

To provide the most reliable and user-friendly air movement & control and air conditioning service.



Due to continuing research, Shanghai Nautilus reserves the right to change specifications without notice.

SHANGHAI NAUTILUS GENERAL EQUIPMENT MANUFACTURING CO LTD

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Process Expert Series Products

- FRP fan with high corrosion resistance;
- High mechanical strength;
- Gas supply and exhaust for corrosion protection and explosion protection;
- Temperature : -40~120°C
- Volume up to 143,900 m³/h
- Static pressure up to 3,080 Pa

G4.0

Company Profile

Shanghai Nautilus General Equipment Manufacturing Co., Ltd. is a middle and high-end solution provider of air supply and gas heating and air cleaning equipment that integrates R&D, production and sales. Established in September, 2003, it is located in the Jiading District of Shanghai. The company is the member of the US Green Building Council (USGBC) and International Air Movement and Control Association (AMCA), the high and new tech enterprise of Shanghai, **INFINAIR** won the famous trademark in Shanghai.

Vision statement: To become the most trustworthy brand of professional air movement & control and air conditioning.

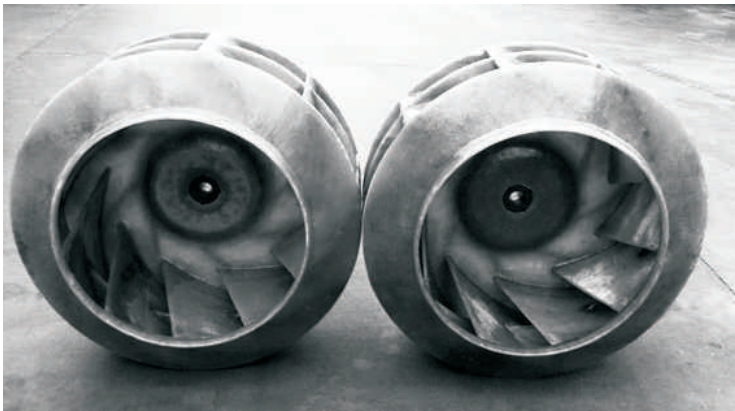
Mission statement: To provide the most reliable and user-friendly air movement & control and air conditioning service.



FRP wheel

● Design of backward curved wheel

The fan adopts advanced technology. Design of backward curved centrifugal wheel is optimized by means of CFD hydro-field simulating. The blade section of the backward curved wheel is a curve with a certain radian. The included angle between airflow direction and the linear speed direction of the blade is an obtuse angle. The design is more accordant with the aerodynamic characteristics, and has lower noise, and stable airflow.



● High-quality FRP material

The fan is made of novel composite material, i.e., glass fiber-reinforced composite resin, and has the characteristics of high intensity, light weight, corrosion resistance, etc. The mechanical property of INFINAIR wheel is similar to that of steel fan, and its linear velocity is up to 78m/s. Different corrosion resistance formulas are added according to different corrosion properties of different gases in the making process so as to achieve an optimal corrosion resistance effect.

● High balancing level

Each wheel is subjected to dynamic balance test. We insist to the balancing level of G4.0 (G6.3 for the same type of products at home and abroad). Long-term quiet and stable running of the fan is ensured fundamentally.

● Light weight and high performance

The weight of FRP is only about 1/4 that of steel, so that FRP wheel is lighter. Shaft power needed by starting is remarkably lowered, so that the efficiency is improved and energy consumption is lowered. The expansion coefficient of FRP is smaller than that of steel, so that fitting gap between air inlet and wheel is reduced, aerodynamic performance further enhanced, turbulent flow reduced, and the noise lowered.

Product Features

● High intensity

Fan body adopts an FEA theological design structure. The fan is molded from high-quality FRP material with advanced formula and relatively small thermal expansion coefficient by using a mold, so that stable structure and high intensity are achieved.



● Excellent corrosion resistance

The corrosion resistance of BCSF FRP fan is far higher than that of stainless steel fan, and its service life is 6-7 times that of stainless steel fan in most application environments; Housing and access door in components contacted with corrosive gas are made of FRP. Metal parts are covered by FRP coatings and are not exposed in corrosive gas. Shaft is provided with FRP shaft sleeve. Shaft end is covered by FRP coating.

● Good gas leakage

Fan housing joint is bonded by FRP seamless bonding technology, and shaft seal is arranged at a position where fan shaft passes, so that gas leakage is prevented.

● High reliability

Fan shaft is subjected to finish turning & hardening and tempering. Maximum load surpasses 25% of limit speed;

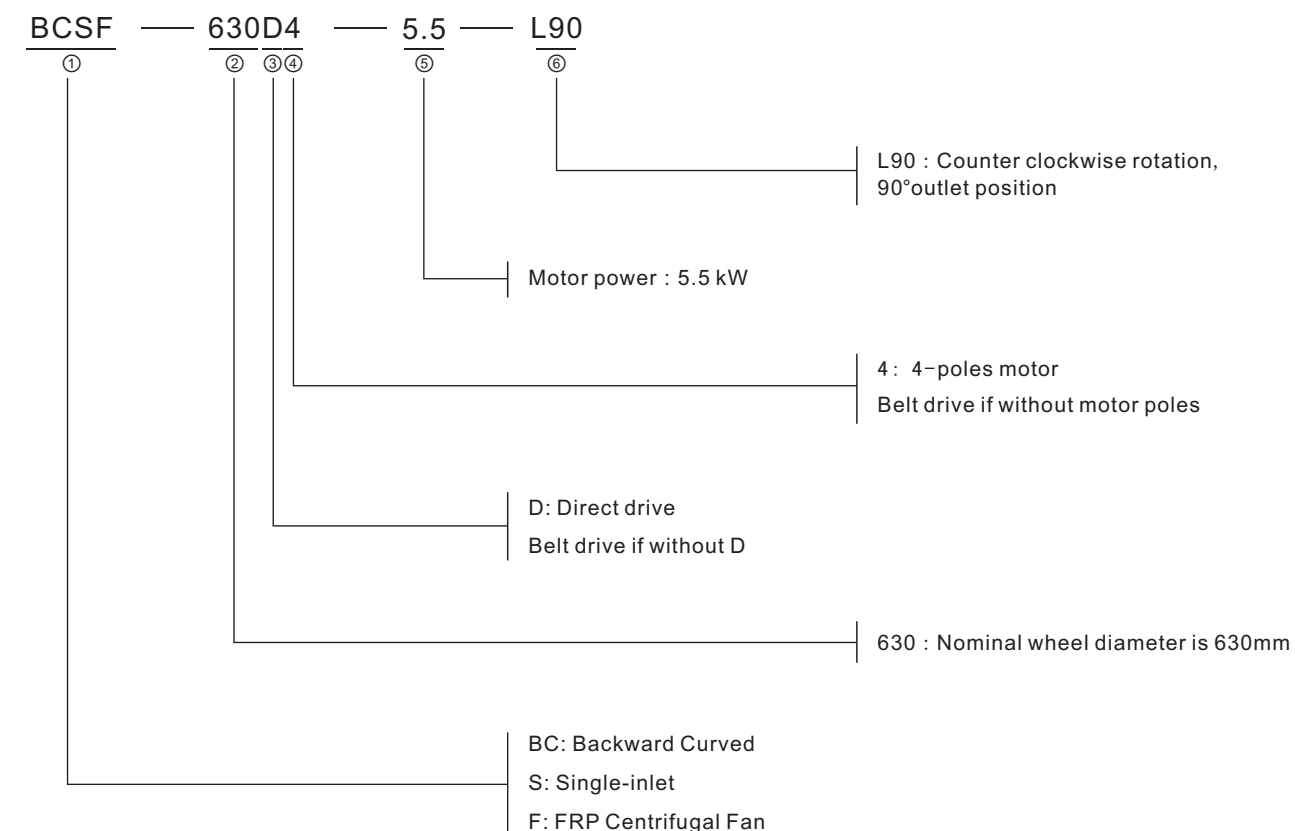
Bearing seal in bearing box can be lubricated. Service life more than L10 : 80000hours;

The fan is supported by stable channel steel base, so that stable running of the fan is ensured.

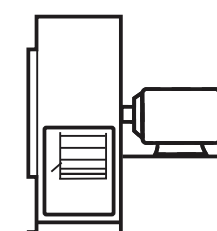
● High efficiency and energy saving

The fan adopts backward curved wheel with high balancing level and high efficiency. In combination with housing designed by CFD flow field simulation and inlet Venturi pipe, fan efficiency is over 69%, can reach 90% in maximum, and high-efficiency and energy-saving running of the fan is ensured.

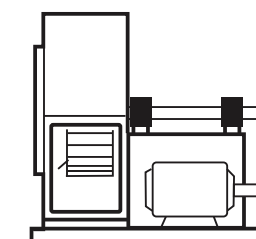
Naming convention



Drive arrangements for centrifugal fans

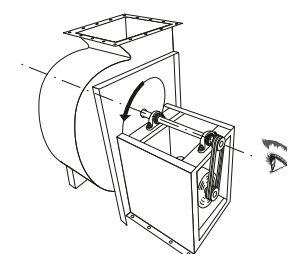


Drive Arrangement 4
(China National Standard: Type A)

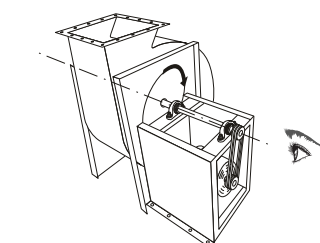


Drive Arrangement 12
(China National Standard: Type C)

Designation for Rotation



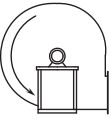
L — Counter clockwise rotation



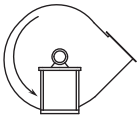
R — Clockwise rotation

Note: The rotation is identified from the view of fan drive (as shown in the above figure)

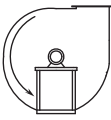
Designation of outlet position



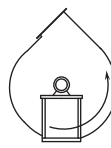
L0°




L45°




L90°



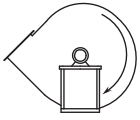
L135°




L180°




R0°




R45°



R90°



R135°



R180°

INFINAIR® standard	L	L0	L45	L90	L135	L180
China national standard	L	0°	45°	90°	135°	180°
ISO standard	LG	LG 270	LG 315	LG 0	LG 45	LG 90
AMCA standard	CCW	CCW270	CCW315	CCW360	CCW45	CCW 90

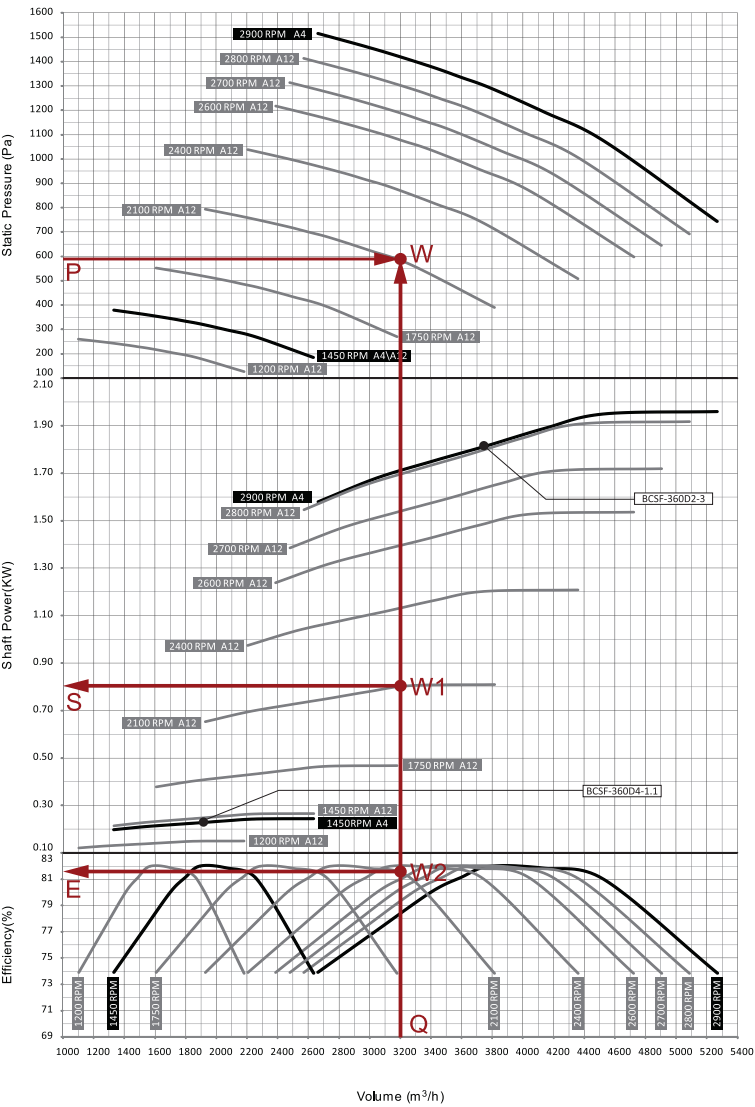
INFINAIR® standard	R	R0	R45	R90	R135	R180
China national standard	R	0°	45°	90°	135°	180°
ISO standard	RD	RD 270	RD 315	RD 0	RD 45	RD 90
AMCA standard	CW	CW 270	CW 315	CW 360	CW 45	CW 90

Examples of Naming, Drive Arrangements, Rotation Direction, Outlet position:

- BCSF-630D4-5.5-R0
 - Name meaning: centrifugal wheel with backward curved blades, single-inlet, FRP centrifugal fan, Nominal wheel diameter is 630mm, direct drive, 4-pole 5.5kW motor, rotation speed: 1450RPM.
 - Drive arrangements: A4 (China National Standard: A Type)
 - Selection of rotation direction: R indicates right-handed rotation (clockwise).
 - Selection of outlet position: R0 indicates that 0 degree is selected for outlet position (China National Standard: right 0, ISO Standard: RD270, AMCA Standard: Cw270)
- BCSF-1600-160-L45
 - Name meaning: wheel with backward curved blades, single-inlet, FRP centrifugal fan, Nominal wheel diameter is 1600mm, belt drive, 4-pole 160kW motor, rotation speed: 900RPM.
 - Drive arrangements: A12 (China National Standard: C Type)
 - Selection of rotation direction: L indicates left-handed rotation (counter clockwise).
 - Selection of outlet position: L45 indicates that 45° is selected for outlet position (China National Standard: Left 0, ISO Standard: Lg315, AMCA Standard: CCW315)

Curve Explanation

- The performances of fan of each model in different drive modes at different speeds are represented by a group of curves.
- Static pressure curve indicates static pressures of the fan at different volumes and speeds.
- Shaft power curve indicates practical power consumption of fan.
- Efficiency curve indicates running efficiencies of fan at different volumes and speeds.



Curve examples: Volume: 3200m³/h Static pressure: 580Pa

Step 1: preselecting a fan model meeting given volume, drawing a vertical line from given volume (point Q in the figure: 3200m³/h), drawing a horizontal line from a given static pressure point (point P in the figure: 580Pa) and finding a performance curve (2100RPM static pressure curve in the figure) closest to the intersection point (point W in the figure) which is positioned between the two lines and is taken as a "operating point". Rotating speed is 2100RPM. If the "operating point" is far away from the performance curve, please select another model and repeat "step 1" until a performance curve close to the "operating point" is found.

Step 2: drawing a horizontal line from the intersection point (point W1 in the figure) between the vertical line and shaft power curve of corresponding speed in a way of intersecting with the shaft power shaft, calculating needed power 0.97kW according to coefficient of power reserve and selecting motor of 1.1kW according to needed power, where in the intersection point (point S in the figure: about 0.8kW) is practical power consumption and represents electric energy needed by work.

Step 3: drawing a horizontal line from an intersection point (point W2 in the figure) between the vertical line and efficiency curve of corresponding rotating speed in a way of intersecting with efficiency shaft, wherein the intersection point (point E in the figure: about 81.5%) is the efficiency of operating point W.

Step 4: initially selecting the model of BCSF-360-1.1, A12 belt drive and the rotating speed of 2100RPM according to the steps above. If lower power is required, comparison can be made in reference to fan of large model, but initial investment will be increased.

Step 5: further searching according to the arrow. If required parameter change flow is 3200 m3/h and static pressure is 1420Pa, the distance between point W and 2900RPM black thickened curve is very small. Selecting the model of BCSF-360D2-3.

Remark: Coefficient of power reserve is decided according to practical requirement of pattern selection personnel, and is generally 1.15~1.5.

Fan approx. weight

Unit: kg

model \ Drive arr.	A4	A12
BCSF-320	80	100
BCSF-360	90	120
BCSF-400	110	150
BCSF-450	130	180
BCSF-500	155	215
BCSF-560	180	245
BCSF-600	200	280
BCSF-630	215	325
BCSF-710	240	370
BCSF-750	280	420
BCSF-800	320	485
BCSF-900		695
BCSF-1000		755
BCSF-1120		1045
BCSF-1200		1320
BCSF-1400		1410
BCSF-1600		2440

Notes: Motor weight is not included in the table.

Motor approx. weight

Unit: kg

Power(kW) \ poles	2P	4P	6P	8P
0.25	14.5	14	14.5	17
0.37	15	14.5	16	24
0.55	15.5	15	17	28
0.75	16	18	23	33
1.1	17	22	25	38
1.5	22	27	33	45
2.2	25	34	45	63
3	33	38	63	79
4	45	43	73	110
5.5	64	68	84	121
7.5	70	81	121	147
11	118	124	146	182
15	115	132	167	220
18.5	128	164	210	280
22	165	180	223	300
30	225	225	290	385
37	230	258	370	472
45	280	290	490	538
55	365	388	540	900
75	495	510	900	1000
90	565	606	980	1055
110	890	910	1045	1118
132	980	1000	1100	200
160	1055	1055	1550	2150

Notes: Due to different weights of motors of different brands, motor weights in the table are only for reference.

Datasheet of chemical resistance

Chemicals name	limit concentration
Acetaldehyde	ALL
Acetic Acid	ALL
Acrylic Acid	25
Alcohol, Ethyl	100
Alcohol, Methyl	100
Aluminum Chloride	ALL
Aluminum Nitrate	ALL
Aluminum Potassium	ALL
Ammonia, Liquid	ALL
Ammonia Carbonate	ALL
Ammonia Citrate	ALL
Ammonia Nitrate	ALL
Aniline Hydrochloride	ALL
Barium Acetate	ALL
Barium Sulfate	ALL
Benzene	100
Butyl Acid	100
Calcium Carbonate	ALL
Calcium Nitrate	ALL
Calcium Sulfate	ALL
Calcium Sulfate	ALL
Carbon Acid	100
Chlorine Water	ALL
Chlorobenzene	100
Chlorosulfonic Acid	100
Chromic Acid	30
Chromium Sulfate	ALL
Citric Acid	ALL
Copper Nitrate	ALL
Di-Ammonium Phosphate	65
Diethyl Carbonate	100
Dimethyl Phthalate	100
Dodecyl Alcohol	100
Ferric Chloride	ALL
Ferric Nitrate	ALL
Ferric Sulfate	ALL
Formic Acid	ALL
Gas, Natural	100
Gasoline, Sour	100

Datasheet of chemical resistance

Chemicals name	limit concentration
Hydrocyanic Acid	ALL
Hypochlorous Acid	20
Kerosene	100
Lead Acetate	ALL
Lead Nitrate	ALL
Magnesium Carbonate	ALL
Magnesium Chloride	ALL
Motor Oil	100
Naphtha	100
Nitrobenzene	100
Nickel Sulfate	ALL
Nitric Acid	52
Phenol Sulfonic Acid	100
Phosphoric Acid	ALL
Phosphoric Acid Fumes	100
Pickling Acids, Sulfuri and Hydrochloric	100
Picric Acid, Alcoholic	10
Potassium Carbonate	ALL
Potassium Chloride	ALL
Potassium Nitrate	ALL
Potassium Sulfate	ALL
Sliver Nitrate	ALL
Soaps	ALL
Sodium Carbonate	35
Sodium Chlorate	ALL
Sodium Chloride	ALL
Sodium Chromate	50
Sodium Hypochlorite	50
Sodium Nitrate	ALL
Sodium Sulfate	ALL
Succinonitrile	ALL
Sulfuric Acid	ALL
All Oil	100
Xylene	100
Zinc Chlorate	ALL
Zinc Nitrate	ALL
Zinc Sulfate	ALL
Hydrofluoric Acid	20
Hydrochloric Acid	40
Aqueous Hydrofluosilicic Acid	ALL

Standard Accessories

- Half-closed belt cover
Guarantee the personnel security and make sure that the belt can operate normally.
- Full-closed shaft cover
Protect the shaft from external damage so as to reduce the maintenance cost and improve the operating efficiency.
- Access door
Check the rotation of the wheel, and clear attachments on the wheel to ensure the dynamic balance of the wheel.
- Shear-proof spring absorber
Down-load fan dynamic load to prevent fan from moving horizontally and make sure that the fan operate smoothly and decrease the fan running noise.
- Absorber pedestal
Even distribution of fan weight, avoid local stress concentration and ensure fan smooth running.

Optional Accessories

- Outlet/inlet flexible duct connector
Flexible device connecting fan and duct for avoiding fan vibration from transferring to the whole system, also used for the connection of fan with ducts of different diameters and different centre heights.
- Housing drain
Located on the bottom of scroll to discharge contaminated substance such as condensed water etc.
- Epoxy motor weather hood
Protect motor from rain or snow assault and extend the motor life.
- Full-closed belt cover
When fan is arranged outdoor, prevent rain and snow from corroding belt and pulley so as to protect the safety of personnel and ensure normal running of belt.
- Second-floor absorber pedestal
On base of the floor pedestal, it can decompose the local stress of the cement pedestal and remedy the problem caused by the surface unevenness.

Technical Specifications

● Fan Type

The fan shall be single inlet centrifugal and belt drive or direct drive, with fiber-glass reinforced plastic backward curved centrifugal wheel. Fan parts contacted with air shall be corrosion resistant.

● Quality standards

The fan design and make comply with the “Fiber Glass Reinforced Plastic Centrifugal Fan” (China Nation Standard JC/T 553-1994). Wheel over speed is tested in compliance with the “Fan Wheel Over Speed Testing Method” (China Nation Standard JB/T 6445-2005). Fan is tested in compliance with the “Fan Air Movement Performance Testing Method” (China Nation Standard GB/TQ 1236-2000).

● Material

The housing and wheel shall be fiber-glass reinforced plastic. The content of resin shall not be less than 50%. The different corrosion resistant ingredients can be added according to different gas components. The material shall be free of changing color, appearing spot and peeling in designed condition.

● Wheel

Fan wheel shall be backward curved centrifugal type and fiber-glass reinforced plastic. The wheel shall be statically and dynamically balanced to Level G4.0 as per AMCA standard. Wheel surface shall be uniform color and gloss, bright and clean, and shall be free of crack, gap, burr and bubbles with diameter larger than 3mm.

● Fan Housing

Fan housing shall be fiber-glass reinforced plastic, the thickness and strength shall be adequate to support fan max running weight. Fan housing use fiber-glass reinforced plastic seamless sticking technology to prevent air leakage. All the metal parts in the housing shall be covered by two layers (0.2mm) of fiber-glass reinforced plastic, and cover shall be smooth transited with fan. Shaft hole shall not be larger than 2mm diameter of shaft sleeve and shall be equipped with shaft seal.

● Inlet

Fan inlet shall be fiber-glass reinforced plastic and aerodynamic design round curved section to smoothly transit the air to the wheel cone, it will have well commutate effect to effectively reduce turbulence, improve fan efficiency and reduce noise.

● Belt drives (apply to belt drive only)

Fan shaft shall be heat treated through soaking furnace. The fan shaft shall be balanced together with the wheel, and the shaft design speed shall at least exceed 25% of the maximum fan operation speed. Shaft shall be furnished with fiber-glass reinforced plastic shaft sleeve, which shall be at least 10mm out of the housing. The shaft inside of the chamber and the end shall be corrosion resistant.

Two-bearing units (including two bearings and bearing box) shall be used to support fan shaft. The bearings shall be selected for a minimum (L-10) life in excess of 80,000 hours at maximum cataloged operating speed.

● Motor

Motor shall be carefully matched to the fan load, IP54, and insulation class F. Motor bearings shall be re-lubricated ball type. Motor and drives shall be out of the air stream to avoid corrosive air and extend motor life.

● Nameplate

Permanently fixed aluminum nameplate shall be fixed on fan body clearly display fan mark, product model and serial number. The serial number shall be a unique ID for each fan, so that the customer can use this number to find out the parts used to build this fan.

● Acceptable Manufacturers

INFINAIR® or equivalent. Design based on BCSF from **INFINAIR®**.