

Precise Air Management
High Temperature - Large Tunnel Fans



FläktWoods

High Temperature Fans

Fläkt Woods is the industry leader in air movement technology, providing innovative solutions worldwide. Our extensive knowledge of design and applications is based on over 100 years of experience in tunnels, buildings, industry and original equipment manufacturers. Fläkt Woods' global coverage reaches over 100 countries and is supported by an extensive distribution network.

Our expertise in tunnel ventilation applications covers road and rail tunnels, metros, tunnel construction and wind tunnels. Fläkt Woods' products have been successfully used in underground projects throughout the world and our Large JM product range is unrivalled in its technology, innovation and efficiency.



Ventilation

Ventilation is required for safety and to maintain acceptable temperatures and comfort.

Pollution emitted by trains and road vehicles must be removed to provide an acceptable and safe environment. The heat from a train may need to be removed by forced ventilation in order to ensure that the temperature is acceptable to both people and equipment. In the case of a fire, smoke must be removed in order to enable safe escape and to assist access to fight the fire. The normal ventilation principles are to dilute pollution and to remove the smoke.

The smoke may be removed by creating a reservoir from which it is extracted. Alternatively sufficient velocity is created to drive the smoke to one side.



EN 12101-3 and ISO 21927-3 Certification

Emergency, High Temperature, Smoke Extract Fans fall within the scope of the EU Construction Products Directive.

The implementation of the Construction Products Directive and the publication of the product specific standard, EN 12101-3 have made it a mandatory requirement for smoke control fans sold into the European Union to carry a CE Mark from April 1st, 2005. The CE mark may only be affixed after successful completion of testing, auditing of factory production control and the issue of a certificate by accredited independent authorities.

This procedure is intended to prevent fan failures during an emergency smoke situation, where a fan failure can ultimately lead to the loss of life.

ISO 21927-3 is in accordance with the aims and objectives of the EU's Harmonised Standard EN12101-3 (described above); however, because ISO 21927-3 applies globally, it provides specifications against which powered smoke and heat exhaust ventilators can be evaluated and certified outside EU member states.



Fläkt Woods fully endorse the concept that, in such a safety critical application, only fully verified and certified products should be specified. This made the decision to test and certify this core product range all the more easier.

The decision was made to embark on a major testing programme, the JM HT range was successfully tested in compliance with this demanding new legislation with minimum complications.

The certification of large fans has been made challenging as there were no independent laboratories capable of testing the largest fans. Since 2006, Fläkt Woods have been working with the certifying authorities to built and certify a high temperature facility capable of testing fans up to 3.5meters diameter at up to 400°C.

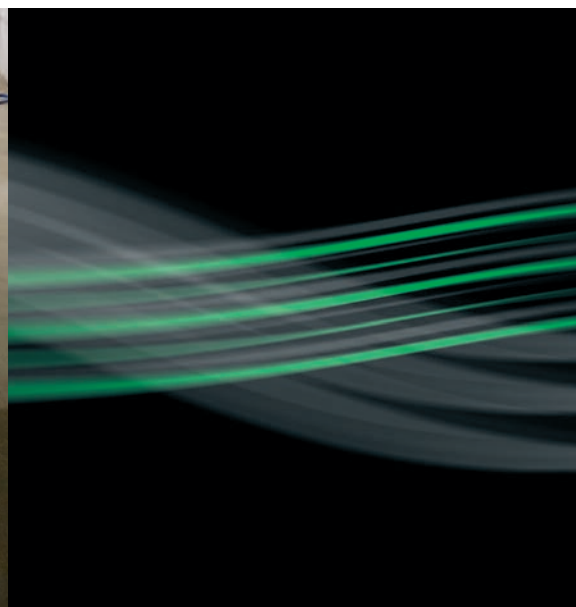
This investment resulted in Fläkt Woods being able to offer a BSI Certified, CE marked JM HT product including 200°C/2 hours, 300°C/2 hours, 400°C/2 hours ranges, in diameter starting at 1400mm up to a maximum of 2800mm at relevant time/temperature categories. Fläkt Woods offers a comprehensive range of approved accessories.

Fläkt Woods have enhanced their position as the foremost provider of specialist products for emergency high temperature smoke control by becoming the first fan manufacturer in the world to be able to apply CE marking to these safety critical products, ensuring that Fläkt Woods has one of the most comprehensive range of products available in the World.

Large JM High Temperature Overview

Fläkt Woods offer the most comprehensive range of fans and accessories for the Tunnel and Metro applications:

- Size range 1.4m to 2.8m with optional non-certified ranges available please enquire
- Guaranteed performance to ISO 5801
- Unidirectional or truly reversible blade sections
- Higher pressure 2 stage fans are available
- High Temperature certification for 200°C, 300°C and 400°C categories
- All impeller components are examined by x-ray to ensure reliability in service
- IEC motors certified to EN 12101-3 and ISO 21927-3
- NEMA motors available, currently being tested to certification ISO 21927-3
- Steel parts hot dip galvanised
- Manufacturer registered and assessed in accordance with BS EN ISO 9001-2000
- Paint finish optional
- Accessories:
 - Guards
 - Condition Monitoring
 - Anti Vibration Mounts
 - Flexible Connectors
 - Bellmouth / Coned Entries
 - Diffusors, Transition Pieces
 - Silencers



Fan Selector

Fan Selector is the selection software for all the Fläkt Woods Group Fan products: Axial Flow Fans (among which are Jet Fans for Tunnels), Centrifugal fans, Boxed Fans, Roof Extract units and Plate mounted fans.

The Fan Selector allows you to choose fans which fit your required application.

How to Register, easy as 1, 2, 3!

All you need to do is register your details on-line and follow the simple instructions shown below.

1. Type in the site link to start the process: <http://fanselector.flaktwoods.com/signup/>
2. Fill in the fields that have red text labels, but if you wish to complete more of the form, this would be helpful.
3. Once you have entered your details, just click the "Register" button at the bottom of the registration page to submit your request.

User Account Set-up

Once a user account has been created, our automatic registration system will send you an e-mail confirming your user name and password. Note: your username will be your e-mail address, so if you have a personal address this would be better than a general one (as this will allow you to personalise our software). The account set-up process is normally completed between 24-48 hours after your initial password confirmation.

Desktop CD

Should you prefer to use the Desktop version of the software (which is locally installed onto your computer's hard drive), then this is available on request. All you need to do is to advise your full postal address and we would be happy to mail a CD to you.

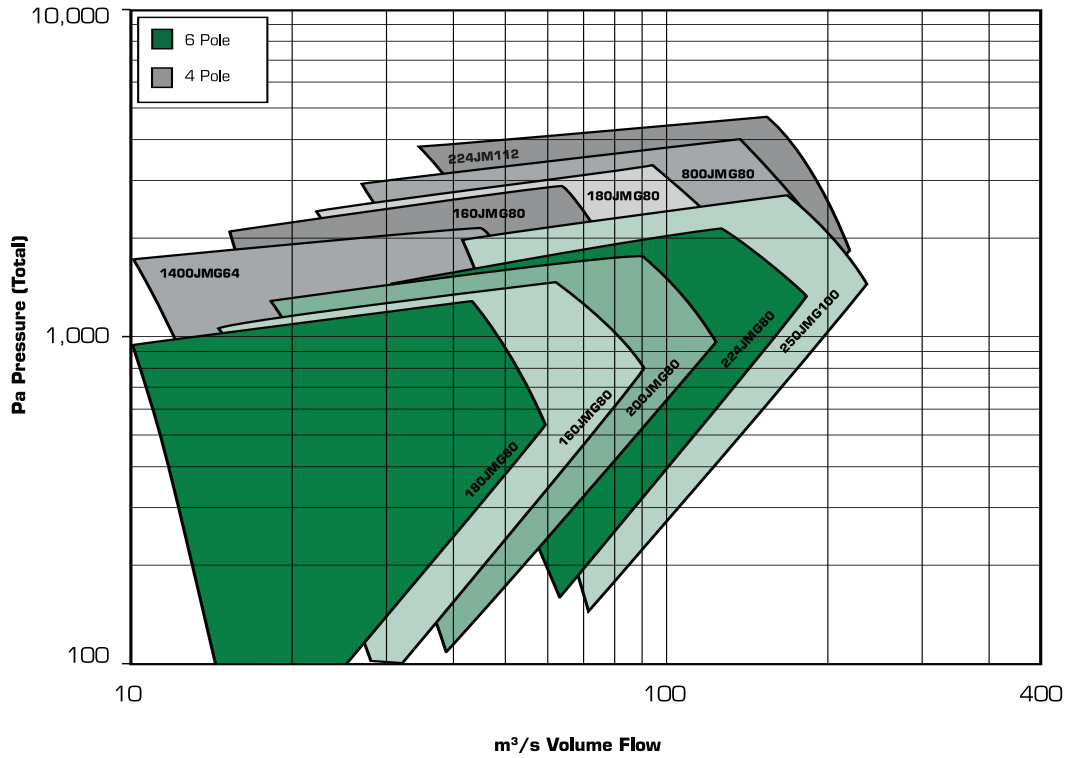
Link to the On-Line Fan Selector: <http://fanselector.flaktwoods.com>

1. After logging in, the first screen displayed allows the selection of axial fans, identify and click 'select' to continue.
2. The next screen displays the various types of axial fans, therefore it is necessary to filter the selection by clicking 'product filter' and 'edit'.
3. The desired flow and pressure can be input to identify suitable fans. Other filters can be adjusted so that the desired fan is identified.
4. Each fan can be highlighted and technical information made available

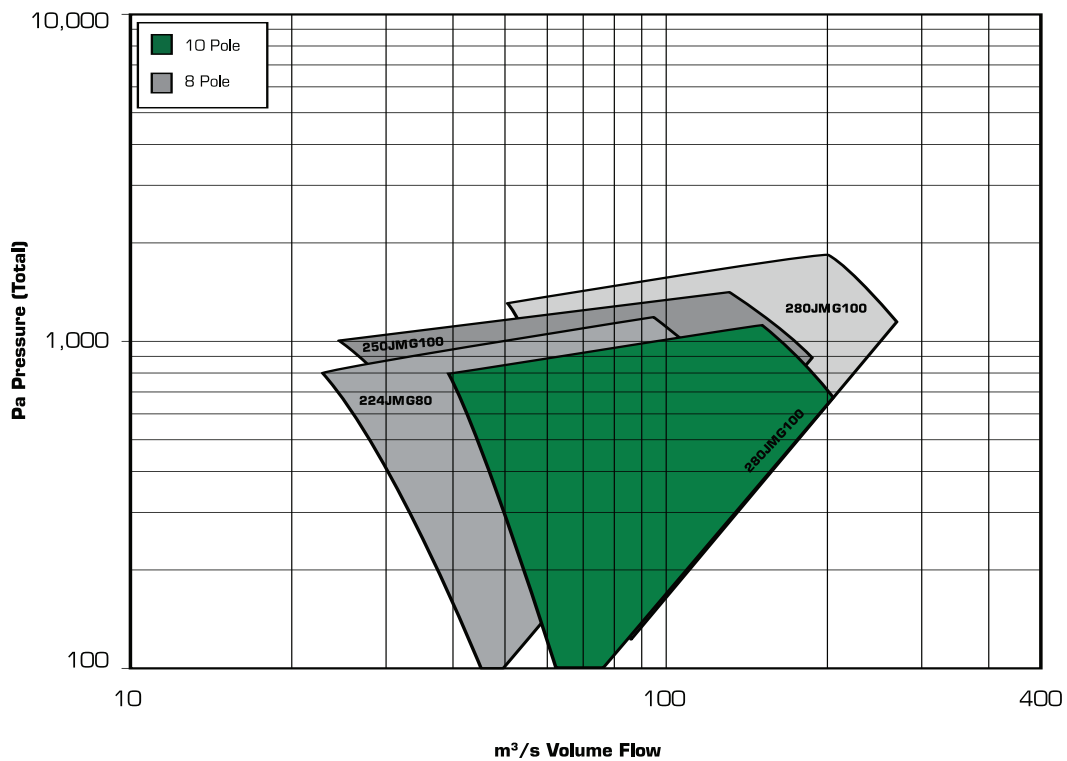


Selection Curves F300

Unidirectional 50Hz 4 & 6 Pole

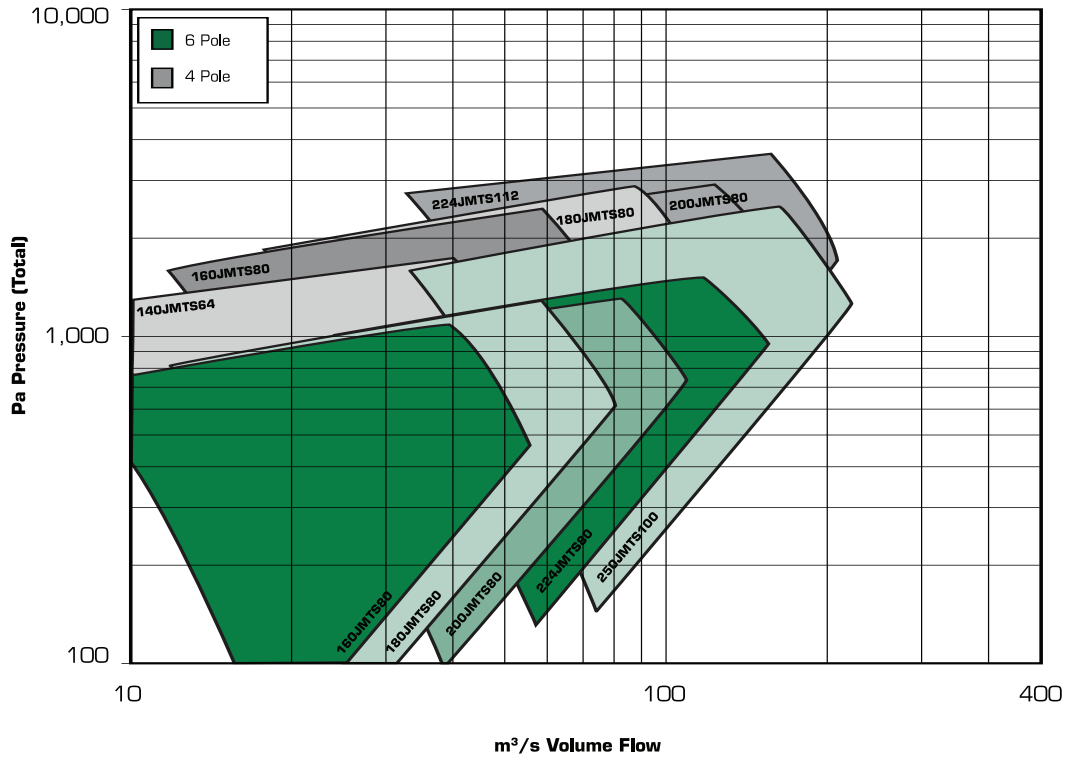


Unidirectional 50Hz 8 & 10 Pole

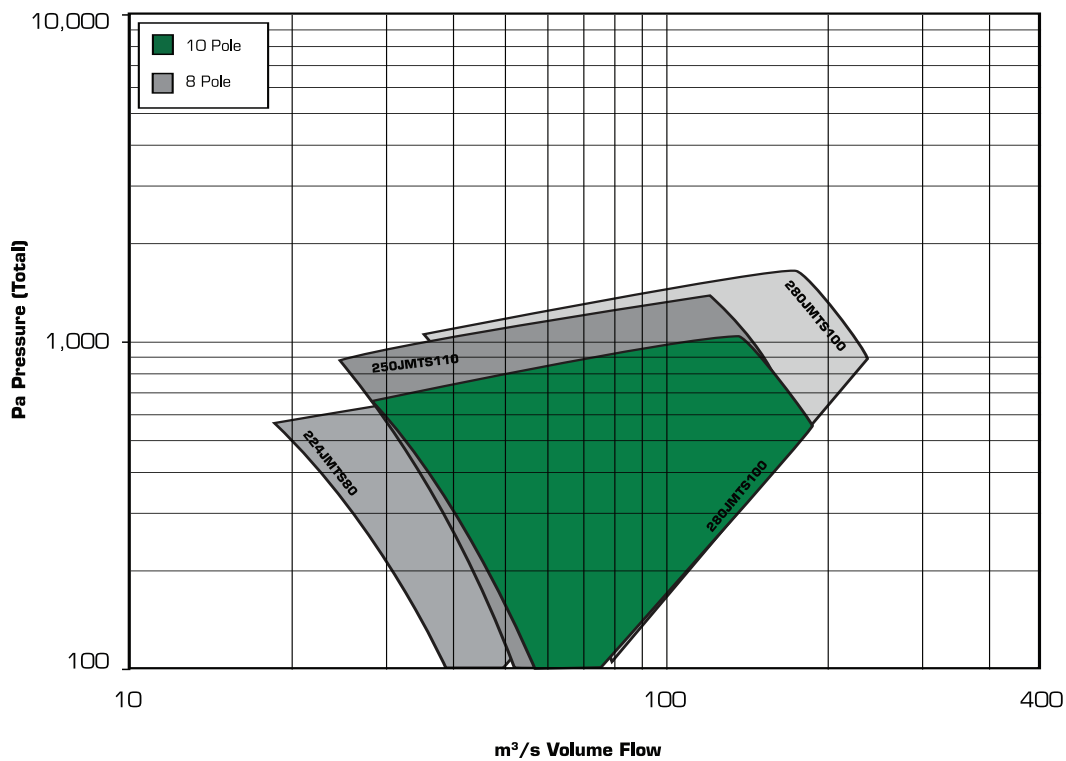


Selection Curves F300

Truly Reversible 50Hz 4 & 6 Pole

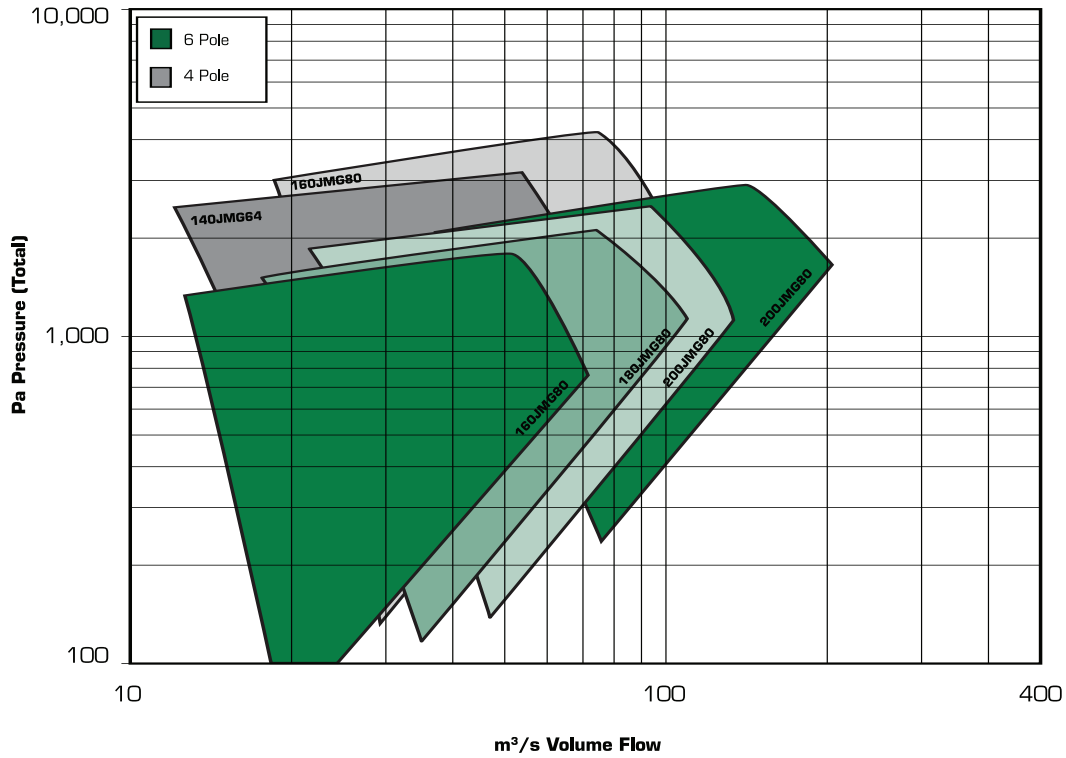


Truly Reversible 50Hz 8 & 10 Pole

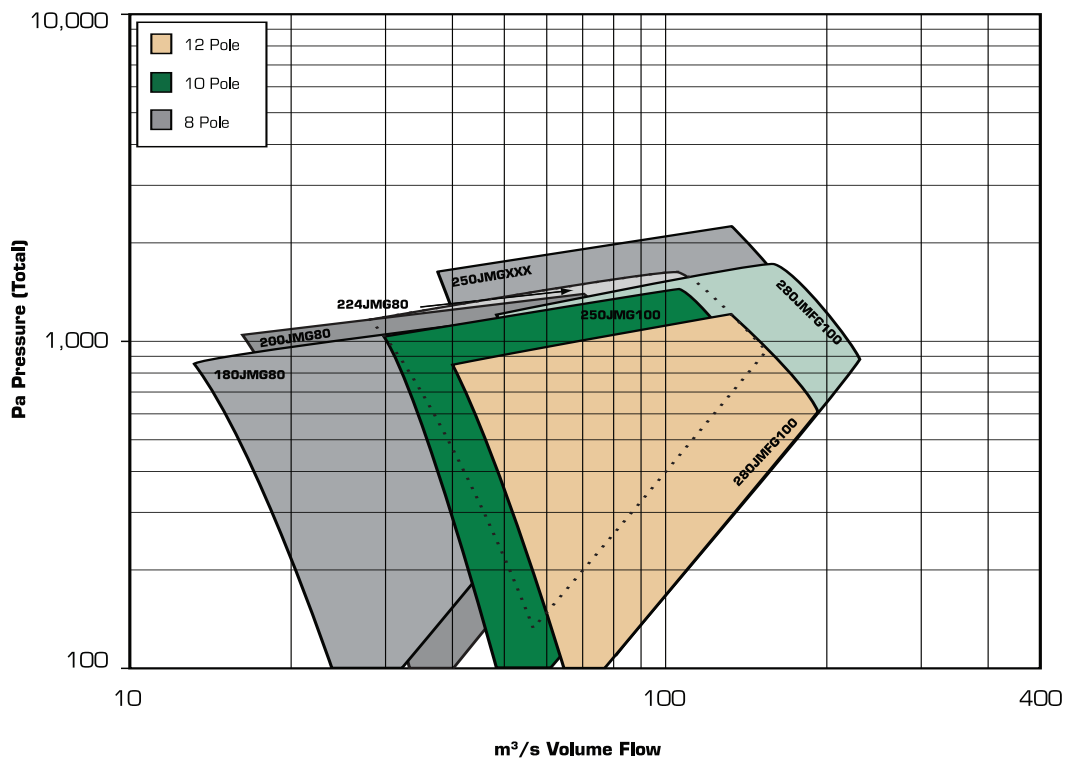


Selection Curves F300

Unidirectional 60Hz 4 & 6 Pole

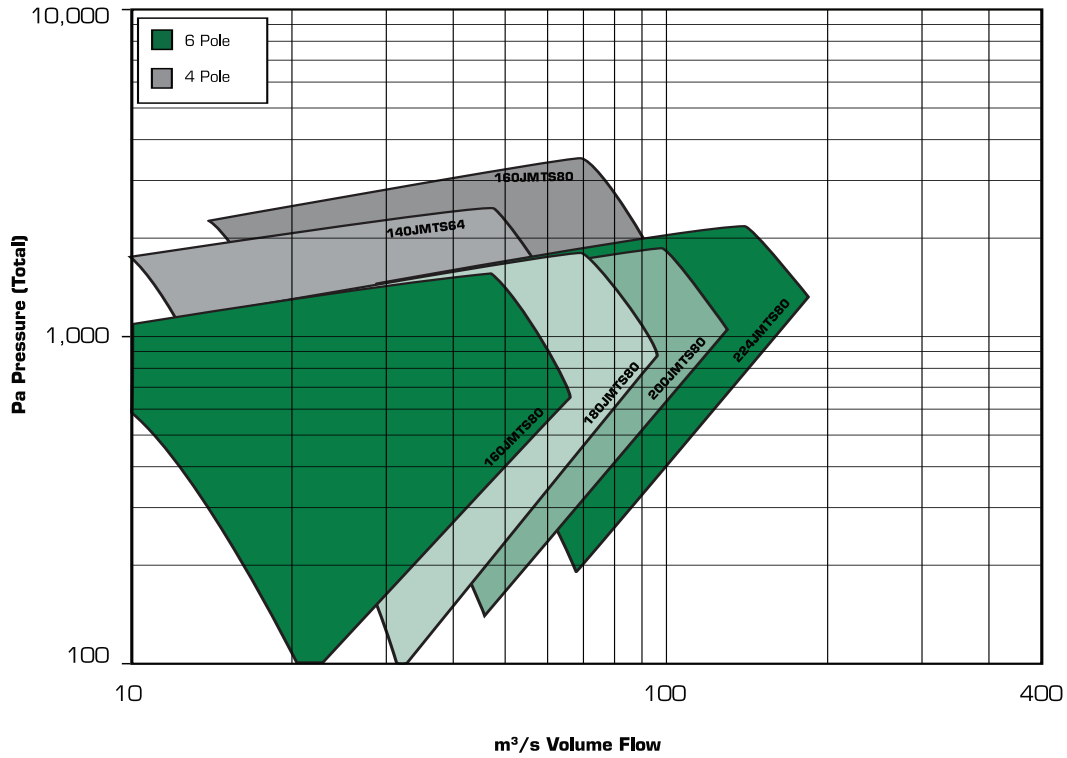


Unidirectional 60Hz 8, 10 & 12 Pole

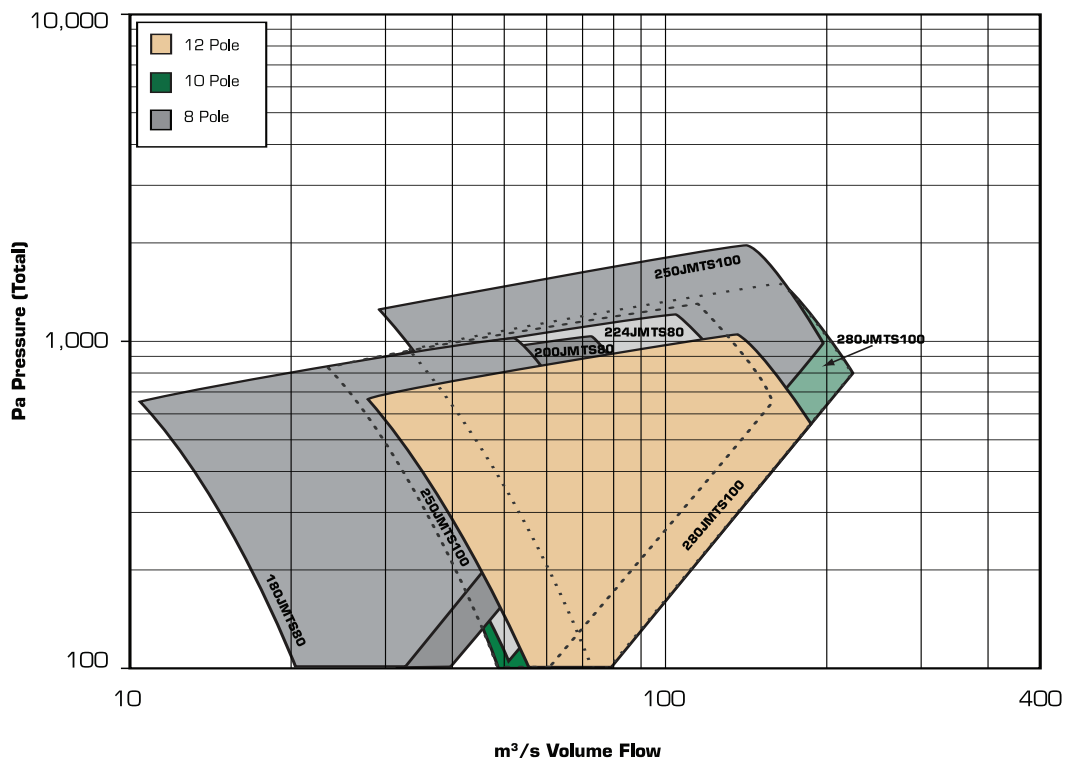


Selection Curves F300

Truly Reversible 60Hz 4 & 6 Pole

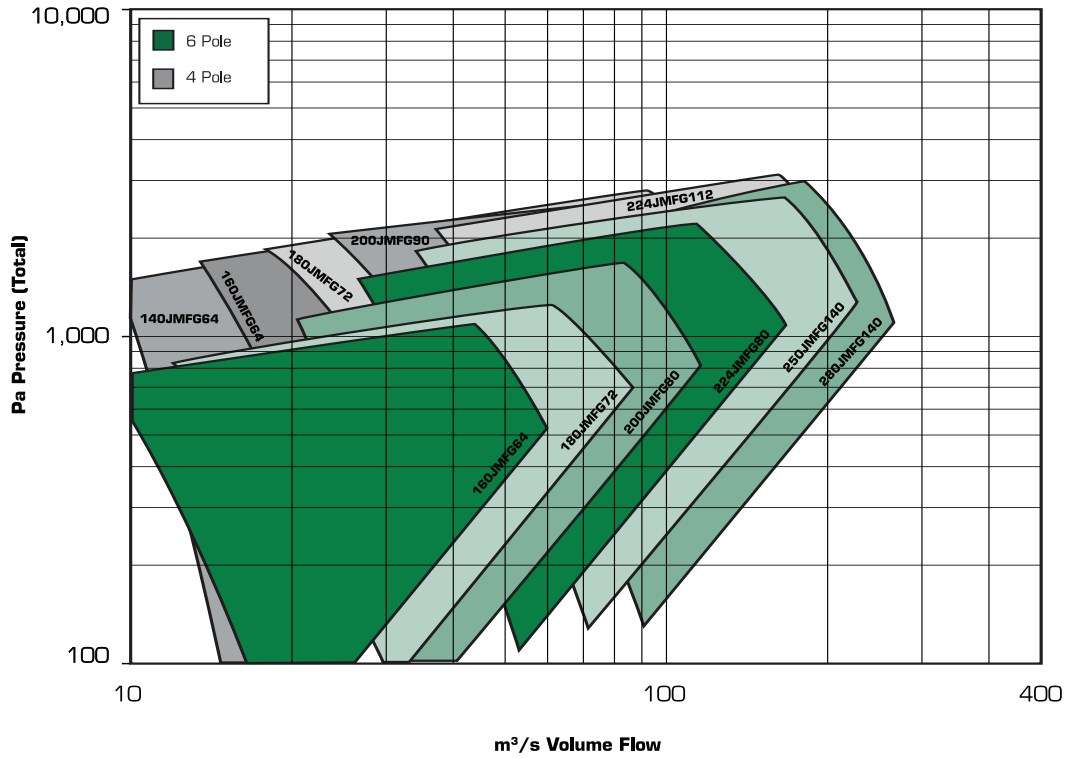


Truly Reversible 60Hz 8 & 10 Pole

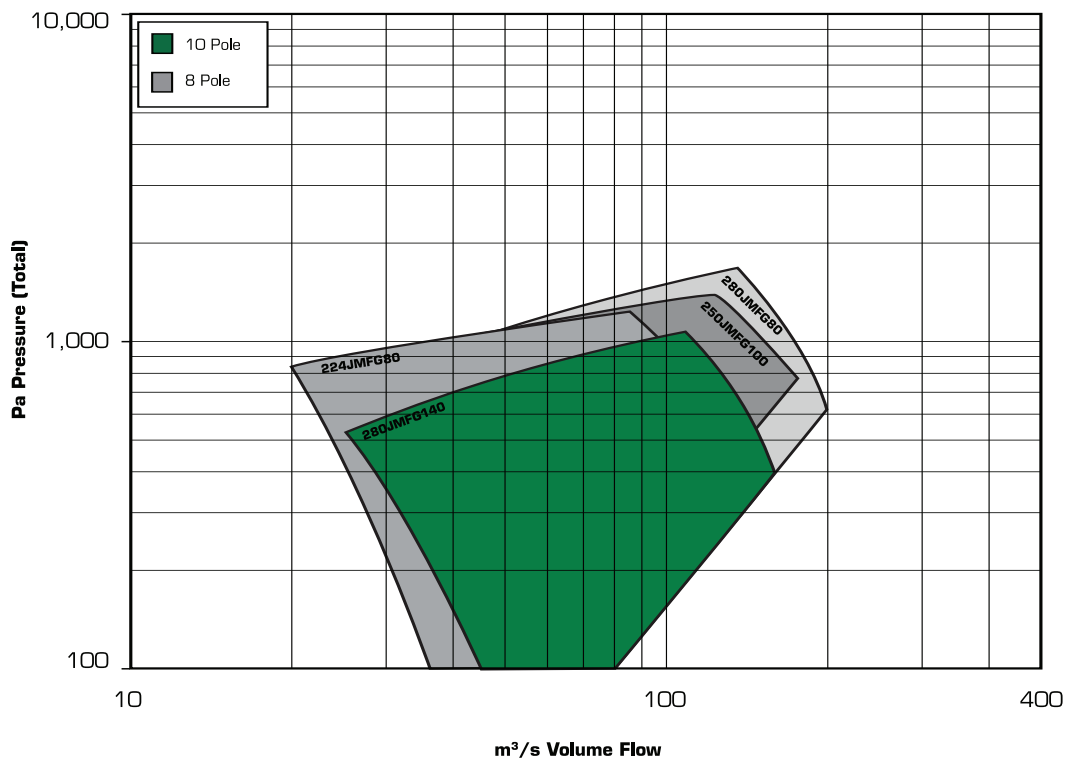


Selection Curves F400

Unidirectional 50Hz 4 & 6 Pole

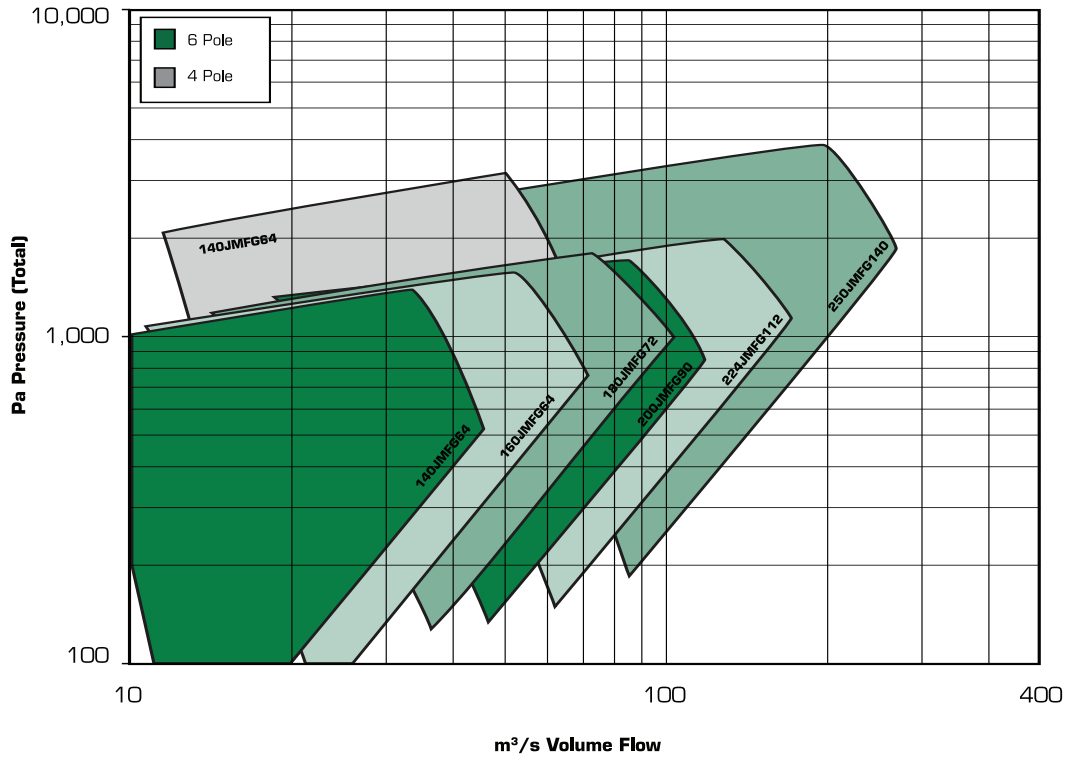


Unidirectional 50Hz 8 & 10 Pole

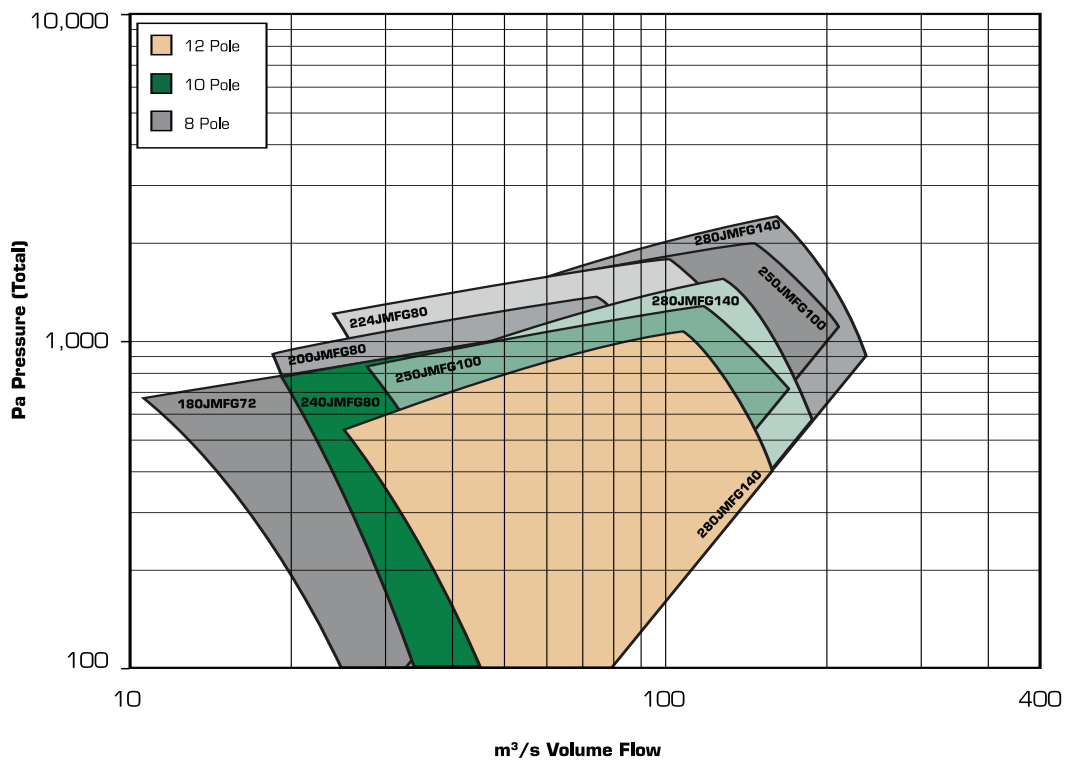


Selection Curves F400

Unidirectional 60Hz 4 & 6 Pole

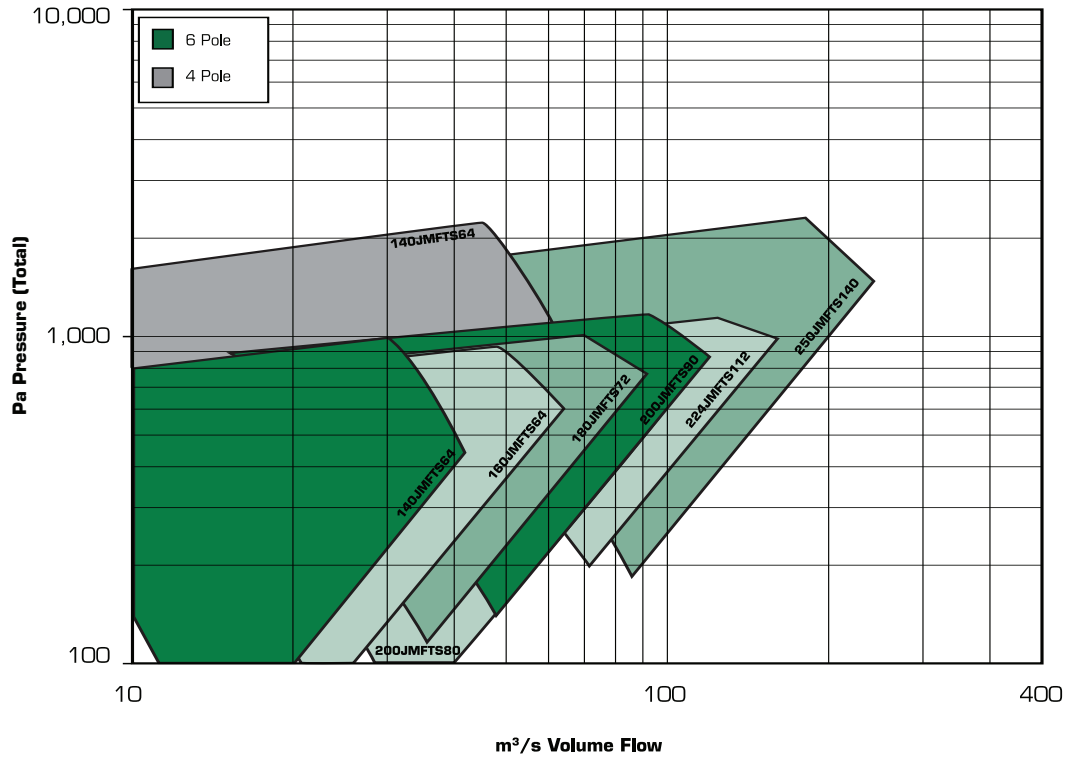


Unidirectional 60Hz 8, 10 & 12 Pole

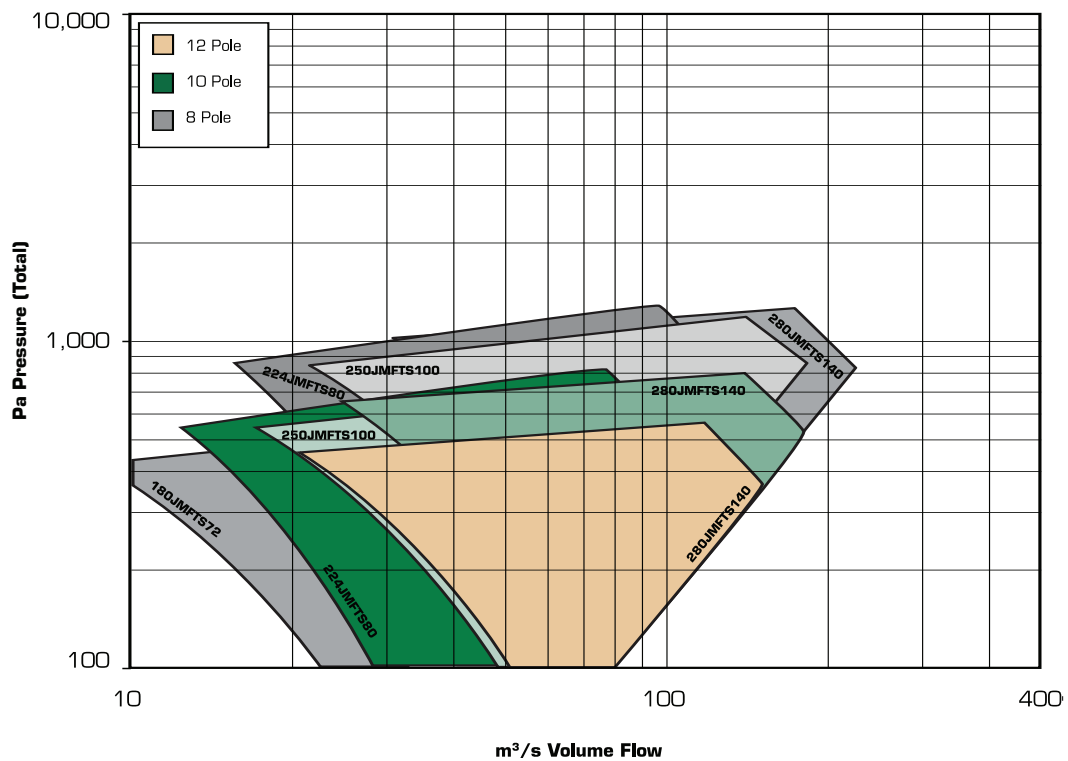


Selection Curves F400

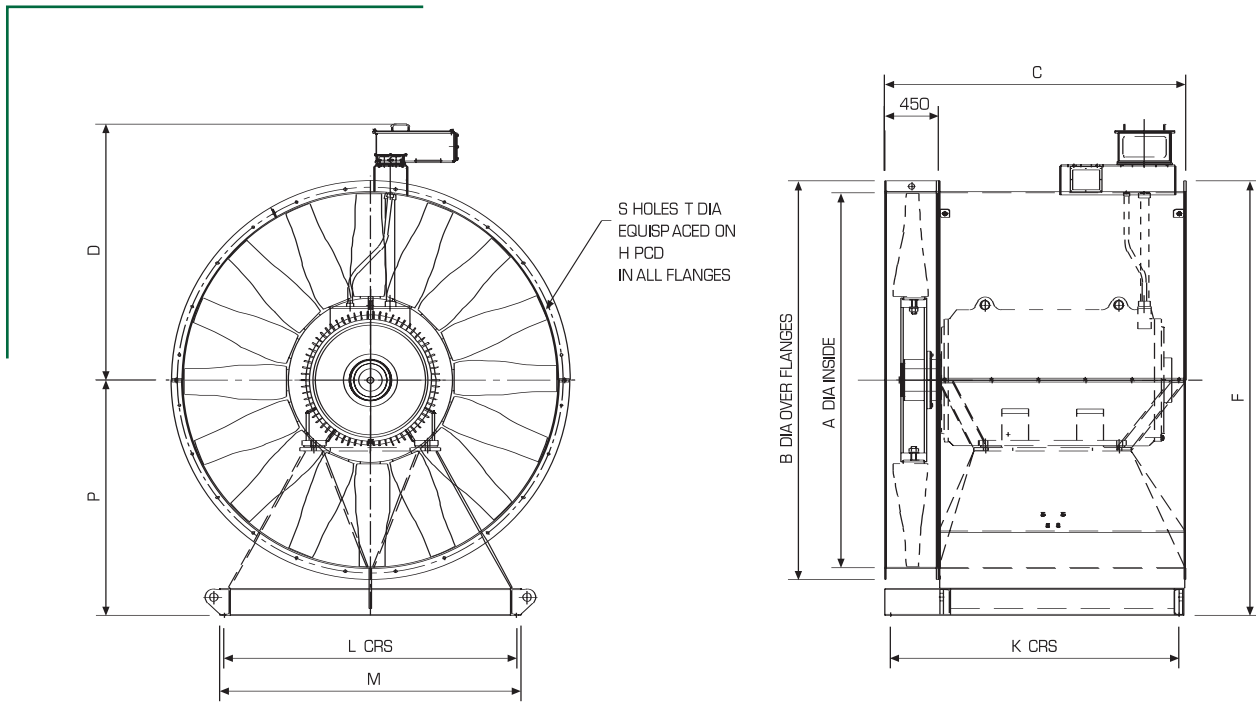
Truly Reversible 60Hz 4 & 6 Pole



Truly Reversible 60Hz 8, 10 & 12 Pole



Dimensions and Weights - Horizontal Mounting



Fan Dia	A	B	C MAX	D MAX	F	K CRS	L CRS	M	P	H PCD	S	T	Max Fan Weight Less Motor (kg)
1400	1400	1538	2050	1050	1670	1700	1300	1400	900	1470	20	15	1400
1600	1600	1760	2050	1150	1962	1700	1454	1600	1082	1680	24	18	1765
1800	1800	1960	2050	1250	2162	1700	1500	1800	1182	1880	24	18	1785
2000	2000	2160	2050	1350	2418	1700	1630	2000	1330	2080	24	18	1850
2240	2240	2415	2050	1470	2658	1700	1830	2200	1450	2320	24	18	2000
2500	2500	2716	2650	1700	2968	2500	1940	2000	1610	2580	24	18	3700
2800	2800	3055	2650	1850	3288	2500	2190	2250	1760	2880	24	18	4170

The motor is sized for the highest absorbed power of the curve. The motor rating may be established by the calculation shown below:

Unidirectional fans: Motor power (kW) = Flow (m³/s)*total pressure (Pa)*0.0015

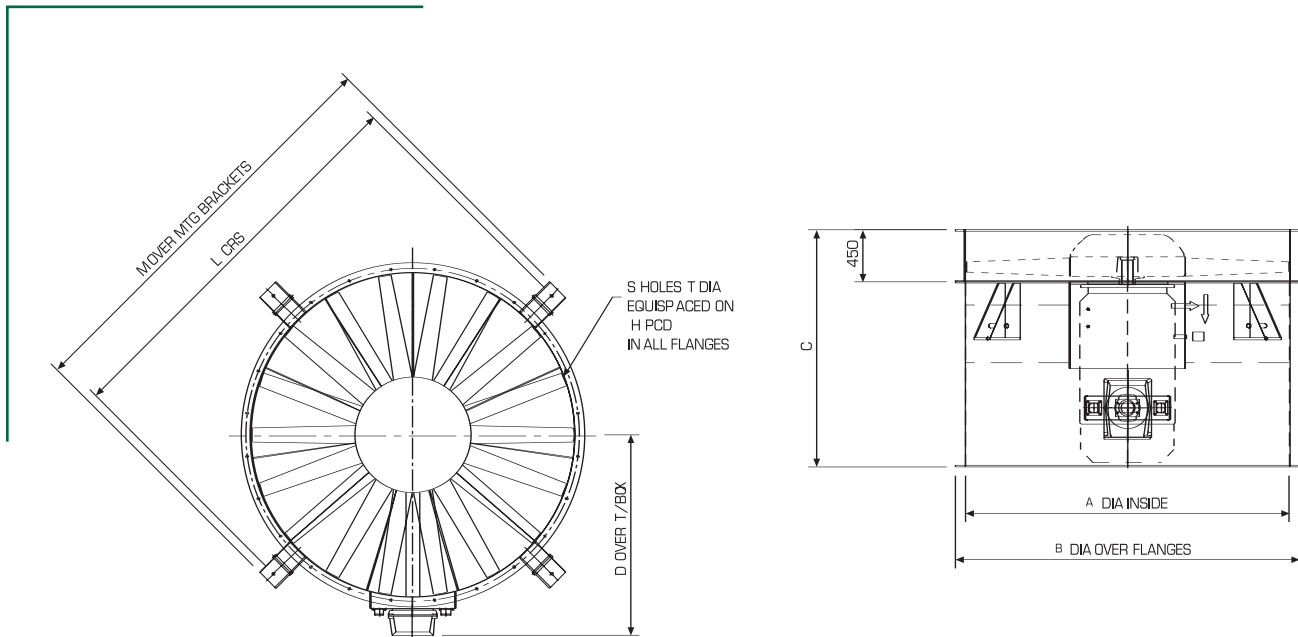
Truly reversible fans: Motor power (kW) = Flow (m³/s)*total pressure (Pa)*0.0017

F300 & F400 Motors Weight (kg)

Motor Power (kW)	50 Hz	55	75	90	110	132	160	200	250	315	355	400	450	500	560
	60 Hz	63	86	103	126	152	184	230	287	362	408	460	517	575	644
4 poles	446	720	756	900	1007	1000	1525	1651	1835	1865	2140	2140	2500	3200	
6 poles	645	830	930	1000	1150	1520	1754	1916	2180	2500	2900	3150	3300	3400	
8 poles	830	930	1021	1390	1520	1680	1820	2180	2600	3200	3400				

Note: More powerful motors are available.

Dimensions and Weights - Vertical Mounting



Fan Dia	A	B	C MAX	D MAX	L CRS	M	H PCD	S	T	Max Fan Weight Less Motor (kg)
1400	1400	1560	2050	1050	1750	2000	1470	20	15	2000
1600	1600	1760	2050	1150	1950	2200	1680	24	18	2365
1800	1800	1960	2050	1250	2250	2400	1880	24	18	2425
2000	2000	2160	2050	1350	2500	2650	2080	24	18	2500
2240	2240	2415	2050	1470	2840	3000	2320	24	18	2720
2500	2500	2716	2650	1700	3100	3250	2580	24	18	4620
2800	2800	3055	2650	1850	3400	3650	2880	24	18	5220

The motor is sized for the highest absorbed power of the curve. The motor rating may be established by the calculation shown below:

Unidirectional fans: Motor power (kW) = Flow (m³/s)*total pressure (Pa)*0.0015

Truly reversible fans: Motor power (kW) = Flow (m³/s)*total pressure (Pa)*0.0017

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6 poles	645	830	930	1000	1150	1520	1754	1916	2180	2500	2900	3150	3300	3400	
8 poles	830	930	1021	1390	1520	1680	1820	2180	2600	3200	3400				

Note: More powerful motors are available.

Accessories and Additional Features

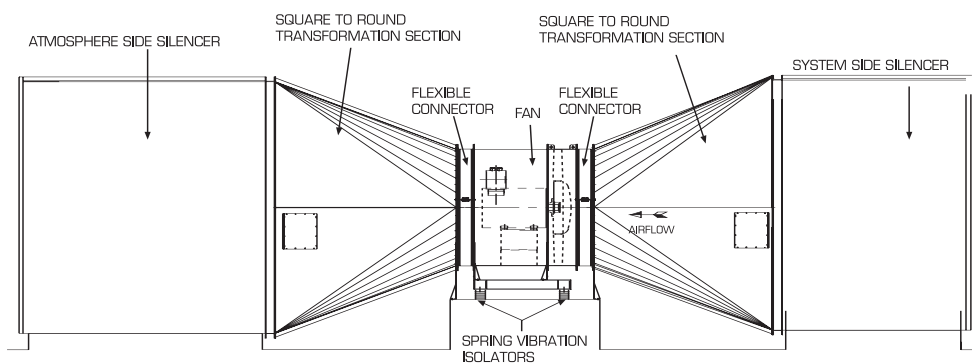
Inlet Cone		Inlet Wire Guard	
Flexible Sleeves and Matching Flanges		Anti Vibration Mountings	
Diffusors		Transitions Pieces	

Attenuators

Fläkt Woods has over 50 years experience in sound control engineering and can assess and design attenuators to meet sound attenuation on both system and atmospheric sides. Attenuators can be provided as complete units, modules and splitter only to suit concrete shafts and housings. Airways velocity above 8m/s should be avoided to limit system pressure and noise generation.

Product Accessories

Such as inlet cones, guards, flexible connectors and anti-vibration mountings are available for further information please enquire.



Typical Installation - Horizontal Airflow

Accessories and Additional Features

Dampers

Key to the control and operation of many ventilation systems are control dampers. These should normally be sized on an airway velocity of 8m/s or below in order to avoid excessive system pressure and excess sound generation. Physical support must be designed in to accept both static and dynamic loading.

Vibration/Condition Monitoring

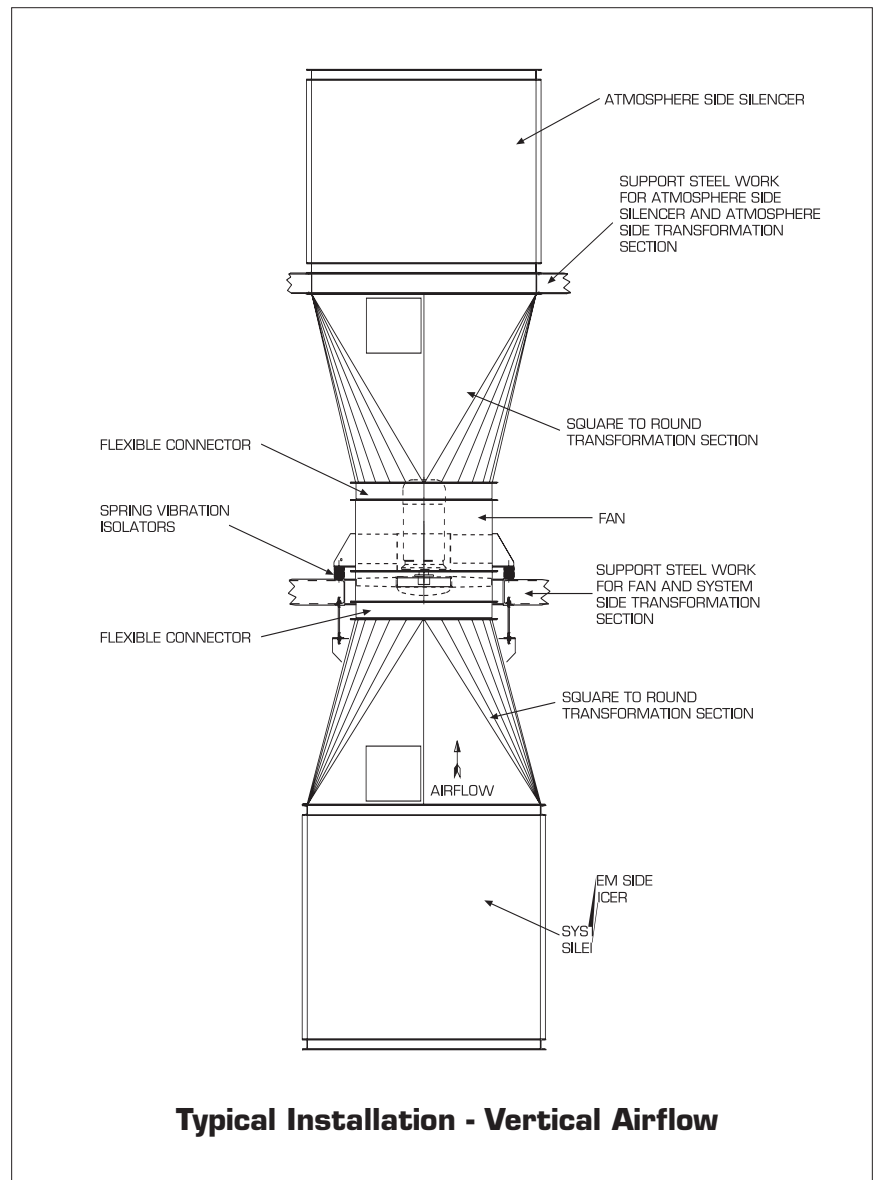
Principle operating monitoring systems are available on the fans to minimise risks of breakdown and enable programmed maintenance to be effectively planned. Options include bearing vibration and temperature systems. Bearing condition monitoring and motor winding condition. We will be pleased to discuss the best choice for your application.

Motor Starters/Inverter Drives

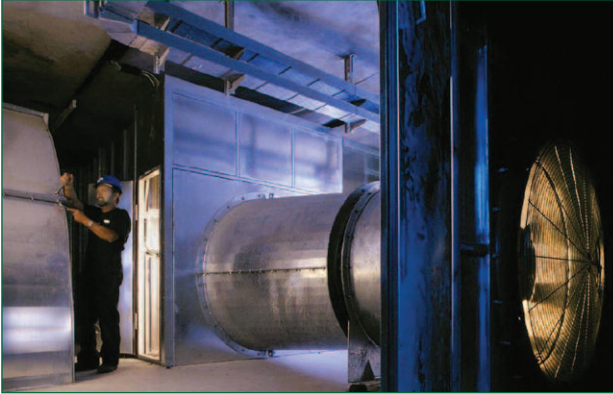
Drive systems can be supplied and specified through Fläkt Woods to match the operating characteristics of the fan drives and ensure compatibility of the complete package. Interfacing with key control and management systems are principle specification requirements.

After Sales Service

Fläkt Woods Service and Repair Division offer a full range of site support activity that includes routine monitoring site surveys and service contracts. Please contact Colchester for further details.



Reference List

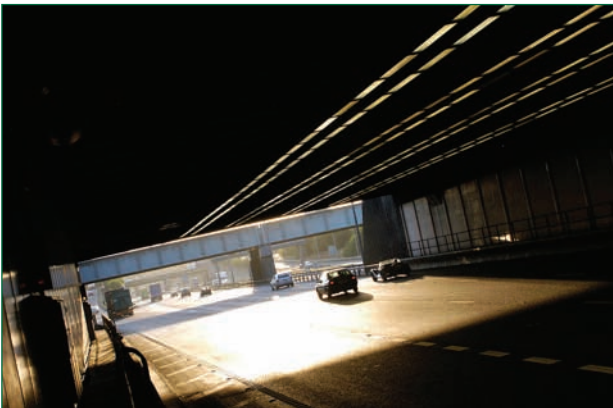


Athens Metro
Greece

Vienna Metro
Austria



Holmesdale Tunnel
United Kingdom



Hong Kong Metro
China



Sample Project Reference List

Road Tunnels

Australia:	Brisbane INB, Eastern Distributor, Harbour Tunnel, Lane Cove, M5 East Tunnel Upgrade, M5 Road Tunnel, Melbourne City Link, Mitcham Frankston – Eastlink, Mitcham Frankston Freeway, Perth Road Tunnel
Austria:	River City, U2 Messe, U2/1 Schottenring, WSKE Tunnel
Canada:	Palais des Congres, Montreal
China:	Hu Nan Xue Feng Shan Tunnel
Croatia:	Brezovica, Cardak, Mala Kapela, Sveta Tri Krajlja, Tunnel Bisko, Tunnel Mravince, Tunnel Strazina, Veliki Glozac
Finland:	Hakamaentie/Kivahaka Tunnel, Vuoli Tunnel
Greece:	Eftaxias, Egnatio Odos Driscos Tunnel
Hong Kong:	Beacon Hill Tunnel, Route 8, Sky Plaza
India:	C-Doctor
Italy:	Avigliana, Cesena Tunnel, GRA Salva Candida, Gran Sasso, Lonato Tunnel, Marinasco Tunnel, Martignano, Mongrando Tunnel, Montenegro Project, Ronco Tunnel, Spezia, Val Badia Tunnel, Valsassina Tunnel
Malaysia:	Smart
New Zealand:	JHT New Zealand
Norway:	Mesta AS
Saudi Arabia:	Jamarat Bridge, King Khalid Road Tunnel, Khaled Cocodi Tunnel
Serbia:	Vrmac Road Tunnel
Singapore:	KPE Expressway
Taiwan:	Hsuehshan Tunnel
UK:	Holmesdale Tunnel, Limehouse Link, T5, Terminal 5 - Coach Station
USA:	Bunyard Tunnel-AR, MSP Airport-Minneapolis-MN, Trimet Portland-OR, Whittier Tunnel-AK
Yemen:	Sayut-Nishtun Road Project

Rail and Metro

Australia:	Parramatta Rail Station, Parramatta Rail Tunnel, Perth Metro, Queensland Rail
Austria:	U1 Unterwerk, Vienna Metro
Brazil:	Sao Paulo Metro
Canada:	STCUM, Montreal, Toronto Transit Commission/ York Mills
China:	Guangzhou Metro
Greece:	Attico Metro
Hong Kong:	Lok Ma Chau
Hungary:	Budapest Metro Line 2 and Line 4
India:	Delhi Metro
Italy:	Alifana, Rome Rail Station, Turin Metro
Puerto Rico:	Tren Urbano
Romania:	Bucharest Metro
Singapore:	CCL3
Taiwan:	KMRT, Nankang Extension, Taiwan High Speed Rail
UK:	London Underground
USA:	BART-San Francisco-CA, Beacon Hill Light Rail/Seattle- WA, MARTA-Atlanta-GA, Maverick Station/ Boston-MA, MBTA Greenline- Boston-MA, MBTA R10-Boston MA, MSP LRT-Minneapolis-St Paul-MN, N.Y.C.T.A , NYNJ PATH, SDSU LRT-San Diego-CA
Venezuela:	Valencia Metro

Precise Air Management

Fläkt Woods is a global leader in air management. We specialise in the design and manufacture of a wide range of air climate and air movement solutions. And our collective experience is unrivalled.

Our constant aim is to provide systems that precisely deliver required function and performance, as well as maximise energy efficiency.

Solutions for all your air climate and air movement needs

Fläkt Woods is the only company in the UK capable of providing total system solutions from the following portfolio:

● Fans

Advanced axial, centrifugal and boxed fans for general and specialist applications. Comprehensive range including high temperature and ATEX compliant options. Engineered for energy efficiency and minimised life cycle cost.

● Air Handling Units (AHUs)

Modular, compact and small AHU units. Designed to ensure optimisation of indoor air quality, operational performance and service life.

● Chillers

Air-cooled and water-cooled chillers with cooling capacity up to 1800kW. Designed to minimise annual energy consumption in all types of buildings.

● Chilled beams

Active induction beams for ventilation, cooling and heating, and passive convection beams for cooling. For suspended or flush-mounted ceiling installation – and multi-service configuration. With unique Comfort Control and Flow Pattern Control features.

● Smoke control and car park ventilation systems

Unique approach to car park ventilation, aided and optimised by Computational Fluid Dynamics (CFD) software. Complete turnkey solutions for designing, installing and commissioning mechanical and natural smoke ventilation.

● Controls and drives

Variable speed drives and control systems, all tested to ensure total compatibility with our products. Specialist team can advise on energy saving and overall system integration.

● Technical Site Services

Our dedicated team providing comprehensive post-installation services. Including condition-based contract monitoring, preventative and routine maintenance, refurbishment and system upgrades.

Fläkt Woods operates a policy of continuous development and improvement. Accordingly, the Company reserves the right to supply products that may differ from those illustrated and described in this publication. Certified dimensions will be supplied on request on receipt of order.

FWG-JRG/LFB-4/0908

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email info.tunnels@flaktwoods.com www.flaktwoods.co.uk

See global website for international sales offices www.flaktwoods.com

The logo for Fläkt Woods, featuring the company name in a bold, green, sans-serif font. A stylized green swoosh underline is positioned beneath the 't' in 'Woods'.