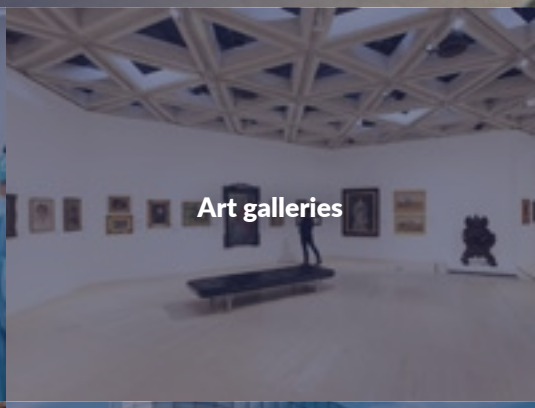
GJWALKER

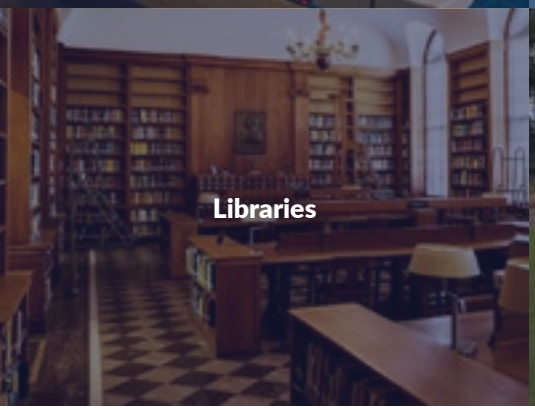
Rotary heat exchanger

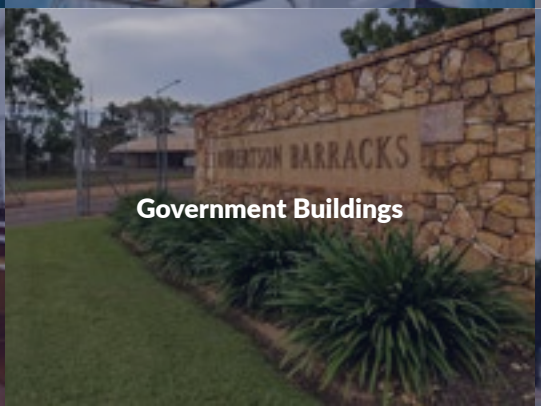
Low noise, low profile EC fan coil units

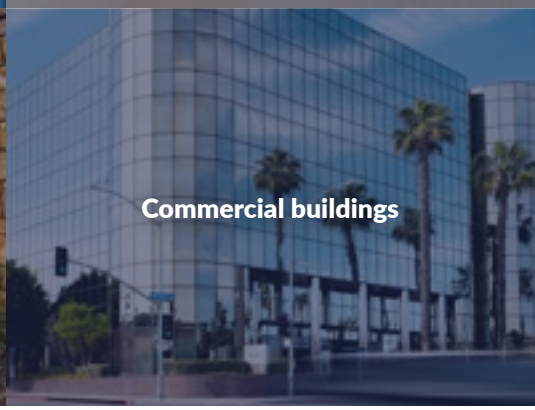
GJ Walker Air Handling Systems, established in 1975 is a leading manufacturer and supplier of air handling products in Australia. For nearly 50 years GJ Walker has been involved in the design and manufacture of specialist air handling systems to AS 3666 for a range of specialist applications including:











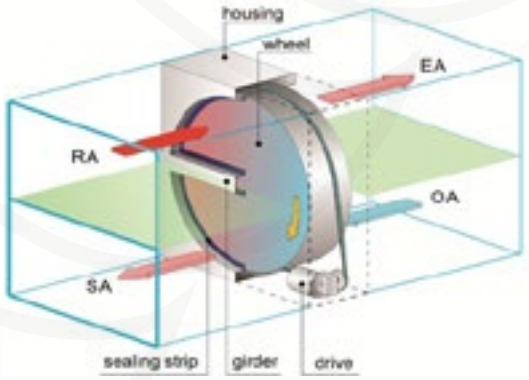
Eurovent certification ensures that you can be confident the units will perform as they have been designed. Manufactured in an ISO9001 certified facility, these units have been also independently certified as an Energy Saving Product.

Our experienced team is looking forward to working with you on your next project.

Contents

Working principle

Rotary heat exchanger is composed of alveolate heat wheel, case, drive system and sealing parts The exhaust and outdoor air pass through half of the wheel separately, when the wheel rotates, the heat and moisture are exchanged between the exhaust and outdoor air. The energy recovery efficiency is up to 70% to 90%.

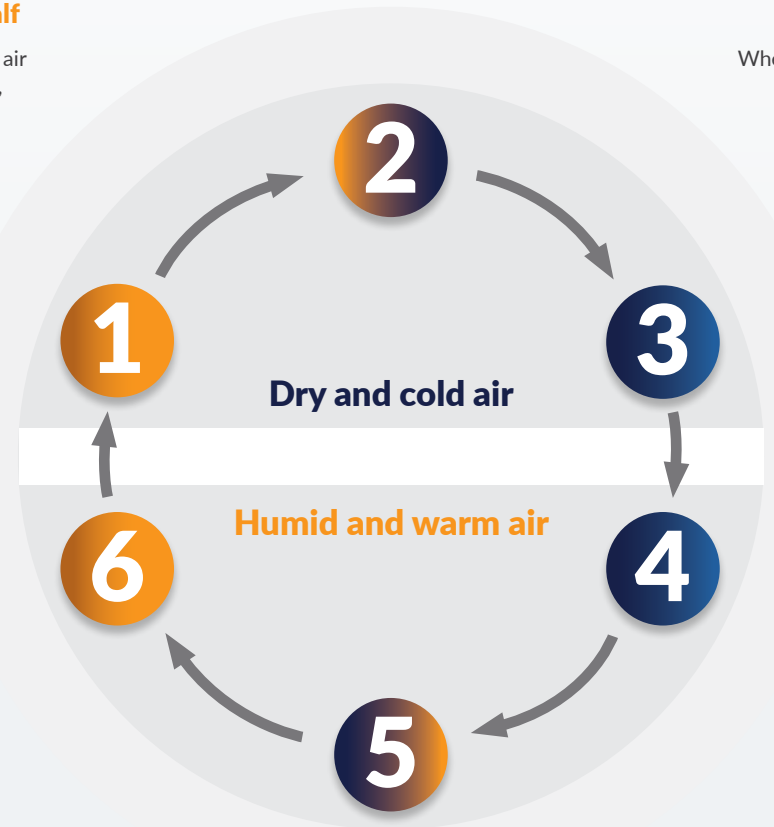


2) In the middle of cold air half

When the wheel rotates to the middle of cold air half, the air temperature continues to drop and moisture continues to dissipate. The dry and cold air is heated and humidified continually. Heat exchange efficiency drops due to the reducing temperature difference.

1) Entering the cold air half

When the wheel enters the cold air half suddenly from warm air half, temperature drops quickly. Heat is absorbed by cold air and the temperature of cold air rises slightly. Heat exchange efficiency is high at this moment due to the bigger temperature difference. Meanwhile, the moisture on the wheel goes into the dry and cold air.



3) Leaving the cold air half

When the wheel is leaving the cold air half, its temperature and humidity become same as the cold air. The heat exchange between the wheel and cold air ends. The temperature and humidity of the cold air stop changing. Wheel temperature drops to minimum and wheel dryness increases to maximum.

6) Leaving the warm air half

The wheel is heated completely. Its temperature is same as the warm air and the humidity exchange stops. The efficiency is zero.

4) Entering the warm air half

Warm air passes though the wheel in reverse direction. Heat exchange efficiency is high at this moment due to the bigger temperature difference. Temperature of this humid and warm air drops quickly, and its moisture is absorbed heavily by the wheel.

5) In the middle of warm air half

When the wheel rotates to the middle of the warm half, efficiency drops because the wheel temperature rises and the temperature difference drops.

The moisture absorbent coated on the surface of the wheel is becoming saturated, the moisture absorption capacity decrease.

Model descriptions

HR T-3000-4 D A-A 2-E

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Stands for Holtop rotary heat exchanger

② T/S

T stands for total heat wheel. The wheel is made by aluminum foils coated with 3A molecular sieve moisture absorbent, which enables the wheel to exchange both temperature and humidity, in another word to exchange both sensible heat and latent heat.

S stands for sensible heat wheel. It generally recovers no latent heat, only when the condensation occurs, can it recover part of that latent heat.

③ Stands for effective wheel diameter

④ 1/4/8/16/24 stands for segment amount of the heat wheel, see P8.

⑤ A/B/C/D/E/F stands for casing code, see P7

⑥ A/D stands for type of casing.

A stands for inner-loaded type which has no side panels and usually is loaded inside the AHU.

D stands for open type which has side panels and is installed between the ducts.

⑦ A/B/C/D/E/ - P stands for the type of installation, see P10.

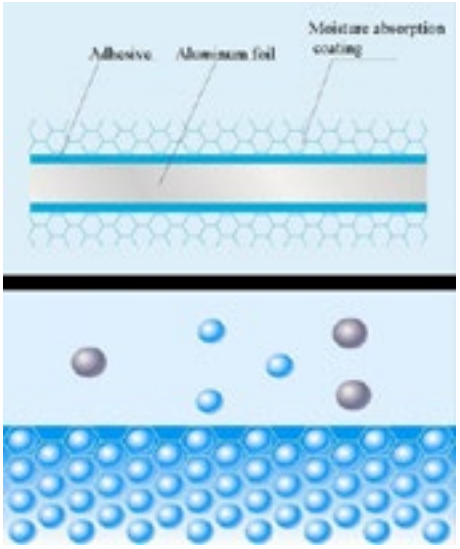
⑧ 1/2/3/4 stands for the motor position, see P10.

⑨ Stands for intelligent control. It's optional, users can use their own control device to control the ON/OFF of wheel.

Wheel Materials

The sensible heat wheel is made by aluminum foils of 0.05mm thickness. And the total heat wheel is made by aluminum foils coated with 3A molecular sieve of 0.04mm thickness.

Silicon gel absorbs both moisture and odor by capillarity.



Molecular sieve selectively absorbs moisture and expels odor by molecular lattice.

Casing construction

Specifications	400 – 1000	1100 – 1500 – 2000	2200 – 5000
Casing A Plate structure, made of aluzinc, one-piece. 	■		
Casing B Plate structure, made of aluzinc, one -piece. For right and left ducted, the upper side should add a vertical beam. 		■	
Casing C Plate structure, made of aluzinc, two sections. For right and left ducted, the upper side should add a vertical beam. 		■	■
Casing D Frame structure, made of aluminum profiles with aluzinc plates, in two sections, assembly at installation. 			■
Casing E Frame structure, made of aluminum profiles with aluzinc plates, casing delivered in parts and assembled a installation. 			■
Casing E Frame structure, made of aluminum profiles with aluzinc plates, casing delivered in one-piece 			

The ways of casing should be selected according to the application spaces as well as transportation capability and conditions at installation. Over segmentation will increase the assembly work, and overlarge size will cause difficulties in transportation.

Wheel construction

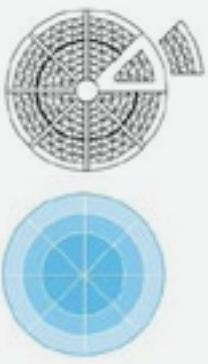
The wheel of the rotary heat exchanger is made of alternating layers of flat and corrugated aluminum foil to form the alveolate shape.

Various height of corrugation is available.

Flat surface ensures minimum leakage.

Interior spokes are used to mechanically bond the rotor's laminations.

These are threaded at the hub and welded at the

Specifications	400	1500	2000	2200	2400	2600	5000
Type 1 One-piece 							
Type 3 4 segments, assembly at installation 							
Type 8/16/24 8 segments along circle, assembly at installation. 2600≤d≤3200, no segment along diameter 3400≤d≤4000, 2 segments along diameter 4200≤d≤5000, 3 segments along diameter 							

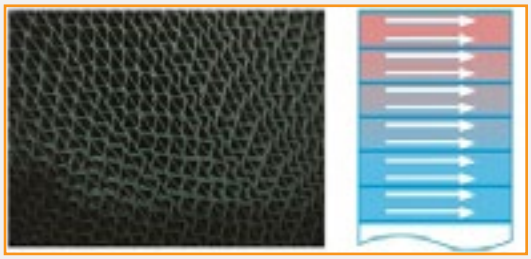
The segmentations of rotor should be selected according to the application spaces as well as transportation capability and conditions at installation. Over segmentation will increase the assembly work, and overlarge size will cause difficulties in transportation.

Technical summary

Laminar Flow Channels

The wave type structure of the wheel forms narrow channels in the direction of air flow. The air flow forms a laminar flow inside the wheel when passing through it.

When the wheel rotates, dust won't accumulate on the channel since outdoor air and exhaust air respectively flow through the channels from two directions. This is called selfcleaning.

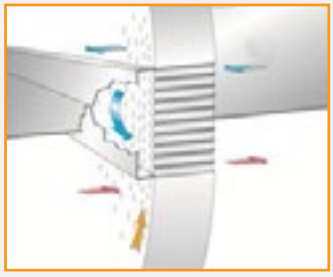


Double Sealing System

Unique double-sealing system is installed around the rotor periphery and along the central beam. The sealing materials are soft and dense of small friction and longer service life.

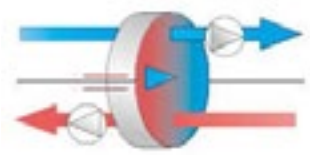
Purge Sector

Because of the structure of rotary heat exchanger, the outdoor air and exhaust air will mix. According to the air velocity, wheel rotating speed and direction, purge sector is installed to prevent the exhaust air from entering the outdoor air. The purge sector enables a small fraction of outdoor air to blow back the exhaust air in the alveolate holes to its side. A minimum pressure difference of 200Pa between the outdoor air side and the exhaust air side is required to ensure the cleaning effectiveness. With all conditions provided, the sector can ensure a leakage below 0.3% from exhaust air to outdoor air.



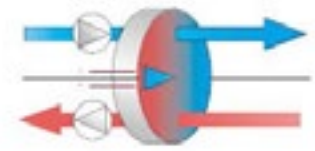
Positioning of Fan and Wheel

The cleaning effect of the purge sector is bound up with the fan position and static pressure difference between outdoor air side and exhaust air side. When the pressure difference is less than 200pa, the cleaning effect is not guaranteed.



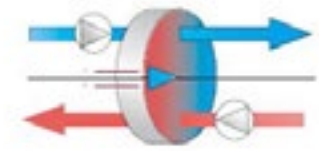
Mode 1: both fans suck out. (Top-priority)

The pressure of supply fan should be more than that of exhaust fan 200-500Pa, standard 2x5 degree of purge sector should be used.



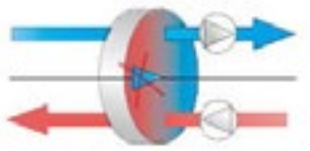
Mode 2: supply fan drives in, and exhaust fan sucks out.

By this way, the pressure difference is 500-800pa, The outdoor air through the purge sector is increased, so 2x2.5 degree of purge sector should be used.



Mode 3: both fans drive in.

The pressure of supply fan should be more than that of exhaust fan 200-500Pa, standard 2x5 degree of purge sector should be used.



Mode 4: supply fan sucks out, and exhaust fan drives in.

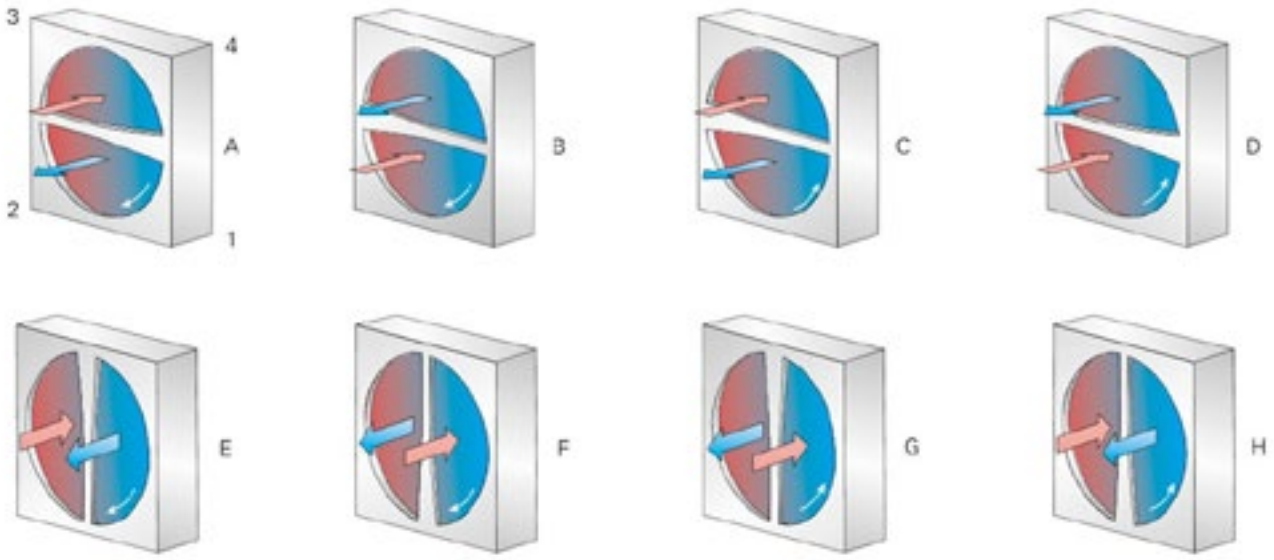
In this case, the exhaust air enters the supply air inevitably, so the purge sector is prohibited.

Bearing and Lubrication

The hub of the wheel is equipped with lifetime lubricated ball bearing or roller bearing, and with covers at both sides. No maintenance is required under normal usage.

Installation Types and Motor Position

The motor is installed at the corner of the rotary heat exchanger, the position of the corner is marked from no. 1 to 4, and the motor positions is optional.



Driving System

The wheel is drove to rotate by this system. The drive system is composed of motor, turbine-worm reducer, belt pulley and V belt. The motor is installed on the special bracket tensioning by the spring, it can ensure the gradually loose of V-belt in case of sudden stop.

Operation control

Motor voltage is 380V/3ph/50Hz, with the turbine-worm reducer, the wheel rotates at about 10 rpm steadily.

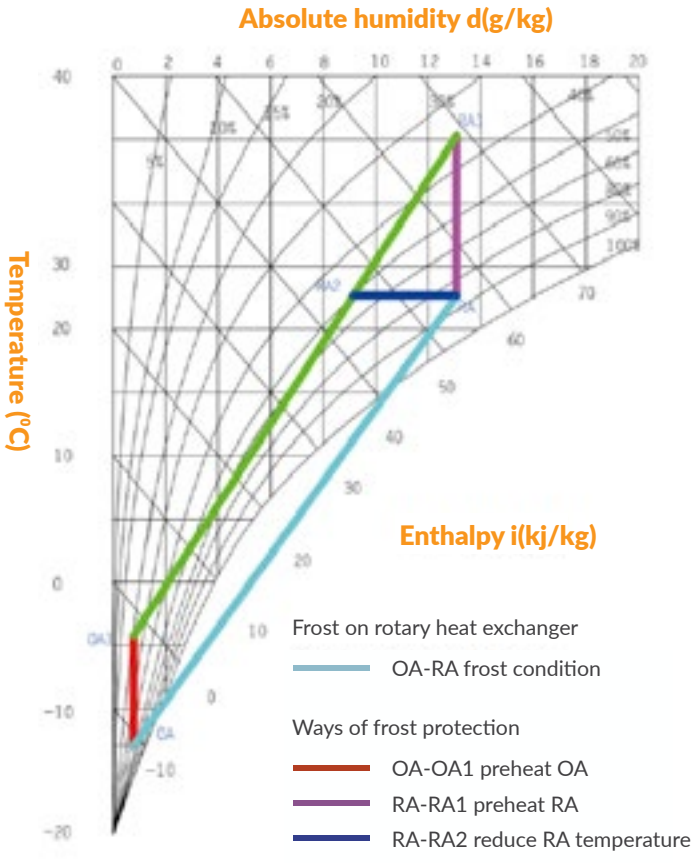
Standardly, we offer wheels without operation control device. However as an option, we offer ZK-100 intelligent controller which has following functions:

- Various rotary speed control by instruction signal from the exterior sensor. Speed can be steplessly adjusted.
- Manual set of rotary speed
- Automatic temperature sensing and running mode selection.
- Fault alarm and display
- Overload and undervoltage protection

Winter Operation

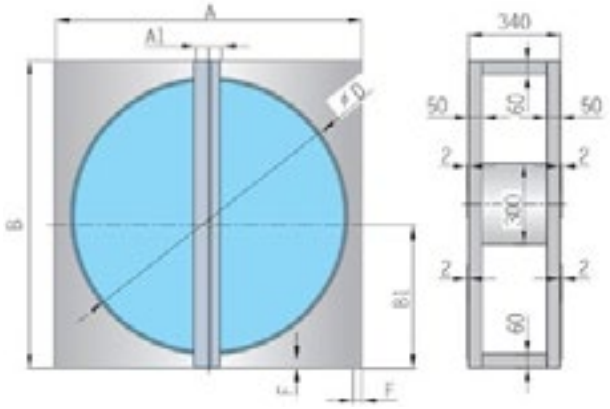
The rotary heat exchanger may frost in the extremely cold winter. Frost usually occurs in the exhaust air side. It would result in blockage and airflow reducing, but do no harm to the wheel. As shown on the graph, when the line connecting OA to RA across the 100% relative humidity curve, the wheel will frost. To prevent this, the air should be pre-handled till conditions such as OA1, RA1 or RA2, thus connecting line between OA1 and RA1(RA2) would not pass across the saturation humidity curve.

To avoid the frost blockage, the wheel should rotate at low speed of 2rpm or intermittently, for example stops 10 seconds each 10 minutes of operation. However, under no circumstance should the wheel stop for long period since dusts will get gathered on the wheel, resulting in lower recovery efficiency and ventilation deficiency in a worse case.

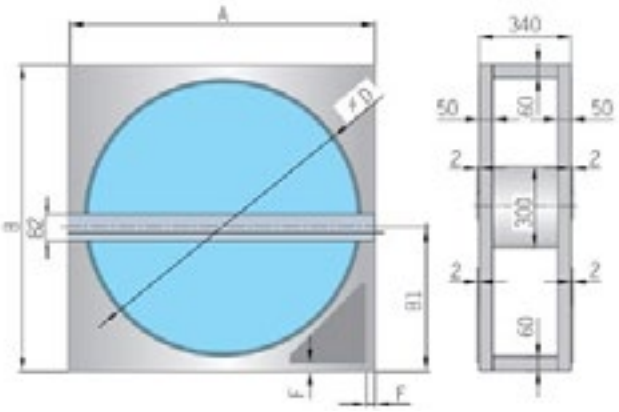


Specifications and dimensions

Casing Type A



Duct installed up and down

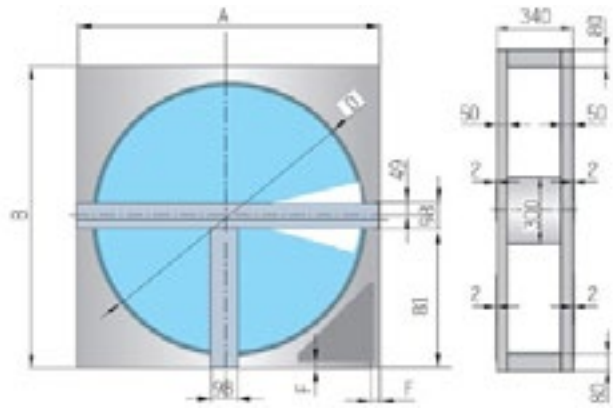


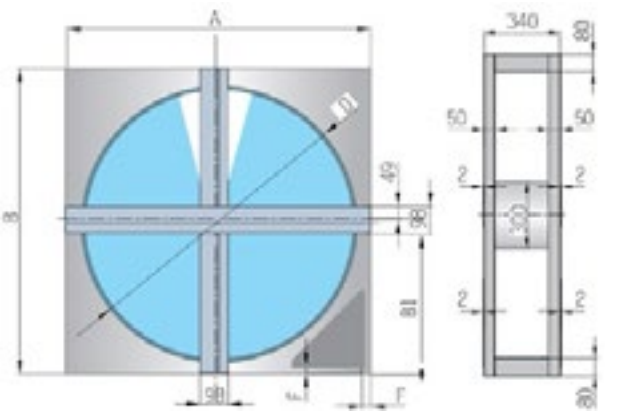
Duct installed right and left

Specifications	A mm	B mm	C mm	B2 (A1) mm	F mm	D mm	Power Kw	Voltage	N.W kg
400	504	554	277	68	32	400	0.09	3~380V50Hz	32
500	600	600	312	68	32	530	0.09	3~380V50Hz	42
600	700	700	350	68	32	630	0.09	3~380V50Hz	59
700	800	800	400	68	32	730	0.09	3~380V50Hz	71
800	900	900	450	68	32	830	0.09	3~380V50Hz	82
900	1030	1030	515	98	32	930	0.09	3~380V50Hz	102
1000	1130	1130	565	98	32	1030	0.09	3~380V50Hz	130

If casing is with side panel, revise the dimension as per formula: A+4, B+4, B1+2, F+2

Casing Type B and Type C

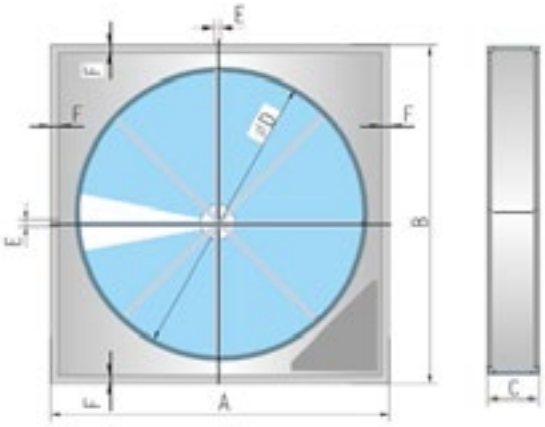




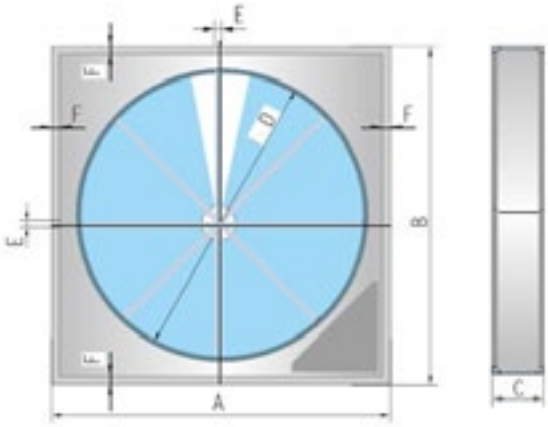
Specifications	A mm	B mm	B1 mm	F mm	D mm	Power Kw	Voltage	N. W. Kg Up-down type/Right-left type
1100	1230	1230	615	32	1130	0.09	3~380V50Hz	151
1200	1330	1330	695	32	1230	0.18	3~380V50Hz	169
1300	1430	1430	745	32	1330	0.18	3~380V50Hz	190
1400	1530	1530	765	32	1430	0.18	3~380V50Hz	205
1500	1630	1630	766	42	1530	0.18	3~380V50Hz	212/220
1600	1730	1730	816	42	1630	0.18	3~380V50Hz	230/239
1700	1830	1830	866	42	1730	0.25	3~380V50Hz	256/266
1800	1930	1930	916	47	1830	0.25	3~380V50Hz	283/293
1900	2030	2030	966	47	1930	0.25	3~380V50Hz	301/320
2000	2130	2130	1016	47	2030	0.25	3~380V50Hz	358/370

If the casing is with side panel, revise the dimension as per formula: A+4, B+4, B1+2, F+2.
Specifications 1100-1400 are for casing B, specifications 1500-2000 are for casing B or C.

Casing Type D and Type E



Duct installed up and down



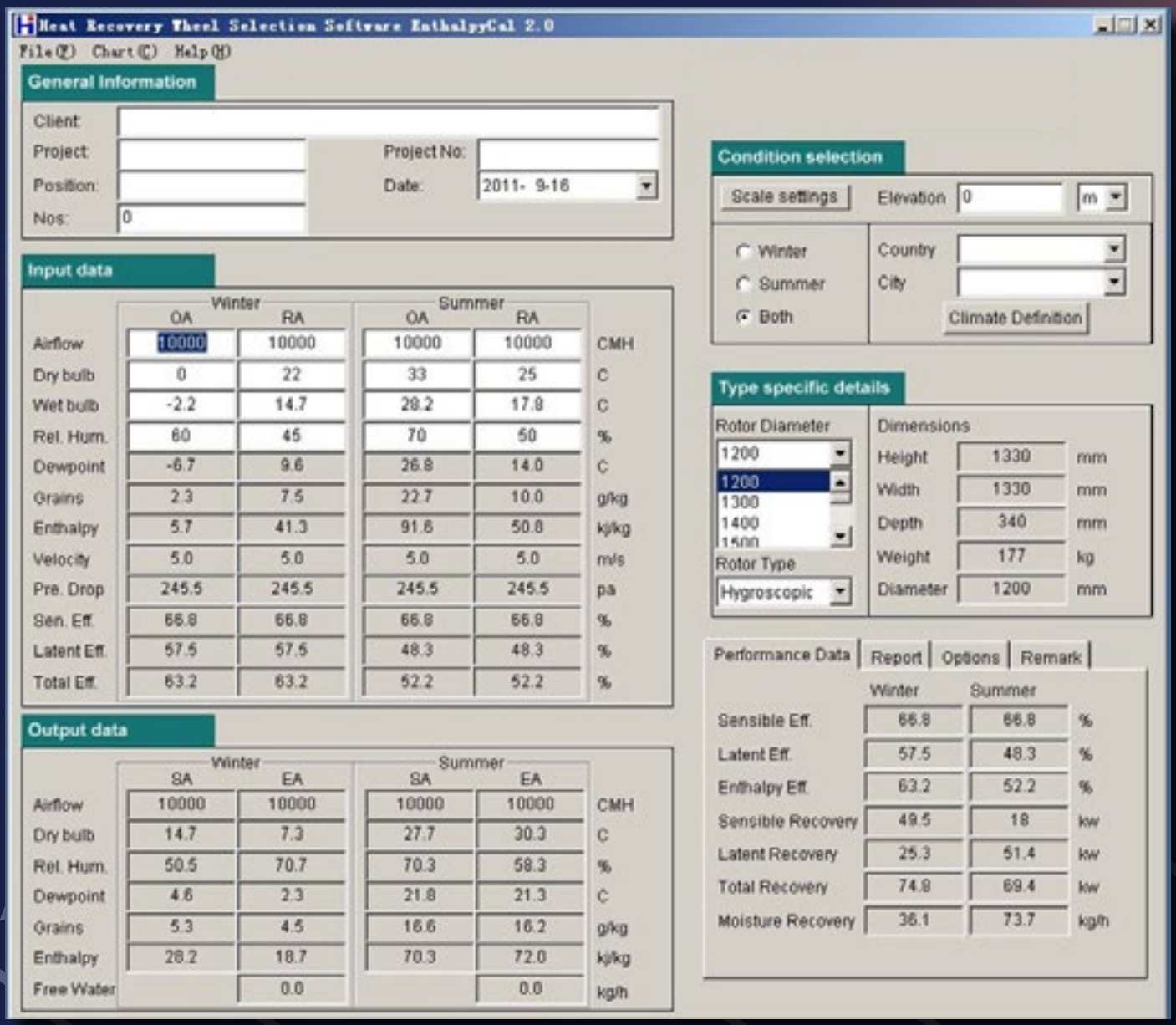
Duct installed right and left

Specifications	A mm	B mm	C mm	B2 (A1) mm	F mm	D mm	Power Kw	Voltage	N.W kg
2200	2400	2400	400	50	40	2230	0.37	3~380V50Hz	420
2400	2600	2600	400	50	40	2430	0.37	3~380V50Hz	500
2600	2800	2800	400	50	40	2630	0.37	3~380V50Hz	570
2800	3000	3000	400	50	40	2830	0.37	3~380V50Hz	860
3000	3200	3200	430	70	70	3030	0.55	3~380V50Hz	950
3200	3400	3400	430	70	70	3230	0.55	3~380V50Hz	1039
3400	3600	3600	430	70	70	3430	0.55	3~380V50Hz	1110
3600	3800	3800	430	70	70	3630	0.55	3~380V50Hz	1220
3800	4000	4000	430	70	70	3830	0.55	3~380V50Hz	1360
4000	4200	4200	430	70	70	4030	0.75	3~380V50Hz	1500
4200	4400	4400	430	70	70	4230	0.75	3~380V50Hz	1645
4400	4600	4600	430	70	70	4430	0.75	3~380V50Hz	1750
4600	4800	4800	430	70	70	4630	1.1	3~380V50Hz	1830
4800	5000	5000	430	70	70	4830	1.1	3~380V50Hz	1980
5000	5200	5200	430	70	70	5030	1.1	3~380V50Hz	2100

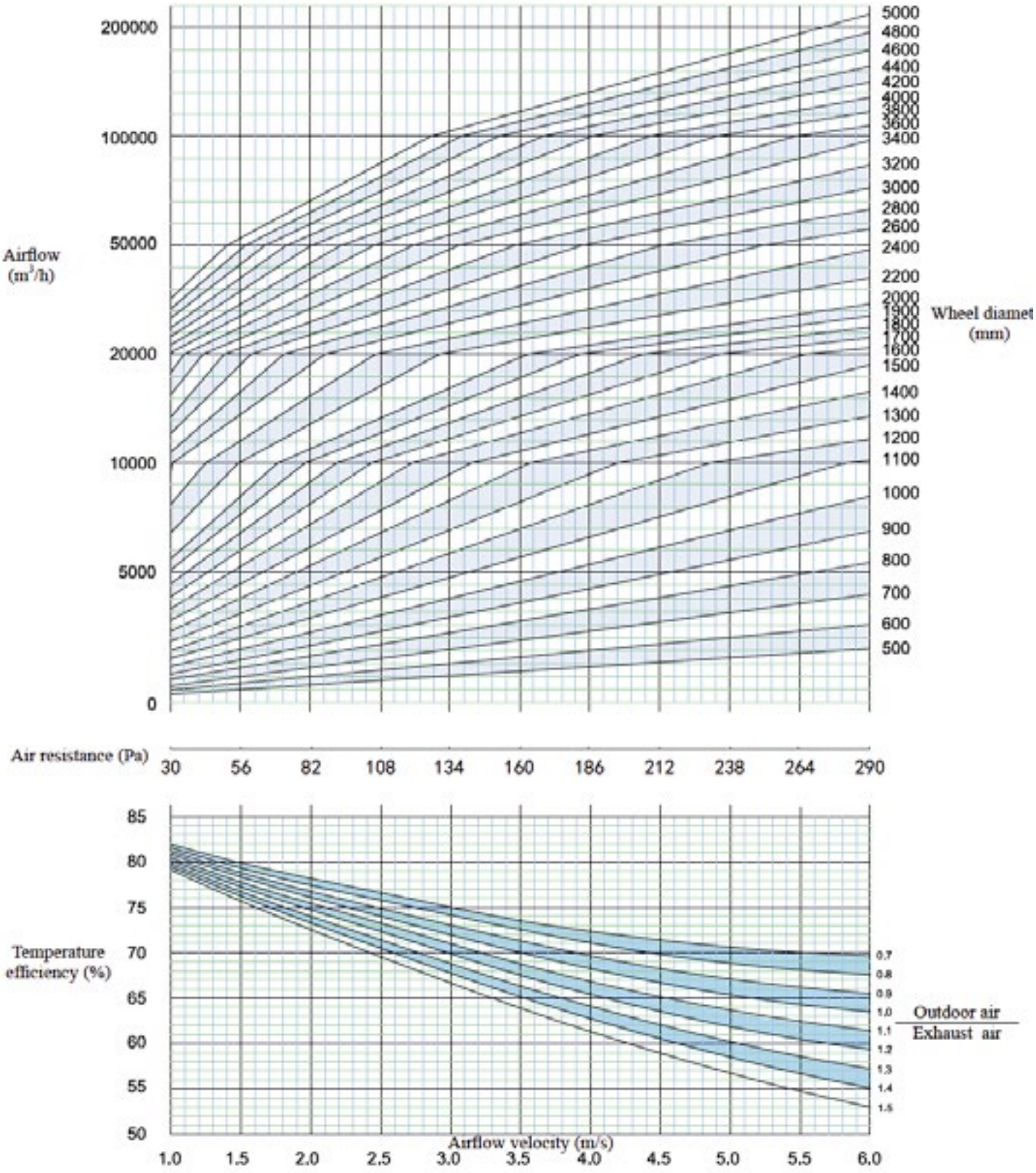
If casing is with side panel, revise the dimension as per formula: A+4, B+4, B1+2, F+2

Selection Program

We have developed a calculation program for simple selection of a rotary heat exchanger model. It can not only be used as a single design selection program, but can also be combined into your program by DLL. We can add it to your program upon your request, too. Please contact us for the selection program.

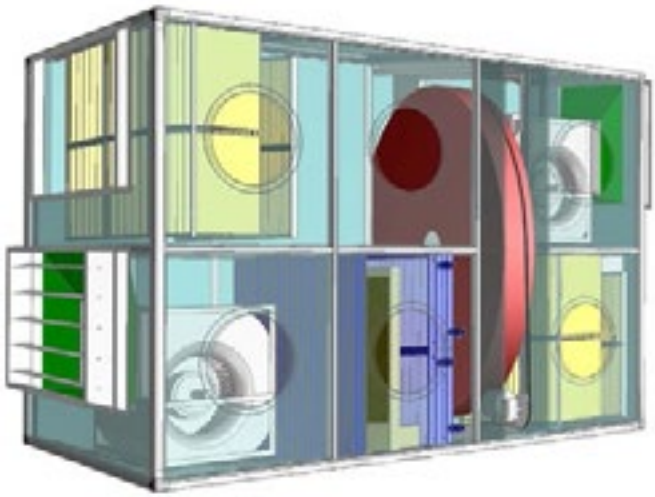


Selection chart

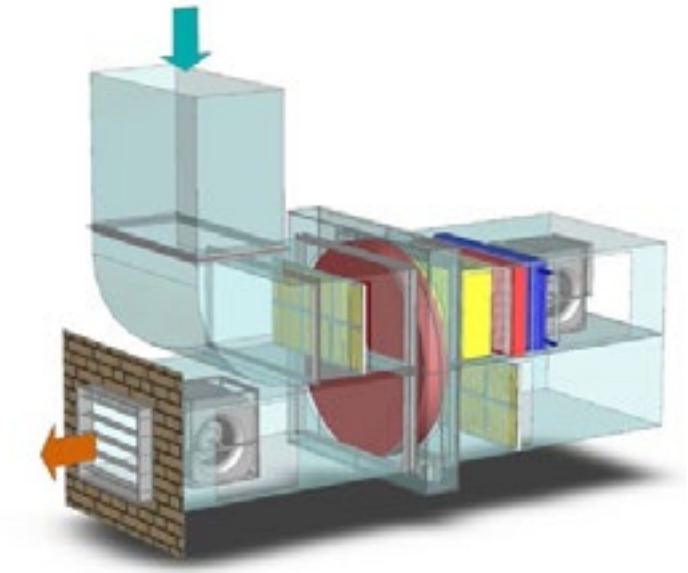


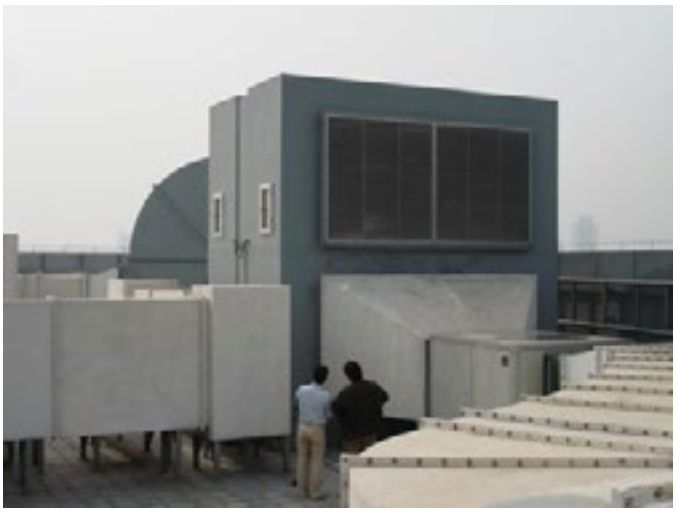
Applications

Rotary heat exchanger can built in air handling unit (AHU) as a main part of the heat recovery section. Usually side panel of the exchanger casing is unnecessary, except that bypass has been set in AHU.



It can also be installed in the ducts of ventilation system as a main part of the heat recovery section, connected by flange. In this case, side panel of the exchanger is necessary to prevent leakage.





Note: casing type and segment quantity should depend on the application spaces as well as transportation capability and conditions at installation. Over segmentation will increase the assembly work, and overlarge size will cause difficulties in transportation.

Application conditions

- Ambient temperature: -40-70°C
- Max face velocity: 5.5m/s
- Max pressure on casing: 2000Pa

Recent projects

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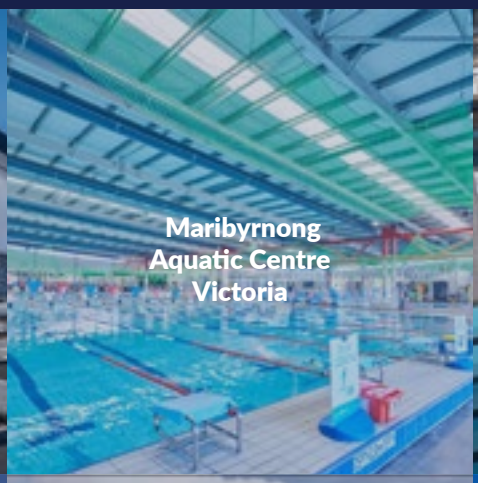
RSEA Park Stage 2
Victoria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Mt Duneed
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ANU Research School
of Physics
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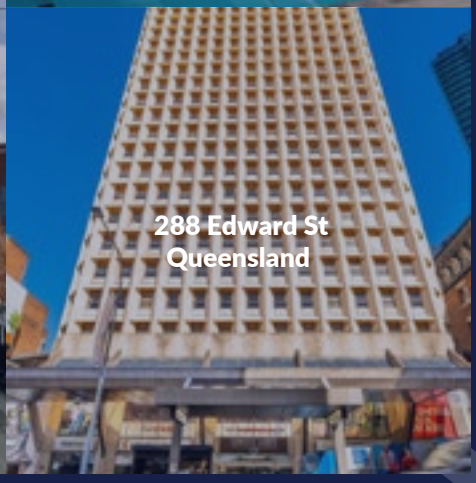
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