## Fan Code

LC 500 4 10B 20°

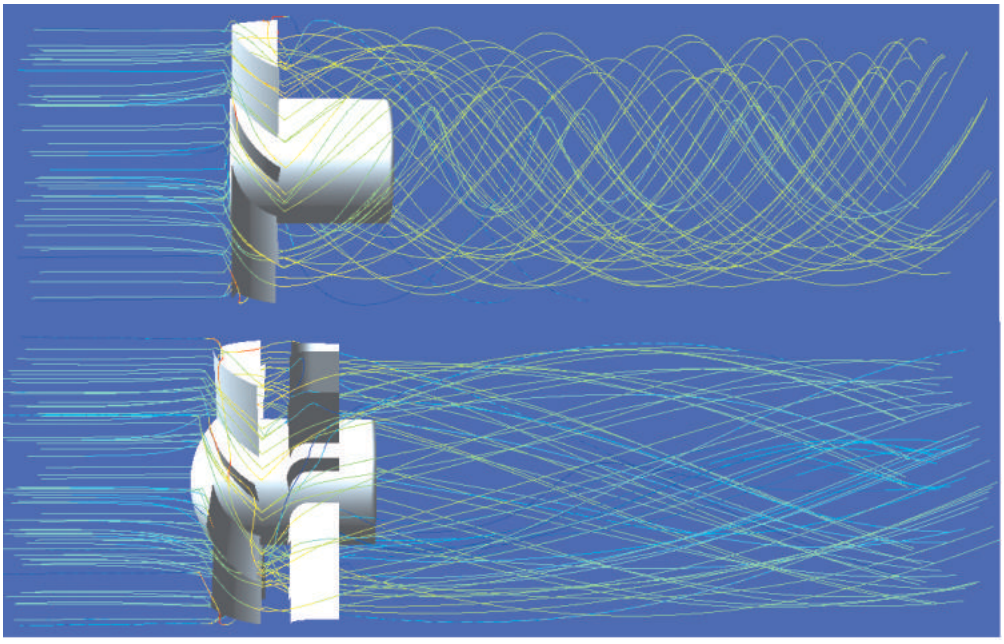
- 20° — Pitch Angle
- 10B — Number of Blades
  Blade Type:
  - B blade
  - TXA blade
  - C blade
- 4 — Motor Poles
- 500 — Diameter of Impeller
- LC — Fan Type

### Description

Axial fans offer you a complete range of fan system and wide options of accessories such as impellers and hubs to meet all kinds of applications and demands. The impeller of axial fans offer high efficiency up to 80% or even higher.

### Advanced Design of Straightening Stator Vanes and Ogive for Axial impellers:

With world's leading Computational Fluid Design (CFD), axial fan has developed advanced straightening stator vanes and ogives for axial impellers. As the figur shows, with straightening stator vanes and ogive, turbulence in front of impeller has been greatly reduced, airflow becomes more stable and the efficacy can be improved up to 8%.



Notes:

1. For detail, please see the fan performance curve or contact with Breeze Industrial Ventilation JSC.
2. Special or other size of air outlet direction, please negotiate with Breeze Industrial Ventilation JSC.

## General Information

The performance range is from 500 $m^3$/h up to 195.000 $m^3$/h, static pressure up to 1.500 Pa. High pressure is possible on two-stage fans.

**Fan type:**

- SC Series: Short Cased Axial Flow Fan.
- LC Series: Long Cased Axial Flow Fan.
- LCS Series: Smoke Extract Axial Fan.
- LCF Series: Explosion Proof Axial Fan.
- CRLC Series: Two-stage Axial Fan.
- CRLCS Series: Smoke Extract Two-stage Axial Fan.

## Construction Information

Axial series are mainly constructed of casing, impeller, motor and other accessories.

### Casing

Fan sizes are from 315mm to 1600mm diameter.

All casings and motor mounting are made of mild steel, all steel parts are epoxy coated after manufacturing, thickness from 2.0mm to 6.0mm upon diameter.

Casing flanges are rolled, the pitch circles of holes are in accordance to BS 6339 and ISO 6580.

Material option available:

- Galvanized steel.
- Hot dip galvanized after manufacturing.
- Stainless steel: 304 or 316L
- Requested.

Casings are completed with an externally mounted terminal box which is prewired from the motor terminal box, ensuring ease of installation at site.

### Two-stage Axial Flow Fan

Two-stage axial flow fans, in series, counter rotating for high pressures or for carpark application.

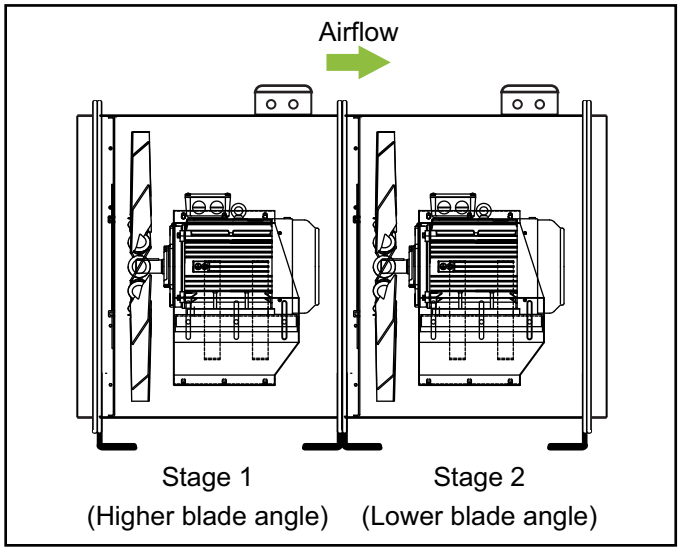
The system with just 2 counter rotating, in series axial flow fans, static pressures up to nearly 2.500 Pa can be achieved. The two-stage unit consists of 2 or more counter rotating single stage in series with left hand and right hand blades, without guide vane. The spin of the first stage is transformed into an additional static pressure by the following stage.

This way, the system produces an excellent airstream profile and 2,7 to 3 times the pressure of a single stage version.

All parts of the multi stage version can be taken from the single stage fan and therefore can be produced at a low cost. Each stage has its own seperate motor. If one stage fails or is switched off, the second stage still produces 65% of the air volume, while consuming only 40 % of the energy. This system is ideal for exhausting in carpark buildings. It works in accordance to the regulations for carpark exhaust systems in United Kingdom and other countries, which require two independent stages, so that the fan will still be operating in case of a failure of one stage. The airstream of the first stage will automatically turn the impeller of the switched off second stage in the opposite direction, so that it supports the airflow instead of disturbing it. This also saves energy compared to similar systems. Besides, the impeller is already rotating in the right direction when the second stage is switched on. As another advantage, this is an inexpensive way of adjusting the air volume.

These are designed a two-stage axial flow fan:

- Stage 1: Right hand blade
- Stage 2: Left hand blade




For example:
Fan ref LC1000/4/12TXA/ALU/17.5°/15°

- Stage 1 is 17.5°
- Stage 2 is 15°

## Smoke Extract Operation

The LCS series are designed and tested to operate at standard temperatures as well as elevated temperatures of 250°C/2 hours (H250) or 300°C/2 hours (H300), according to BS EN 12101-3/ISO 9001:2015.

Certificate number 0086-CPD-493412.

Manufacturing FLC EN 12101-3/ISO 9001:2008

## Explosion Proof Operation

The LCF series are driven directly by an ATEX or IECEx certified motor. Single phases and three phases, IP55 or IP66, class F insulation, can be frequency conversion motor.

For motors provided with PTC posistor sensors that should be connected to the protection system, the type of sensor should be specified by the customer/electrician.

The range covers Gases Group IIA, IIB & IIC and most dust hazards. The Gas or Dust type must be specified.

The impeller of LCF series are fitted with Anti-static Nylon (AST) or Aluminum (AL blade) material if required.

The LCF series are typically used for the purpose of industrial ventilation, cooling and exhausting etc.

This product specially applies to Oil & Gas, Offshore Platform, Chemical, Petrochemical, Refinery and Marine Industries etc.

## Impeller Data

High efficiency aluminum aerofoil type. All units are fitted with Breezax Impellers with Aluminum (ALU) blades. GRP or GRN blades can be fitted if required.

Hubs are manufactured from fully die cast aluminum alloy as standard.

The blades are with adjustable pitch angle to optimize the dutypoint. The solidity varies for a wider range of performance.

**Blade materials are available in:**

- ALU: Standard
- GRP: Glass Reinforced Polypropylene
- GRN: Glass Reinforced Nylon
- AST: Anti-static Nylon

**Operating temperature:**

- ALU: -40°C + 200°C
- GRP: -40°C + 70°C
- GRN: -40°C + 150°C
- AST: -30°C + 110°C

**Hub system:**

Our range of axial fans has fully adjustable blades and there are 6 hub systems, as shown below:

| Hub Type | Number of Blades |
|---|---|
| 110 | 5 |
| 160 | 5,10 |
| 230 | 3,6,12 |
| 250 | 3,6,12 |
| 330 | 4,8,12,16 |
| 400 | 4,8,12,16 |

**Blade Design/Type:**

We have several options Blades Design as following:

| Design Type | Material | Hub Series |
|---|---|---|
| Breezax, S | GRP/GRN | 110, 160, 230 |
| Breezax, B | ALU | 110, 160, 230 |
| Breezax, A | GRP/GRN | 110, 160, 230 |
| Breezaxmax, A | ALU/GRN | 250, 330 |
| Breezaxmax, T | ALU | 250, 330 |
| Breezaxmax, C | ALU/GRP | 400 |

**Balance:**

The impellers are statically and dynamically balanced on precision machines according to ISO 1940 with G2.5mm/s quality standard.

## Mounting and Airflow

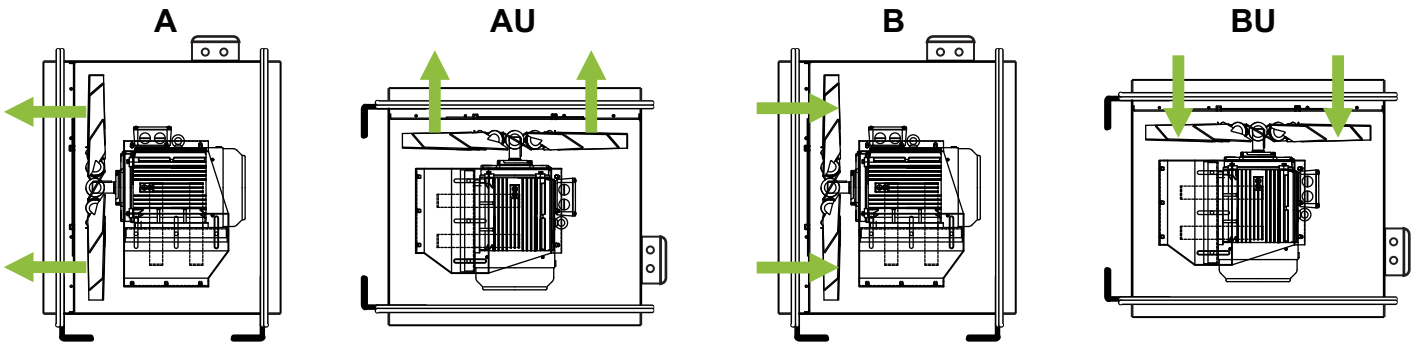
All units are suitable for internal or external operation at any installed angle.

Airflow direction:

- Plan B as standard.
- Plan A can be supplied if required.

Arrows indicating correct rotating and direction of airflow are mounted on the outside of the fan case.

These forms of running are as follows:




## Performance data

The axial fans are produced by Breeze Fan base on technology of London Fan company, a world famous axial impeller manufacture which was set up in 1928. Fan performance and data of type selection program are approved by British Standard.

- Manufuactured under a certified ISO 9001:2015.
- The performance is tested international standards by BS 848-1:1985 and ISO 5801.
- Installation position D, i.e. ducted inlet and ducted outlet configuration.
- All curves to a density of $\rho$ = 1,2 kg/m$^3$, at 20°C.

## Selection Program

Full details are available on our selection program: Breeze Fan or London Fan.

The selection program is convenient, simple, intelligent. It is easy to choose suitable fans, provide and print out all data to confirm the result of choice. You can transfer these data to consultants and designers.

Please contact our sale department or login http://www.breeze.com.vn for selection program.

## Sound levels

All measurements of the sound that the fans generate have been taken strictly in accordance with BS 848-2, test method 1 and ISO 13347-2 for acoustic performance.

Sound data are determined according to BS EN ISO 5136 – In-duct method.

Published sound power level spectra figures are dBW with a reference of $10^{-12}$ Watt (1 Pico watt).

The sound power levels shown on the fan curves are for inlet LwiA scale for installation type D: ducted inlet, ducted outlet. Ratings include the effects of ducted end correction.

The sound pressure level at the inlet at 1m distance in low reflection can be obtained by deducting 11dB from the sound power level at the inlet side. The sound pressure difference from 1m to distance d is obtained as follows:

$$LpiA = 10 * \log (1/d)$$

Where: d = distance from fan in meters.

Please note that reflections and room characteristics as well as natural frequencies influence the size of the sound pressure level differently

## Motor Data

Motors incorporated are TEFC (Total Enclosed Fan Cooled) and airstream rated to IEC 34-1.

Standard motors are protected to IP55 with Class F insulation. Operating temperature is from -20°C to +50°C as standard, fans for operation beyond these limits are also available.

Motors are suitable for speed control by frequency inverter, subject to fan selection.

Available specific for your project requirements such as:

- 220-240V / 380-415V-50Hz.
- 60Hz: specific to your voltage requirements.
- IE1, IE2, IE3 and IE4 Efficiency Classes.
- 2-speed (Full/Half and Full/Two Thirds).
- High temperature motor and double speeds motor (Class H): 250°C/2hrs or 300°C/2hrs or requested.

## Fan Laws

### Speed Change - Constant Size - Constant Density

- Air Volume ≈ Rotation Speed

$$\frac{V_2}{V_1} = \frac{n_2}{n_1}$$

- Pressure ≈ (Rotation Speed)$^2$

$$\frac{\Delta p_1}{\Delta p_2} = \left(\frac{n_1}{n_2}\right)^2 = \left(\frac{V_1}{V_2}\right)^2$$

- Abs. Power ≈ (Rotation Speed)$^3$

$$\frac{P_1}{P_2} = \left(\frac{n_1}{n_2}\right)^3 = \left(\frac{V_1}{V_2}\right)^3$$

### Size Change - Constant Speed - Constant Density

- Air Volume ≈ (IMP. Diameter)$^3$

$$\frac{V_2}{V_1} = \left(\frac{D_2}{D_1}\right)^3$$

- Pressure ≈ (IMP. Diameter)$^2$

$$\frac{\Delta p_1}{\Delta p_2} = \left(\frac{D_1}{D_2}\right)^2$$

- Abs. Power ≈ (IMP. Diameter)$^5$

$$\frac{P_1}{P_2} = \left(\frac{D_1}{D_2}\right)^5$$

### Density Change - Constant Speed - Constant Size

- Air Volume = No change

$$V = \text{Constant}$$

- Pressure ≈ Density

$$\frac{\Delta p_1}{\Delta p_2} = \frac{\rho_1}{\rho_2} = \frac{T_2}{T_1}$$

- Abs. Power ≈ Density

$$\frac{P_1}{P_2} = \frac{\rho_1}{\rho_2} = \frac{T_2}{T_1}$$

### Noise:

$$N_2 - N_1 = 50 \log 10 * \frac{D_2}{D_1} + 50 \log 10 * \frac{n_2}{n_1}$$

### Pressure

- Dynamic Pressure (Pa)

$$p_d = \frac{\rho}{2} * v^2$$

- Total Pressure (Pa)

$$p_t = p_{st} + p_d$$

- Air Velocity (m/s)

$$v = \frac{V * 4}{\pi D^2}$$

### Absorbed Power

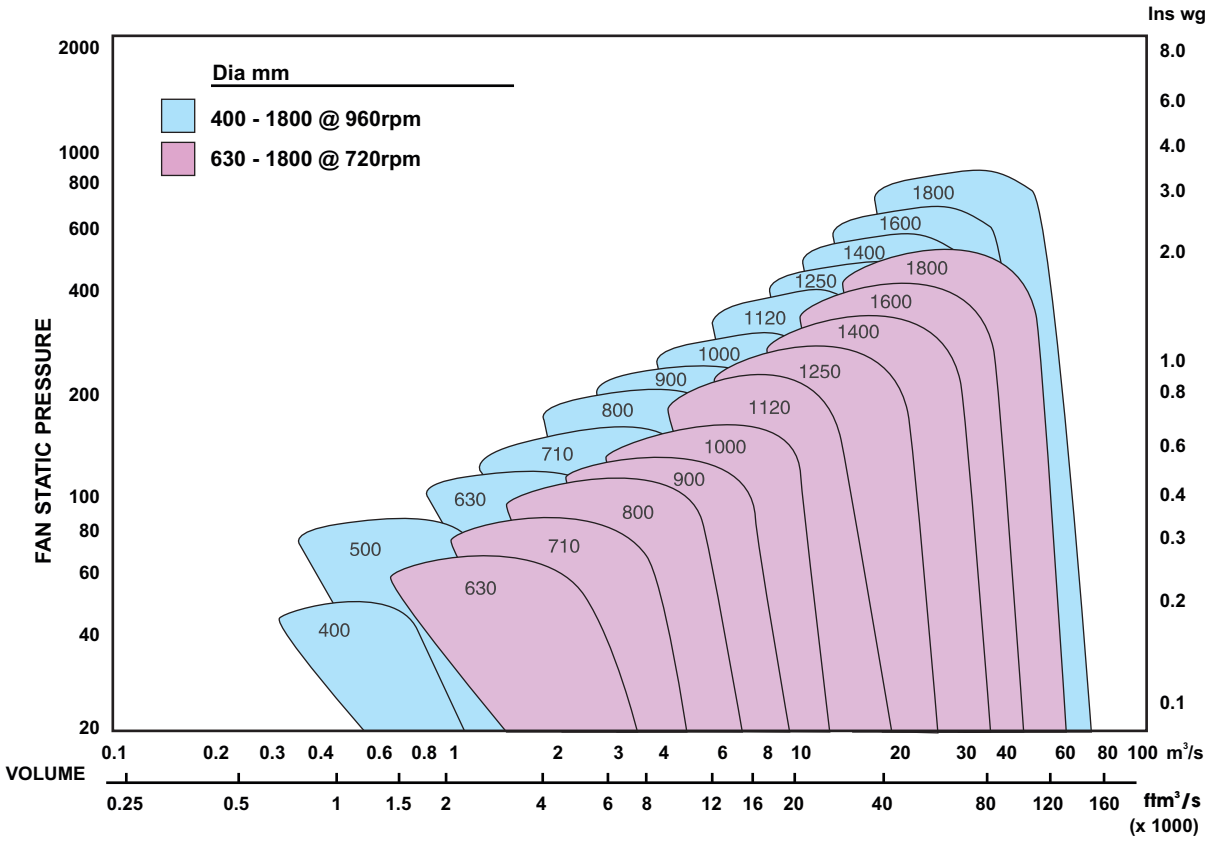
$$P = \left(\frac{V\ (m^3/s) *\ p_t\ (Pa)}{\eta\% * 10}\right) kW$$

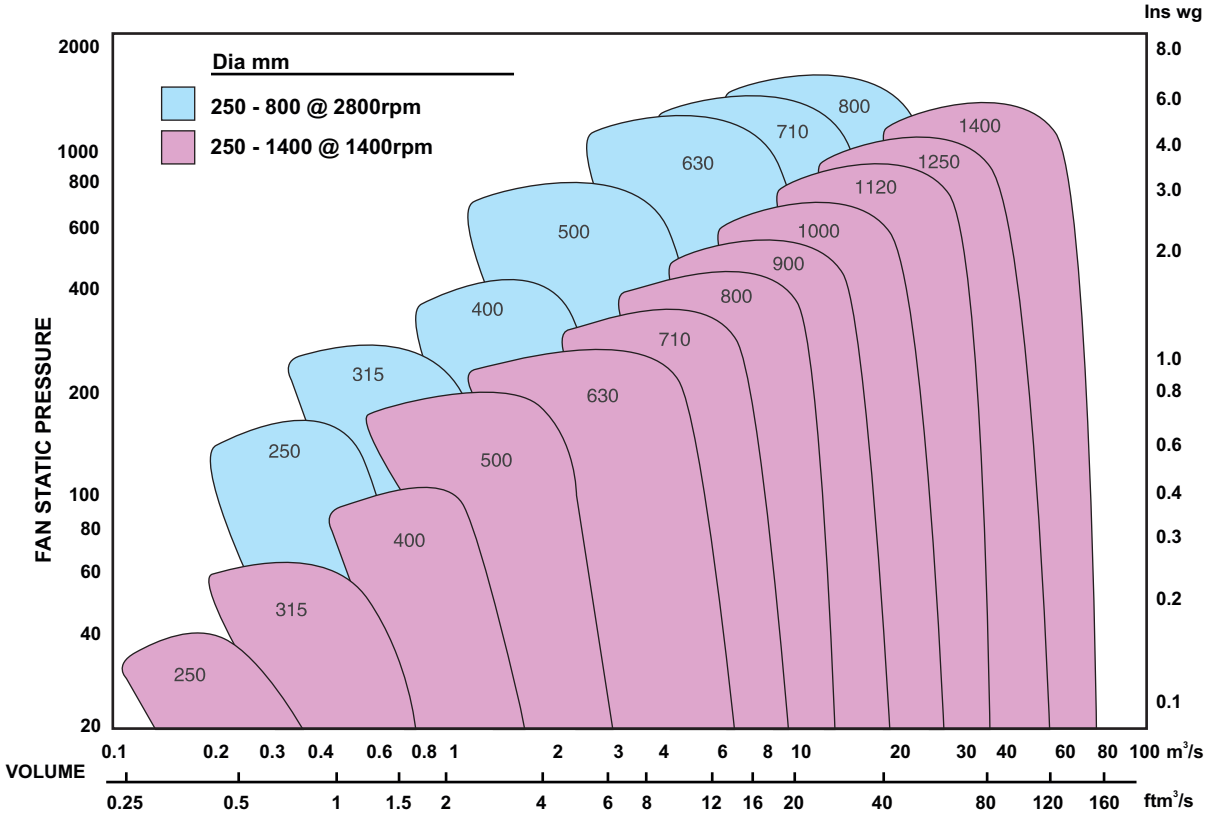
**Whereby:**

- V = Air Volume ($m^3/s$)
- D = Impeller diameter (mm)
- P = Absorbed power (kW)
- N = Noise
- n = Rotation speed (rpm)
- $p_t$ = Total pressure (Pa)
- $p_{st}$ = Static pressure (Pa)
- $p_d$ = Dynamic pressure (Pa)
- $\rho$ = Air density ($kg/m^3$), standard is $1.2kg/m^3$
- v = Air velocity (m/s)
- $\eta$ = Efficiency (%)
- $\pi$ = 3.14

# PERFORMANCE CURVES

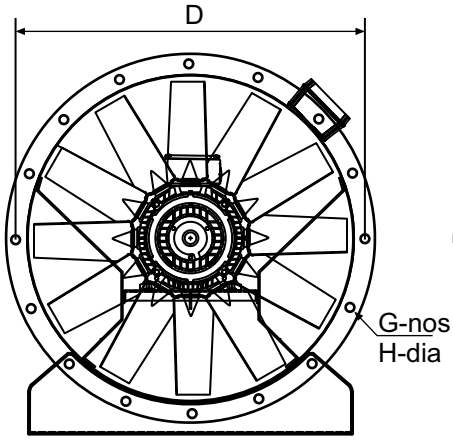
## MORE DETAILED CURVES AVAILABLE ON REQUEST

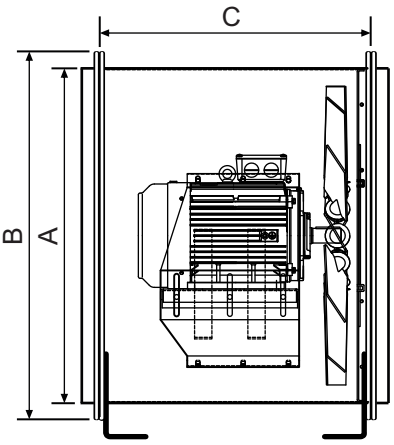



Fan tested in accordance with BS848:Part1:1985 and ISO 5801. There is a policy of continous product improvement, and the right is reserved to revise product information without prior notice.

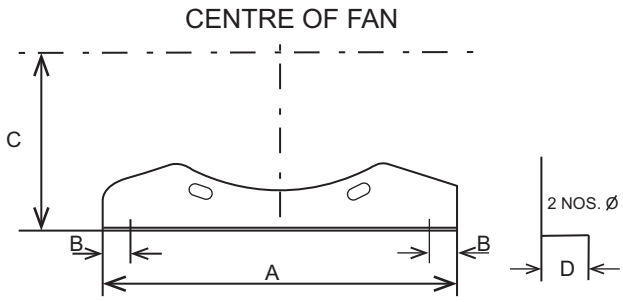
## Dimension Information



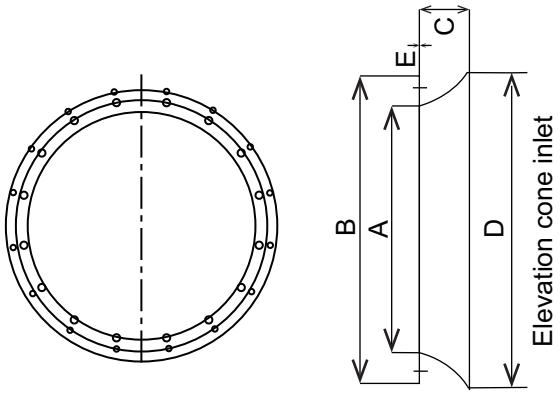

| Model | Motor Frame | A | B | C | D | G-nos | H-Dia | Weight (kg) |
|---|---|---|---|---|---|---|---|---|
| **LC 315** | D71-90 | 315 | 395 | 400 | 366 | 8 | 10 | 45 |
| **LC 355** | D71-90 | 355 | 435 | 400 | 405 | 8 | 12 | 50 |
| **LC 400** | D71-100 | 400 | 485 | 400 | 450 | 8 | 12 | 55 |
| **LC 450** | D71-112 | 450 | 530 | 400 | 497 | 8 | 12 | 80 |
| **LC 500** | D71-112 | 500 | 585 | 500 | 550 | 12 | 12 | 90 |
| **LC 560** | D71-112 | 560 | 660 | 500 | 629 | 12 | 12 | 100 |
| **LC 630** | D71-112 | 630 | 730 | 600 | 698 | 12 | 12 | 120 |
| **LC 710** | D100-112 | 710 | 810 | 600 | 775 | 16 | 12 | 150 |
| | D132 | | | | | | | 190 |
| **LC 800** | D100-112 | 800 | 900 | 700 | 861 | 16 | 14 | 180 |
| | D132 | | | | | | | 220 |
| **LC 900** | D100-112 | 900 | 1000 | 700 | 960 | 16 | 14 | 200 |
| | D132-160 | | | | | | | 250-310 |
| **LC 1000** | D132 | 1000 | 1100 | 850 | 1060 | 16 | 14 | 350 |
| | D160-180 | | | | | | | 420-500 |
| **LC 1120** | D160-180 | 1120 | 1220 | 1000 | 1192 | 20 | 18 | 560-670 |
| | D200 | | | | | | | 750 |
| **LC 1250** | D160-180 | 1250 | 1350 | 1000 | 1337 | 20 | 18 | 610-720 |
| | D200 | | | | | | | 800 |
| **LC 1400** | D160-200 | 1400 | 1500 | 1000 | 1474 | 20 | 18 | 750-950 |
| | D225-250 | | | 1200 | | | | 1250-1450 |
| **LC 1600** | D160-200 | 1600 | 1700 | 1000 | 1675 | 24 | 18 | 900-1100 |
| | D225-250 | | | 1200 | | | | 1350-1550 |

## Accessories



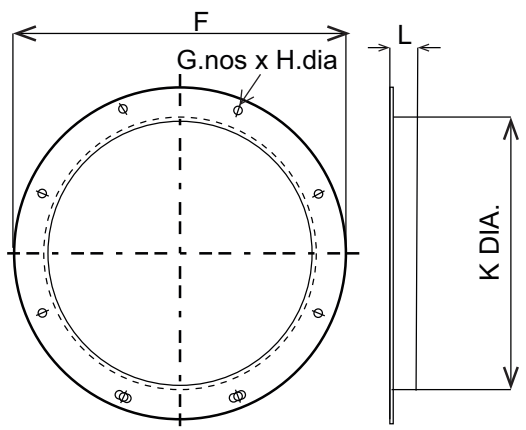

| Size | A | B | C | D | Ø | Wt (kg) |
|---|---|---|---|---|---|---|
| **315** | 365 | 25 | 220 | 50 | 12 | 0.5 |
| **355** | 405 | 25 | 240 | 50 | 12 | 0.8 |
| **400** | 450 | 25 | 260 | 50 | 12 | 1.0 |
| **450** | 500 | 25 | 280 | 50 | 12 | 1.2 |
| **500** | 550 | 25 | 315 | 60 | 12 | 1.5 |
| **560** | 610 | 25 | 345 | 60 | 14 | 2.0 |
| **630** | 680 | 30 | 400 | 75 | 14 | 2.5 |
| **710** | 785 | 30 | 450 | 75 | 14 | 3.0 |
| **800** | 875 | 30 | 500 | 75 | 14 | 5.5 |
| **900** | 975 | 30 | 580 | 75 | 18 | 8.0 |
| **1000** | 1075 | 30 | 630 | 75 | 18 | 10.0 |
| **1120** | 1220 | 30 | 690 | 75 | 18 | 12.0 |
| **1250** | 1350 | 50 | 737 | 95 | 20 | 14.0 |

All dimensions in mm.




| Size | A | B | C | D | E | Wt (kg) |
|---|---|---|---|---|---|---|
| **315** | 315 | 395 | 125 | 420 | 2.0 | 3.0 |
| **355** | 355 | 435 | 125 | 470 | 2.0 | 3.5 |
| **400** | 400 | 485 | 135 | 520 | 2.0 | 4.0 |
| **450** | 450 | 530 | 135 | 570 | 2.0 | 4.5 |
| **500** | 500 | 585 | 150 | 630 | 2.0 | 5.0 |
| **560** | 560 | 660 | 150 | 710 | 2.0 | 6.0 |
| **630** | 630 | 730 | 150 | 780 | 3.0 | 8.0 |
| **710** | 710 | 810 | 200 | 860 | 3.0 | 10.0 |
| **800** | 800 | 900 | 200 | 980 | 3.0 | 12.0 |
| **900** | 900 | 1000 | 250 | 1080 | 3.0 | 18.0 |
| **1000** | 1000 | 1100 | 250 | 1200 | 3.0 | 25.0 |
| **1120** | 1120 | 1220 | 300 | 1320 | 3.0 | 30.0 |
| **1250** | 1250 | 1350 | 300 | 1450 | 3.0 | 35.0 |

All dimensions in mm.

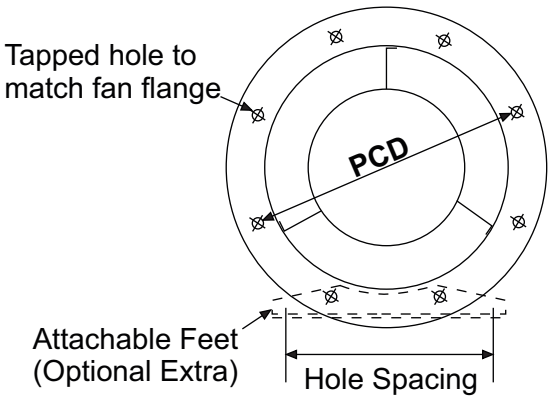


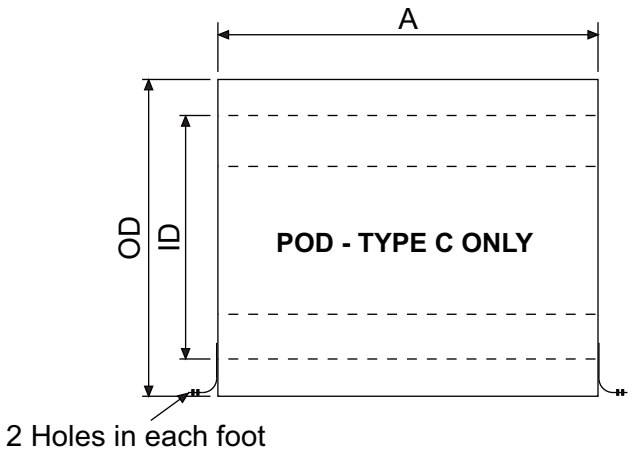

| Size | G.nos | H.Dia | J | F | K | L | Wt (kg) |
|---|---|---|---|---|---|---|---|
| **315** | 8 | 10 | 355 | 395 | 315 | 50 | 2.0 |
| **355** | 8 | 12 | 395 | 435 | 355 | 50 | 2.5 |
| **400** | 8 | 12 | 450 | 485 | 400 | 50 | 3.0 |
| **450** | 8 | 12 | 500 | 530 | 450 | 50 | 3.5 |
| **500** | 12 | 12 | 560 | 585 | 500 | 60 | 4.0 |
| **560** | 12 | 12 | 620 | 660 | 560 | 60 | 4.5 |
| **630** | 12 | 12 | 690 | 730 | 630 | 60 | 5.0 |
| **710** | 16 | 12 | 770 | 810 | 710 | 60 | 6.0 |
| **800** | 16 | 14 | 860 | 900 | 800 | 70 | 7.0 |
| **900** | 16 | 14 | 970 | 1000 | 900 | 70 | 8.0 |
| **1000** | 16 | 14 | 1070 | 1100 | 1000 | 70 | 9.0 |
| **1120** | 20 | 18 | 1190 | 1220 | 1120 | 70 | 10.0 |
| **1250** | 20 | 18 | 1320 | 1350 | 1250 | 70 | 12.0 |

All dimensions in mm.

* Dimensions shown are approximate only. The details please contact local sales office for more information.

## Type B & C Silencers




The above silencers give the approximate dB(A) reductions:

B Type diameter length -7 to 10 dB(A)

C Type 1 diameter length -12 to 15 dB(A)

For full acoustic details contact with London Fan or Breeze Industrial Ventilation Joint Stock Company.

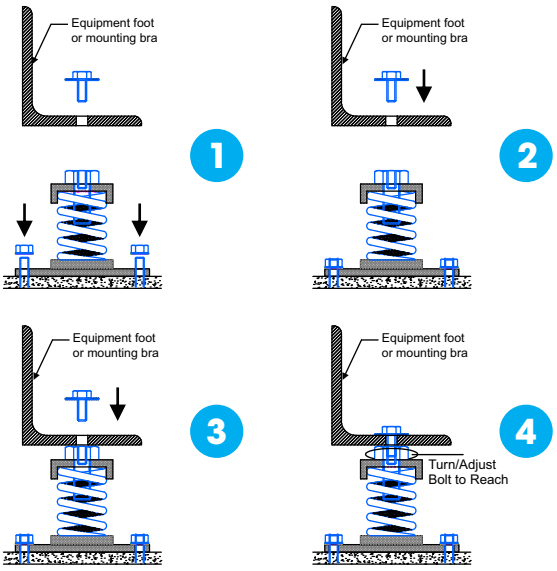
## Dimensions and Weights

| mm | Dimension (mm) | | | | | | | | Weight (kg) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size (D) | OD | No of Holes | PCD | Thread | Mounting Foot Holes | | A Length | | B | | C | |
| | | | | | Dia | Spacing | 1D | 2D | 1D | 2D | 1D | 2D |
| **280** | 385 | 4 | 320 | M8 | 10 | 230 | 280 | 560 | 9 | 14 | - | - |
| **315** | 415 | 8 | 355 | M8 | 10 | 265 | 315 | 630 | 10 | 17 | 13 | 19 |
| **355** | 455 | 8 | 395 | M8 | 10 | 305 | 355 | 710 | 12 | 20 | 15 | 24 |
| **400** | 500 | 8 | 450 | M10 | 10 | 350 | 400 | 800 | 15 | 25 | 18 | 30 |
| **450** | 600 | 8 | 500 | M10 | 10 | 400 | 450 | 900 | 20 | 33 | 24 | 39 |
| **500** | 650 | 12 | 560 | M10 | 10 | 450 | 500 | 1000 | 25 | 41 | 29 | 48 |
| **560** | 710 | 12 | 620 | M10 | 10 | 510 | 560 | 1120 | 30 | 50 | 35 | 58 |
| **630** | 780 | 12 | 690 | M10 | 12 | 580 | 630 | 1260 | 35 | 61 | 42 | 72 |
| **710** | 860 | 16 | 770 | M10 | 10 | 660 | 710 | 1420 | 44 | 76 | 53 | 90 |
| **800** | 1000 | 16 | 860 | M10 | 12 | 750 | 800 | 1600 | 55 | 96 | 66 | 116 |
| **900** | 1100 | 16 | 970 | M12 | 12 | 850 | 900 | 1800 | 70 | 129 | 84 | 150 |
| **1000** | 1200 | 16 | 1070 | M12 | 12 | 950 | 1000 | 2000 | 82 | 157 | 100 | 182 |
| **1120** | 1320 | 20 | 1190 | M12 | 16 | 1070 | 1120 | 2342 | 100 | 211 | 118 | 247 |
| **1250** | 1450 | 20 | 1320 | M12 | 16 | 1150 | 1250 | 2602 | 127 | 266 | 147 | 306 |
| **1400** | 1600 | 20 | 1470 | M12 | 16 | 1300 | 1400 | 2902 | 199 | 399 | 220 | 453 |
| **1600** | 1800 | 24 | 1680 | M16 | 16 | 1500 | 1600 | 3302 | 311 | 637 | 362 | 739 |

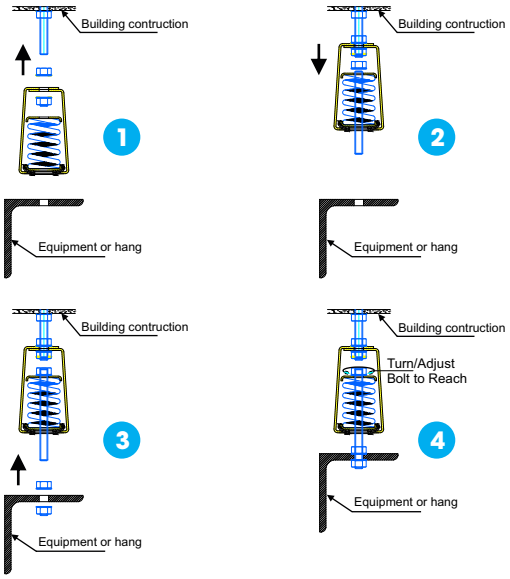
All dimensions in mm.

* Dimensions shown are approximate only. The details please contact local sales office for more information.

## Installation Guide




Mounting Isolators




Hanger Isolators

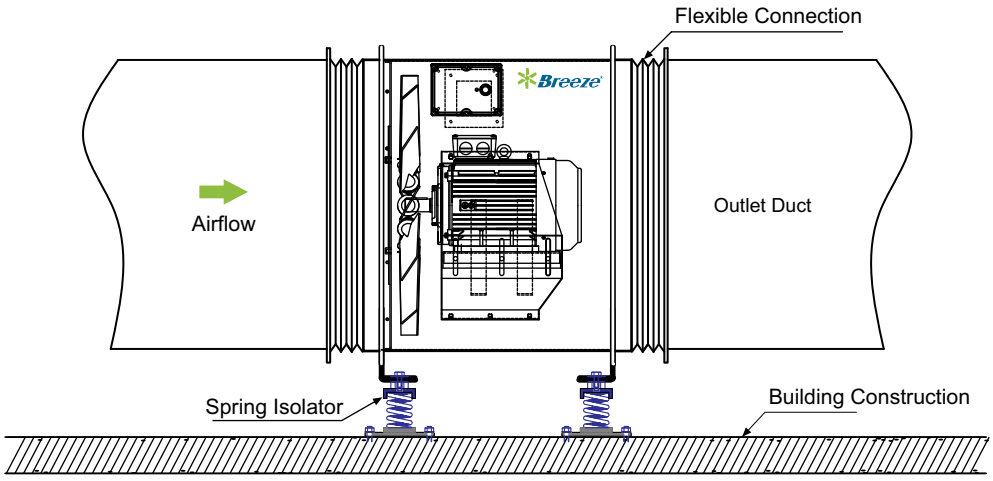



**Fig 01. Mounting type**

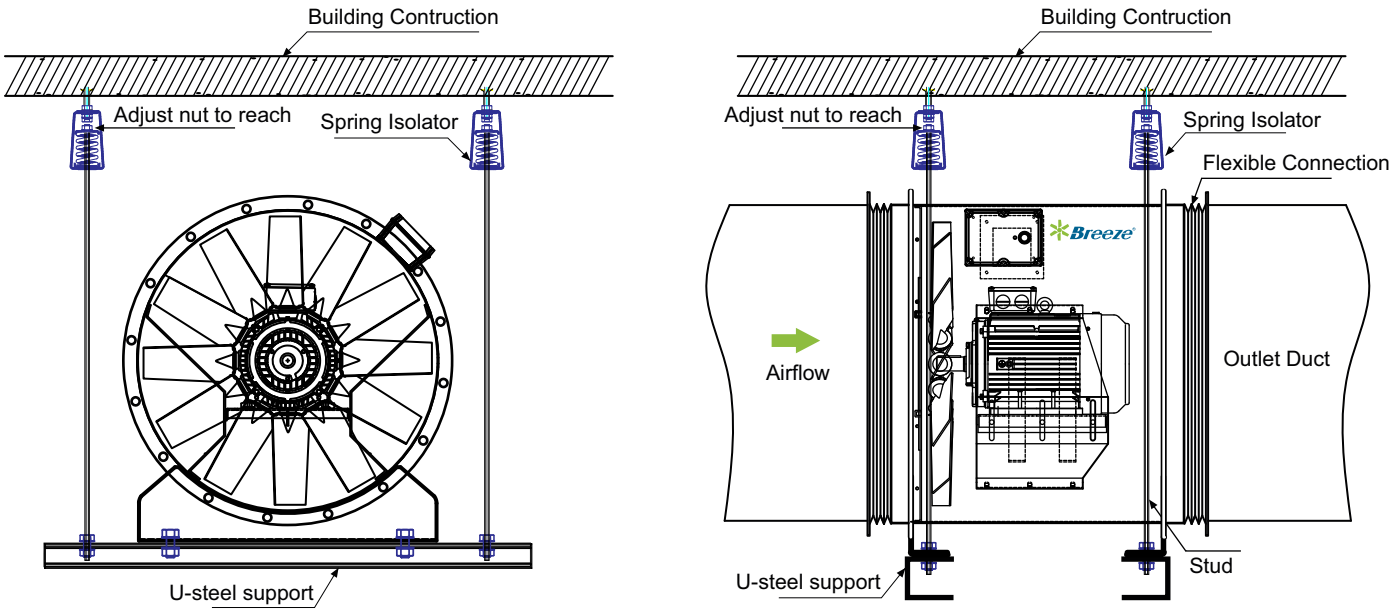



**Fig 02. Hanging type**