



BROAD AIR CONDITIONING

## Solar Air Con — Free Sunshine

### Applications

Cooling & heating for homes, supermarkets, exhibition halls, gyms, office buildings, factories, etc. Designed to use solar energy during day time and use an alternate fuel at night 24/ 7/ 365 operation.

### Significance for environment

BROAD Solar Air Con is the only commercial product which incorporates renewable energy to provide air conditioning. Parabolic collectors combined with chillers double the efficiency of conventional applications.

### Customers' satisfaction

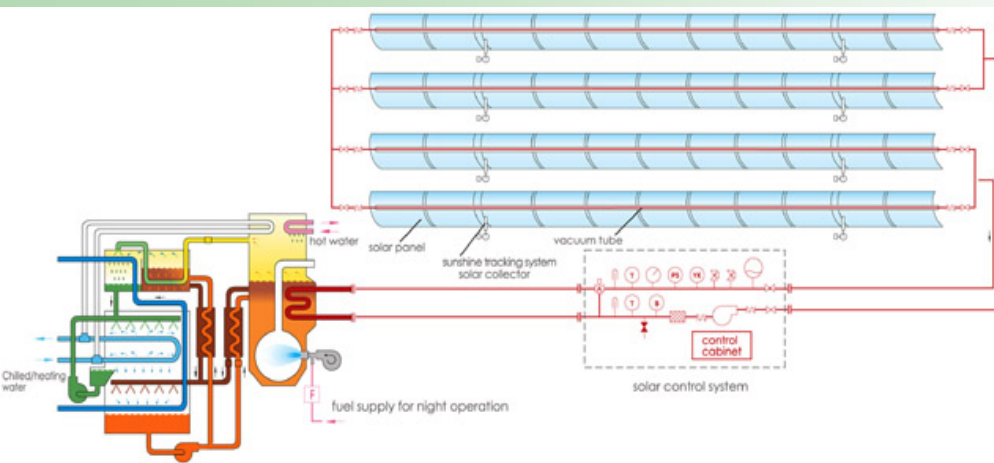
BROAD solar air cons have been sold in China, Europe and the U.S.A., and have achieved impressive environmental & economic impact.

### Early payback

Applying BROAD Solar Air Con in the right location will yield a payback in about 3~6 years.

### Life design

15~25 years depending on air quality.



### Operating mode

BROAD Solar Air Con provides fully automatic operation 24/ 7/ 365 (Only periodic dust cleaning for solar connectors is needed).

### Patented technology

BROAD solar tracking connector system, steel space box and control technologies are BROAD patented technologies.

### Sunshine area

1m<sup>2</sup> for solar collectors equals 3~6 m<sup>2</sup> for air conditioning.

### Solar collectors proper are a bright landscaping

The solar collectors can be placed on the rooftop or on the ground. The collectors can also be built on stilts creating a roofed car park. Today, collectors can create an architecturally pleasing statement about your business.





## Solar collector system Performance data

Model code	Heat collecting capacity	Cooling capacity	Heating capacity	Space taking (m <sup>2</sup> ) varies with latitude				Number of modules	Operation weight	Power demand	Flowrate	Heat source pipe diameter	Installation labor day/person
				10°	20°	30°	40°						
BJ	kW	kW	kW	10°	20°	30°	40°		kg	kW	m <sup>3</sup> /h		(estimate)
16	16	16(4.6)	15	40	40	40	40	3	600	0.5	0.9	φ35	4
23	23	23(6.6)	22	65	65	65	65	5	1000	0.5	1.3	φ35	6
64	64	70(20)	61	180	220	260	320	12	2400	1.0	3.7	φ35	20
105	105	115(33)	100	340	380	440	550	20	4000	1.25	6.0	φ35	30
134	134	174(50)	127	430	480	555	690	26	5200	1.75	7.7	DN40	40
179	179	233(66)	170	565	630	725	910	34	6800	2.6	10.3	DN40	50
223	223	290(82)	212	715	800	920	1150	43	8600	3.0	12.8	DN40	60
268	268	349(99)	255	865	965	1110	1390	52	10400	4.0	15.0	DN40	80
358	358	465(132)	340	1150	1280	1473	1840	70	14000	5.5	20.5	DN50	100
448	448	582(165)	426	1450	1620	1860	2320	87	17400	7.0	25.7	DN50	120
582	582	756(215)	553	1880	2100	2410	3020	113	22600	8.0	33.4	DN65	160
1118	1118	1454(413)	1062	3630	4050	4660	5820	218	43600	13.0	64.1	DN80	300
1565	1565	2035(579)	1487	5080	5670	6520	8150	305	61000	18.0	89.7	DN100	430
1789	1789	2326(661)	1700	5795	6465	7435	9290	348	69600	23.0	102.6	DN100	500
2236	2236	2907(827)	2124	7258	8100	9315	11640	436	87200	30.0	128.2	DN125	600
2683	2683	3490(992)	2549	8710	9715	11170	13970	523	104600	34.0	153.8	DN125	700
3578	3578	4650(1322)	3400	11600	12950	14890	18610	697	139400	37.0	205.1	DN150	1000

### General conditions

- Heat source water rated outlet / inlet temperature: 180 °C/165°C for cooling, 110°C/95°C for heating.
- Heat collecting efficiency: ≥40%. Calculated per peak radiant intensity 1000W/m<sup>2</sup> and ambient temperature 30°C.
- Ambient temperature: - 10 ~ 50°C (except special order).
- Ambient wind speed: the maximum wind speed is Force 7 in operation, and Force 11 in protection mode. Typhoon-resistant type is available (special ordering).
- When laid in south-north array, the space taking of solar collector modules is taken as equivalent to 20 degree, which is not affected by latitude.
- Power supply: 3Φ- 380V - 50Hz (others are for special orders). Since the step motor usually works instantly, the actual power consumption will be 30%~60% of the rated power demand in the above table.
- The power demand does not include the chiller (please refer to chiller catalogue for chiller power demand).





## Technical features

- Working principle: the tracking system drives the solar panels to keep track of the sun and focus the sunlight on the receiver (vacuum tube). The heat source water inside the vacuum tube is heated to 180°C to realize two-stage absorption cooling. The conventional heat collecting mode can only produce 90°C hot water for single stage absorption cooling, which is not economic or environmentally friendly.
- The chiller can utilize 2 energy forms: solar energy in daytime, natural gas or other heat sources as the backup energy on cloudy days or at night.
- The surplus solar energy can be stored by using a BROAD thermal energy storage tank (optional).
- All control elements are integrated into a "olar Control System" before shipment. Only wiring and pipe connection are required on the jobsite.
- The solar panels can be folded during the shipment so that the shipping cost is minimized. Site assembly work involves only fixing the solar panels onto the steel space boxes.

## Load matching with the chiller

Heat collecting capacity shall be no greater than the heat input required by the chiller, and any shortfall can be made up by fuel or other heat sources. The design of heat collecting capacity is mainly restricted by space or investment. Please refer to BROAD chiller catalogues for related information.

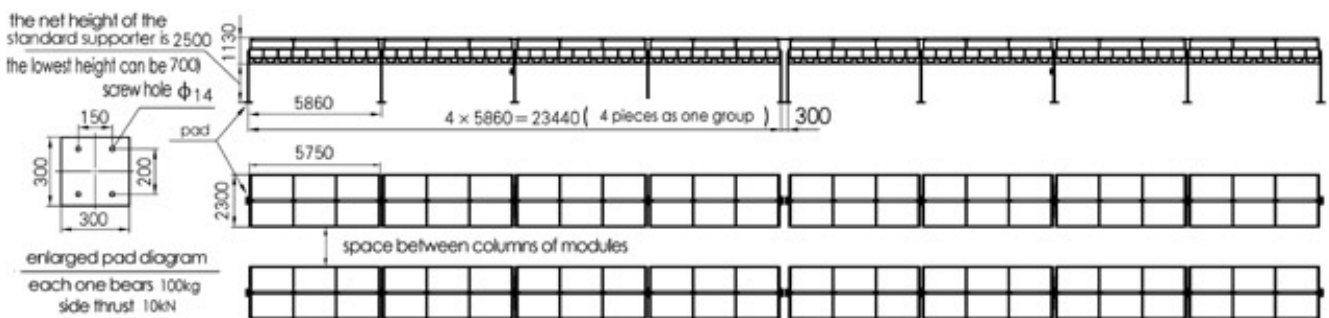
## Model selection and ordering

- Lead time: 4~10 months (depending on the scale/capacity).
- Specify the chiller cooling capacity as well as the required heat collecting capacity. The heat collecting capacity of each solar collector module (5,750 x 2,300 mm) is 5.13 kW.
- Decide the number and array of solar collector modules according to the heat collecting capacity, space between columns of modules and field conditions. A minimum of 600 mm clearance around each module must be left for dust cleaning.
- 3-5 modules are combined into a unit, and a standard unit consists of 4 modules. The diameter of vacuum tubes is  $\Phi 35$ , and the heat source water flow velocity shall be 1~2.5 m/s.
- The space between columns of modules varies with the latitude, and the recommended figures are as listed: Latitude, space between columns of modules (east-west array), space between columns of modules (south-north array)

Latitude	10°	20°	30°	40°
Space between columns of modules (east-west array) m	0.6	1.0	1.6	2.6
Space between columns of modules (south-north array) m	1.0	1.0	1.0	1.0

Recommendations: solar panels should be arranged in a south-north array in high latitude areas.

## Layout of solar collector system (typical installation)





## Supply list

Cat.	Item	Remarks
Solar collector	Solar panel elements (modules)	Including steel supporter, solar panel, steel space box, receiver (vacuum tube), receiver supporter, anchor ear, insulation base, unit connection tube, bellows, brace bar connector, brace bar
	Solar tracking system	Including motor supporter, step motor, speed reducer, driving gear, rotation axis pedestal, rotation axis lag, bearing socket, position switch, approach switch
	Collector piping	Including auto air vent, stainless steel hoses, stainless steel hose connectors
Solar control system	Heat source pump	2 pumps for BJ2236 or above model, piping of pump & accessories, including pipes, hoses, filters and valves
	Control cabinet	Including high-voltage electric components, low voltage electric components and PLC
	Sensors and actuator	Including temperature sensor, pressure sensor, flow switch and actuator
	Expander	Including expander connector, 20m connecting pipe
	Safety valve	2 pieces



Solar panel shipping status



Steel space box shipping status

