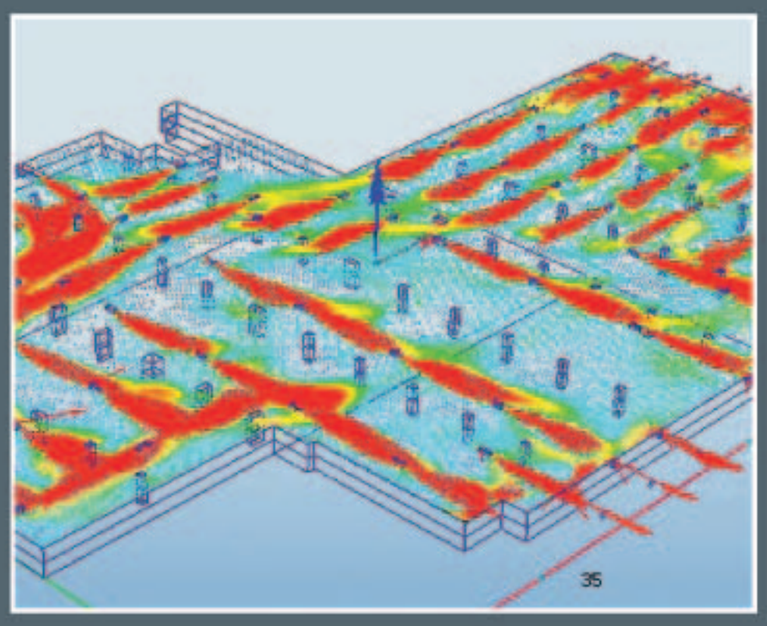
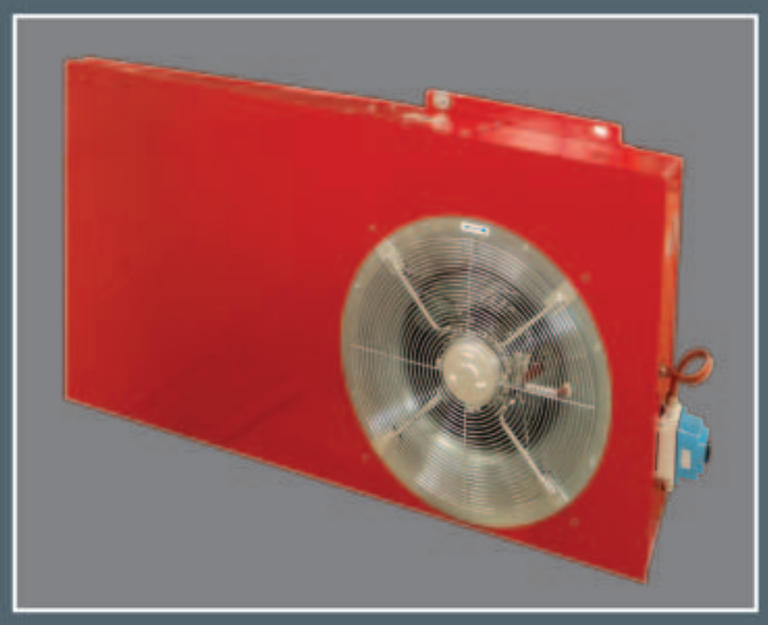
JET FANS

Car park ventilation systems





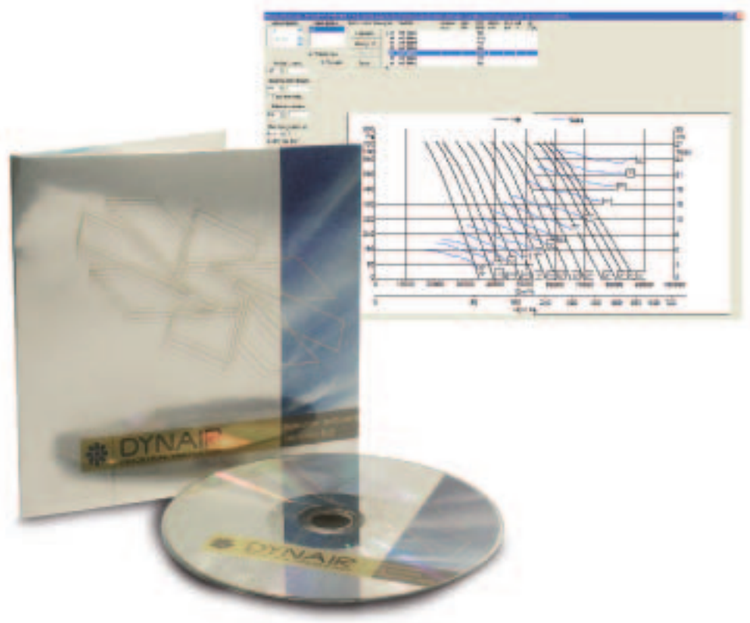
DYNAIR®
INDUSTRIAL VENTILATION

Introduction to Jet Fan System

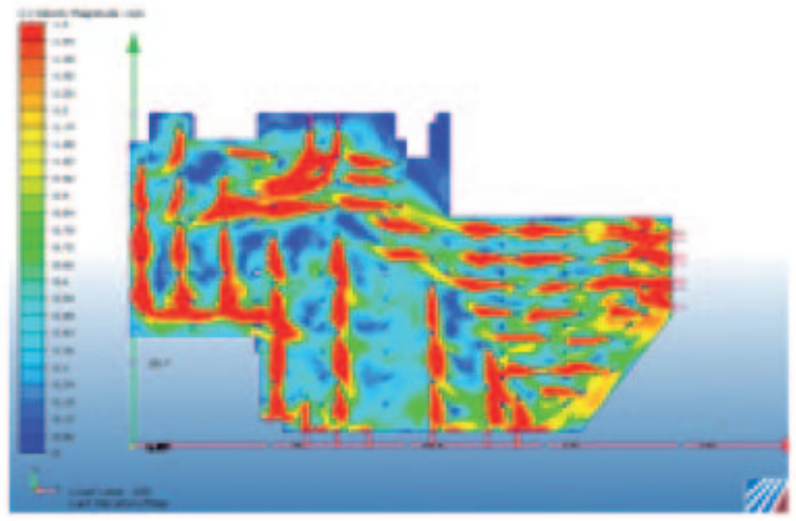
DYNAIR® is the industrial division of Maico Italia S.p.A. and is a well known brand name at global level in the industrial ventilation and plant engineering sector. Technological expertise, high production capacities, strong research and investment policies together with a personalised back-up service focused on customer needs have, for over 30 years, been the qualities that distinguish our company: Italian excellence renowned throughout the world and an industrial concern fortified by belonging to Maico Holding GmbH, the German group that leads the way in the ventilation industry.

Experience and high technology at your service

Living in a market in continuous evolution, DYNAIR® bases its force on a step by step project follow-up in close collaboration with the customer to create tailored and highly reliable solutions.



BLOWDYN is the fan selection software that allows to select the most suitable product for any ventilation project



The consolidated experience in product application of our Engineers is supported by the high-skilled assistance of the technical department and by advanced technological means such as the CFD software, designed to elaborate all fluid dynamic variables and simulate the real working conditions of any ventilation system.

CAR PARK VENTILATION: PRINCIPLES & SOLUTIONS

BASIC PRINCIPLE

The ventilation of enclosed or underground car parks fulfils two key requirements: remove the pollutants emitted by cars and, in the event of a fire, control the hot fumes and gases produced by the fire, protecting the escape routes and easing access for the emergency teams.

SPECIAL TECHNOLOGY

In recent years, the technology used for jet (or impulse) fans has been established as the new standard for normal ventilation and smoke extraction in case of fire in enclosed car parks..
In fact, this technology represents the most innovative and cost-effective alternative to traditional ducted mechanical extraction systems.
Carefully managing the project in all its development stages, which requires the fundamental use of fluid dynamics calculation programs, also ensures that the system is working correctly.

JET FAN system provides either normal ventilation and can also be provided for smoke extract in case of fire in underground car parks, or a combination of both, i.e. a dual purpose fan.

OPERATION

The fully integrated **JET FAN** system developed by DYNAIR® includes three ventilation elements, some CO (carbon monoxide) detection sensors, a control panel and a CFD analysis: these are the essential requirements to design the most suitable ventilation system for a specific car park.

The system is based on placing a set of axial impulse fans **(JET FANS)** all along the parking area, which operate in a similar way to a ducted system: when installed on the ceiling, they move the air from the top layers to the bottom layers towards the exhaust areas; by effectively creating a continuous air flow, the **JET FANS** are able to thoroughly cleanse the air at the bottom and the top layers of the car park, avoiding the creation of areas where air gets trapped.

JET FANS system is completed by air inlet devices operated by natural air or mechanical devices (parking access ramp, natural ventilation ducts, side openings or inlet fans) and exhaust fans.

JET FAN - CC - JD
Impulse Fan

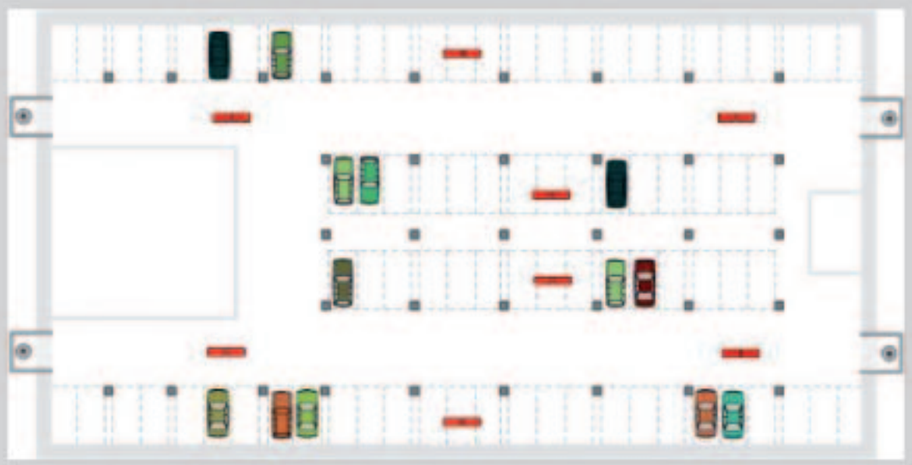
CC-HT
Exhaust Fan - CC range

Operation and benefits

DYNAIR® INDUSTRIAL VENTILATION

OPERATION:

1

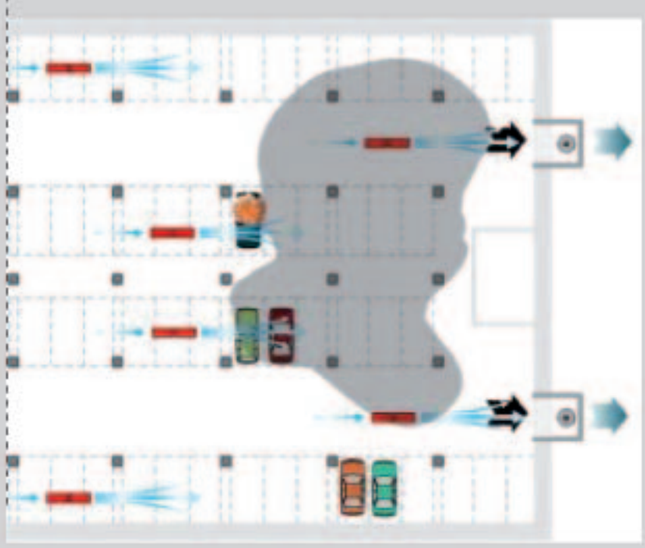


Normal ventilation
The JET FANS effectively ventilate both the bottom layer, near the ground, and the top layers, near the ceiling, avoiding the creation of areas where air gets trapped. The fans are only operated when the CO (carbon monoxide) detectors detect a level of pollution higher than the preset threshold value (which varies according to the type of project and local legislation).

2

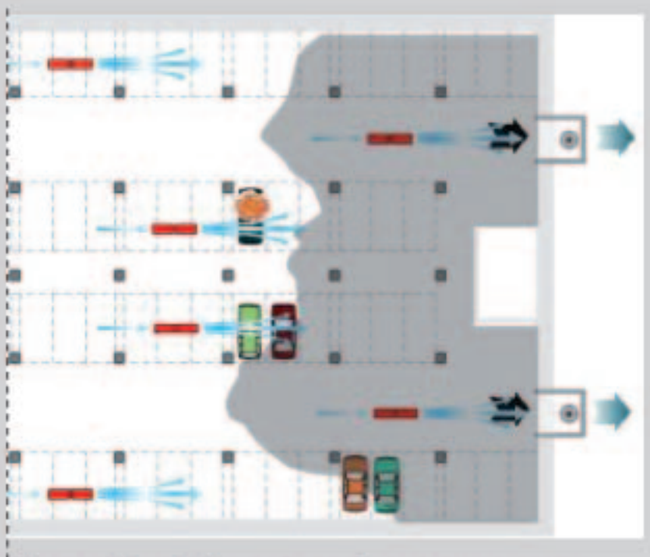
A fire Starts

3



The ventilation system starts running

4



The fire smoke is exhausted

Smoke extract in case of emergency
The mechanical fume extraction ventilation system based on JET FANS can easily be split into control areas in order to reduce the effects of fumes only to the area affected by the event. This system, in fact, has the advantage of causing the overpressure of the fire fighting sections and the underpressure of the site of the fire, stopping the fumes from spreading; it drastically reduces the temperature of the area affected by the fire and is not affected by external weather conditions (wind, pressure) or events like cold fumes that tend to lag in the bottom layers (at human height).

BENEFITS:

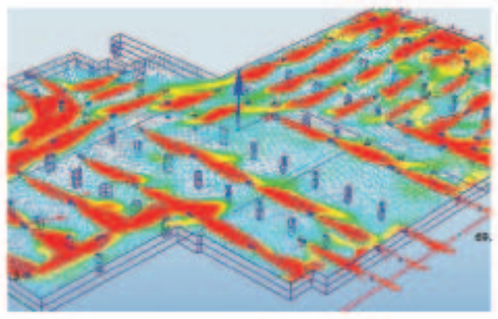
Compared to a ducted ventilation system, the innovative JET FAN system ensures multiple benefits in terms of low cost and efficiency associated with its design, installation, operation and usage.

DESIGN

- The compact size of the JET FANS allows to optimise the spaces and their flexibility of installation both when building new properties or refurbishing and/or certifying existing buildings
- It saves design time as it does not require a complex ducted system to be designed and implemented
- The system effectiveness can be measured with CFD (fluid dynamics calculation) modelling
- It allows the project designer to benefit from a better pre-sales customer service
- The project can be financially assessed within 24 hours
- Final costs are in line with expected costs

INSTALLATION

- It removes the need for costly and complex ducted and grilled systems
- The fans are easy to install, ensuring time saving in terms of hours of work
- The reduced size of the JET FANS easies installation of other systems (sprinklers, lighting etc)
- Ease of scheduled and breakdown maintenance



OPERATION

Major savings in running costs ensured by the system distinctive features:

- Ventilation can be fully or partly operated: the CO (carbon monoxide) detectors and the smoke sensors, in fact, ensure that only the ventilators located in the areas where pollution levels are exceeded or where a fire has started are enabled
- Less total power required as the accurate design ensures the optimal size of the ventilation system; more specifically, the inlet and exhaust fans can be smaller as the JET FANS generate a negligible pressure drop compared to ducted systems.

USE

- Better quality of breathable air: the JET FAN system creates a continuous airflow able to mix the different layers of air and to avoid areas where air gets trapped;
- Optimised safety in the event of a fire: fast and effective toxic fume extraction, leading to safer escape routes, easier access for the emergency teams, promoting people safety and minimising the effects of fire on the building structures.

System design and services

DYNAIR® INDUSTRIAL VENTILATION

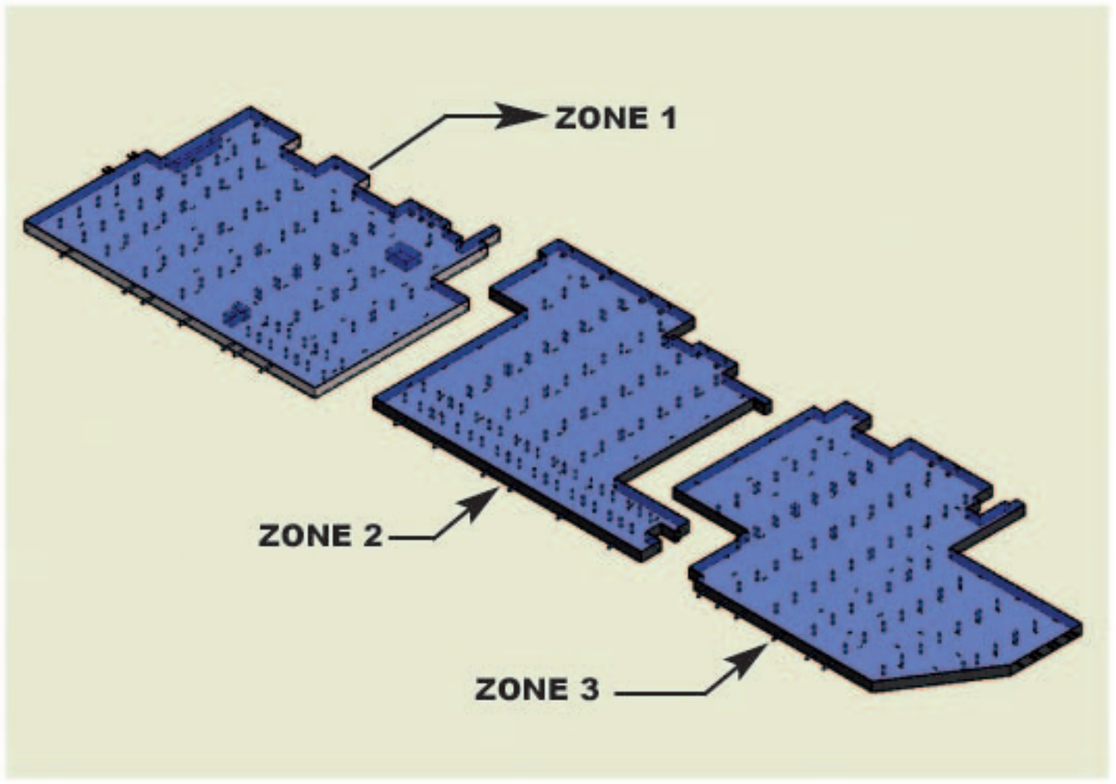
SYSTEM DESIGN AND SERVICES

FROM DESIGN TO CUSTOMER SERVICE

Designing a car park ventilation system requires assessing issues associated with fluid dynamics. The high complexity of fluid dynamics calculation is well known: manual calculation increases the risk of making mistakes, compromising the correct operation of the ventilation system designed and, therefore, users' health and safety.
During this crucial design stage, DYNAIR® is able to offer a real and valuable engineering support thanks to the experienced and highly skilled technical staff, who boasts an in-depth knowledge of the CFD software, an advanced computational fluid dynamics calculation tool.

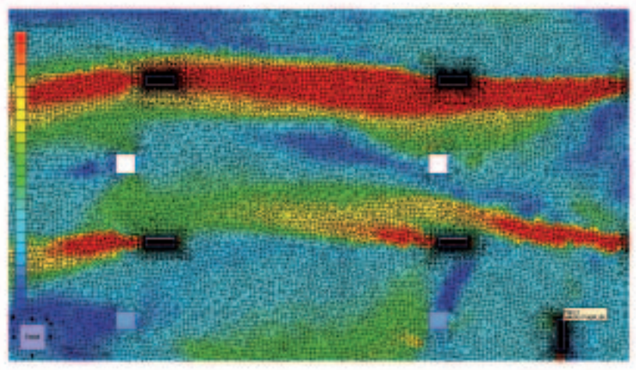
HOW IT WORKS

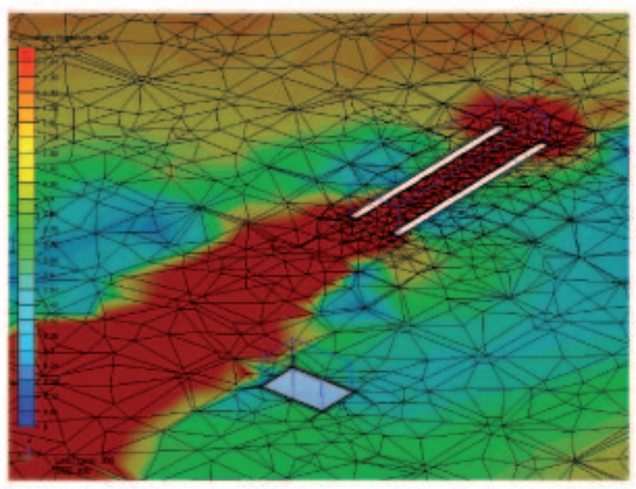
CFD calculation is essential to ensure that all areas of the car park are correctly ventilated and, in the event of fire, fume extraction is optimised. It is also required to establish the accurate size of the ventilation system and the correct positioning of the JET FANS and of other exhaust and/or inlet fans.
This calculation is based on simulation, combining variables such as the required number of air changes/hours (established by local legislations), air volume and direction and structural features of each car park (in a 3D model). The processed data generate dynamic scenarios based on air speed profiles, particle movement and airflow distribution. This allows a customised solution to be produced. This methodical approach ensures not only to assess the system effectiveness, by also the most cost-effective solution as over-sized projects are avoided.



3D MODELLING OF THE CAR PARK AND ITS DIFFERENT SECTIONS

At this level of calculation, only the geometrical and mathematical conditions required by the model are known (bounding conditions of the system).





CALCULATION SET-UP AND SCENARIO DEVELOPMENT

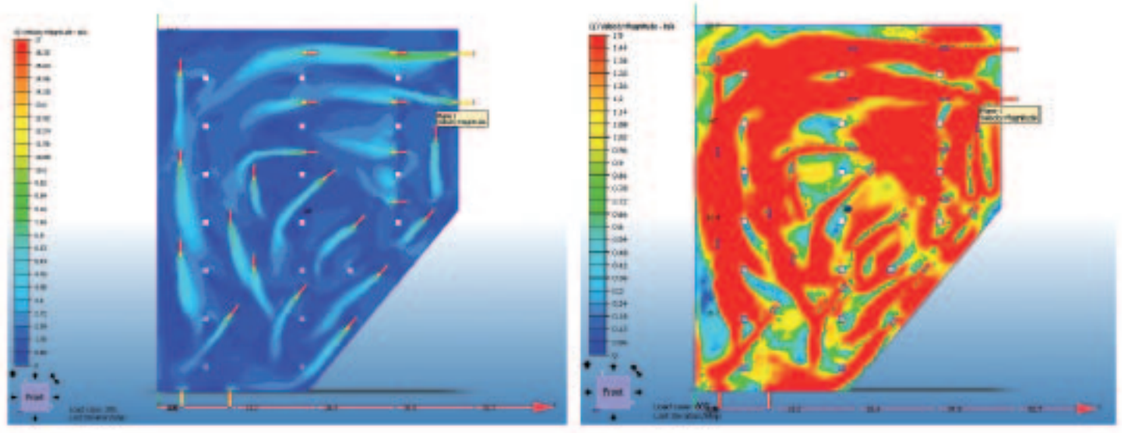
Introduction of boundary conditions and initial conditions such as external pressure and outside air temperature; structural parameter set-up (light wells, access ramps...) and operating conditions set-up (material definition, assignment of air performance curve to the fan model), mesh definition (quantity of primary volumes the model must be split into). Data processing and assessment of each scenario by changing the type, quantity and position of the JET FANS

ANALYSING THE RESULTS AND DEVELOPING A BALANCED SOLUTION

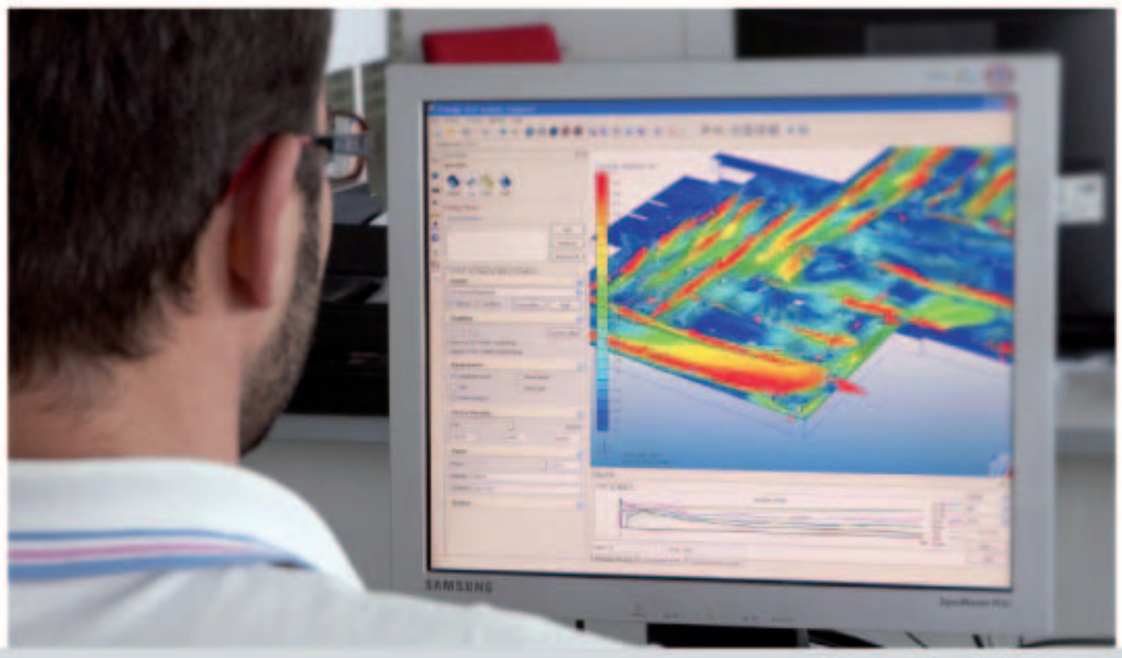
The data can be analysed by checking the air speed inside each section of the car park.
The graphs shown below represent the average air speed on a sectional floor.

FINAL SCENARIO

During this last stage, system effectiveness is put to the test.



DYNAIR® is able to assist you with its know-how and experience during each stage of the ventilation project for car parks based on the JET FANS system.



Construction & Features

CONSTRUCTION

Silencers in galvanized steel sheet inside lined with high performance acoustic insulation material.

Protection guard on inlet side.

Deflector on outlet side for optimum air discharge and air cleaning of all layers. Supplied as standard.

Fixing brackets in galvanized steel sheet for ceiling (or wall) installation. Supplied as standard and pre-assembled

ON REQUEST
Sevice switch IP67, tested and guaranteed for high temperature.

Terminal box IP54, resistant to high temperature and supplied as standard.

Silencers are fitted at both ends with an especially designed smooth bell shape to improve air performance and reduce losses and sound level.

Housing in electrolytically galvanized steel sheet

Hub impeller and airfoil profile blades made in aluminium. Balanced according to ISO 1940 G.6.3. Variable pitch angle in still position.

Execution 4 (with impeller directly coupled to motor with feet.

FEATURES

MOTOR

Asynchronous three-phase motors 380-420V 50 Hz according to international standards IEC 60034, IEC 60072, EMC 2004/108/CE, LVD 2006/95/CE.
Motors suitable for DOL (Direct On Line) start marked
Protection IP55, class F or H

INSTALLATION

Each JET FAN is supplied with fixing brackets for ceiling (or wall) installation. It is recommended for JET FANS to be installed at a minimum distance from beams of 0.5 m on the inlet side and 2.0 m on the outlet side.

RANGE

The range consists of different models according to size requirements, air flow direction, speed and operating conditions (normal ventilation or smoke extraction). The JET FANS are available in two standard sizes with 310mm and 400mm diameter blades, one-way airflow (CC-JD models) and single or dual speed. The following options are available on request: 350mm size and CC-JR versions with 100% reversible airflow.

TEMPERATURE OPERATING RANGE

The standard JET FANS for normal ventilation (CO extraction) can be used within the –20 to +50 °C temperature range.

The fire smoke extraction models are CE certified to F200, F300 class, in compliance with Standard EN12101-3 and guaranteed to operate at 300°C for 2 hours.

CERTIFICATIONS AND MONITORING SYSTEMS

High temperature resistance scheme

Fire fighting fan design and installation is regulated by the European reference standard EN 12101-3, which establishes the temperature ranges/operation time certified products must comply with. DYNAIR® fire smoke extraction JET FANS are CE certified to class F200, F300 in compliance with EN 12101-3 standard and are guaranteed to operate at 300°C for 2 hours. CC-HT series used in combination with JET FANS as exhaust fans, is certified in class F200, F300 and F400.

Performance and dimensions

DYNAIR® INDUSTRIAL VENTILATION

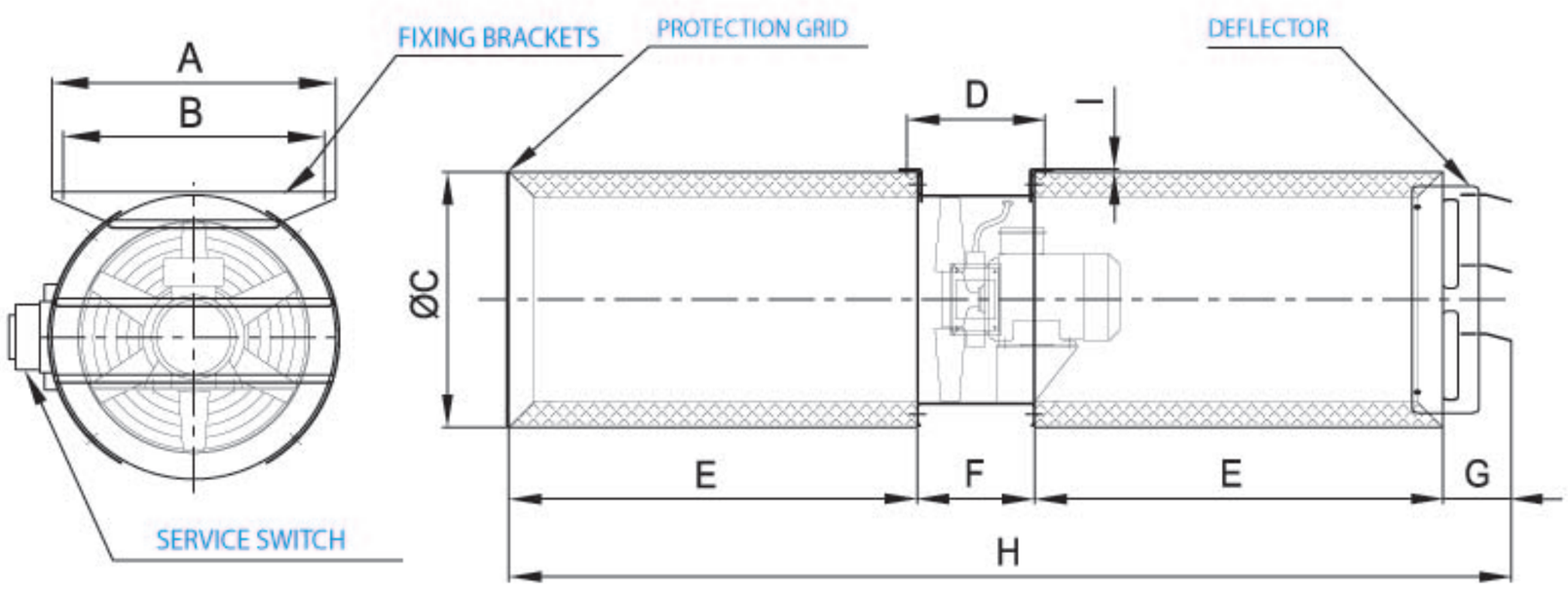
PERFORMANCE

TECHNICAL DATA						
Type	Model	Speed	Pm	In [400V]	Tension 50 / 60 Hz	Temperature Class
		rpm	kW	A	V	
CC-JD	312	2790	0,55	1,35	380-420	-20 / +50°C
CC-JD	402	2835	1,5	3,2	380-420	
CC-JD	312	2875	0,75	1,65	380-420	F200 - F300 300°C/2 HRS
CC-JD	312/4	1400/2785	0,12/0,75	0,45/1,72	380-420	
CC-JD	402	2875	1,5	3,05	380-420	
CC-JD	402/4	1455/2900	0,25/1,5	1,05/3,54	380-420	

PERFORMANCE					
Type	Model	Air flow	Air speed	Thrust	Lp
		m^3/s	m/s	N	dB(A) @ 3m
CC-JD	312	1,28	17,3	27	54
CC-JD	402	2,88	22,3	78	58
CC-JD	312	1,28	17,3	27	54
CC-JD	312/4	1,28/0,64	17,3/8,7	'27/07	54/43
CC-JD	402	2,88	22,3	78	58
CC-JD	402/4	2,88/1,44	22,3/11,2	78/20	58/47

ON REQUEST: Reversible version CCJR is available in both models and in single and double speed.

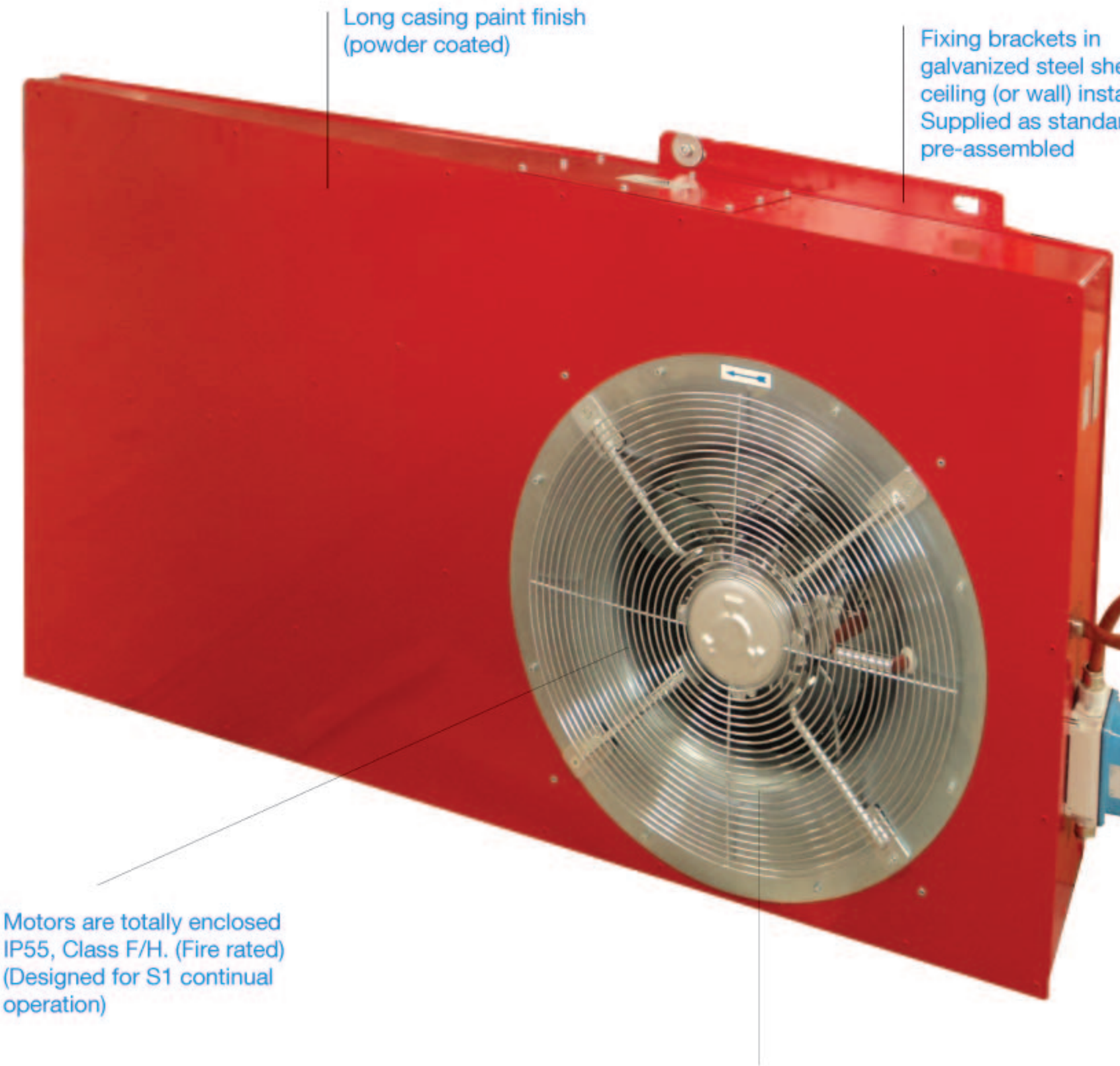
DIMENSIONS



DIMENSIONS (mm)										
Model	A	B	ØC	D	E	F	G	H	I	Kg
CC-JD 310	415	375	415	240	630	200	134	1595	6	65
CC-JD 400	500	460	500	270	800	230	134	1965	6	80

Induction Jet Fans

DYNAIR® INDUSTRIAL VENTILATION



Description:

- Low profile casing in coated steel sheet
- Centrifugal backward curved impeller
- Motor power supply 415V, 50Hz
- Motor suitable for DOL (Direct on Line) start.
- Motor protection for IP55 and Insulation Class F or H, depending on model
- 2-speed motor, Dahlander
- Tested according to EN 12101-3 (F300)
- Service switch available upon request.

Technical data and dimensions

DYNAIR® INDUSTRIAL VENTILATION

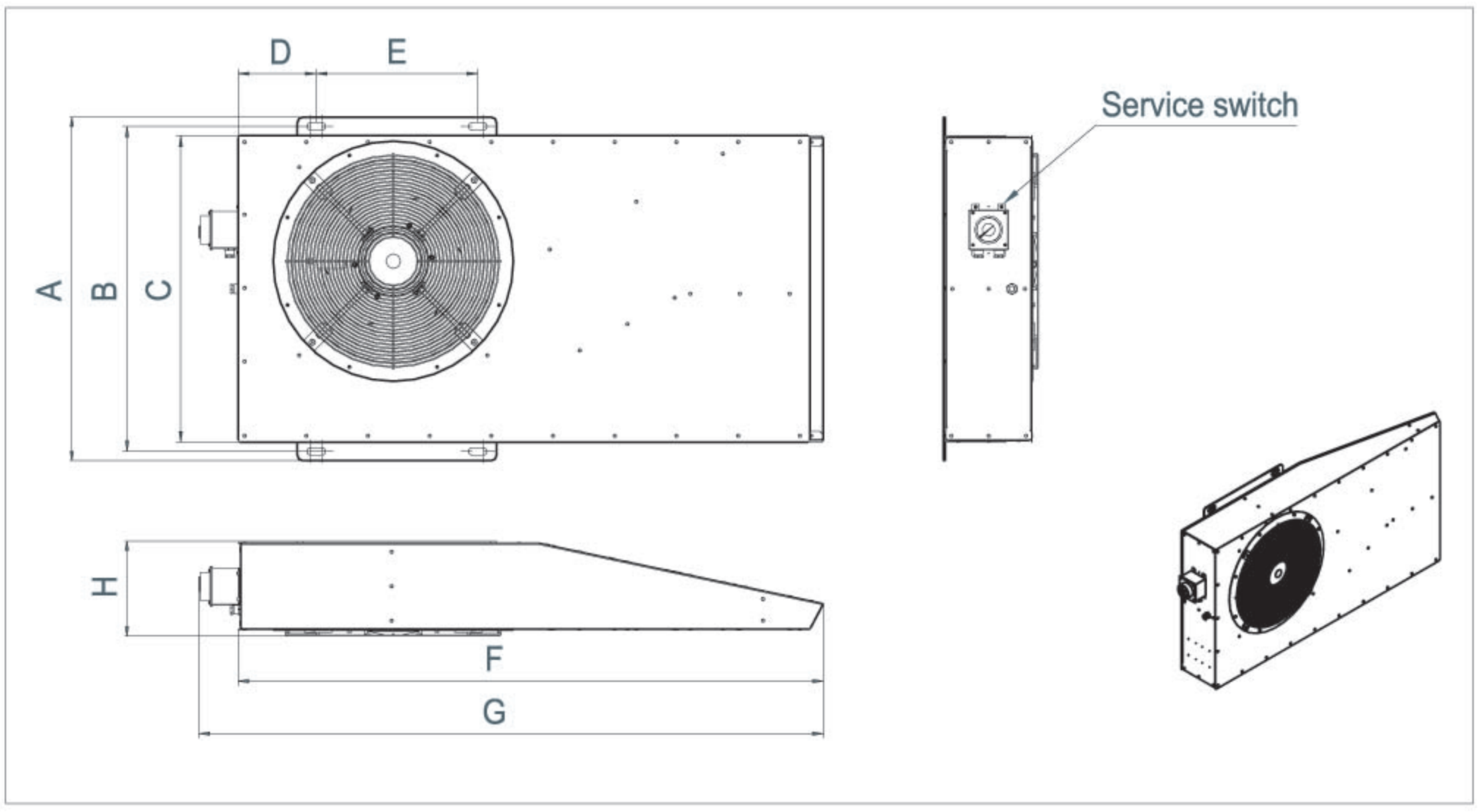
TECHNICAL DATA

MODEL	SPEED rpm	MOTOR POWER kW	MOTOR RATED CURRENT A	VOLTAGE FREQUENCY V
I-JF 250 4/8 S F300	1400/700	1,2/0,3	3,3/1,43	380/420
I-JF 300 4/8 S F300	1400/700	2,2/0,55	5,8/2	380/420

PERFORMANCE

MODEL	AIRFLOW m3/s	AIR SPEED m/s	THRUST N	SOUND PRESSURE db(A) @ 3m
I-JF 250 4/8 S F300	1,5	26,9	55,3	70/53
I-JF 300 4/8 S F300	2,7	30	111	71/55

DIMENSIONS



Model	A	B	C	D	E	F	G	H
250	930	880	830	196	467	1584	1690	257
300	1074	460	1000	180	650	1907	2013	314

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