

Building & Industry

NOVENCO 

SCHAKO Group

NOVENCO[®] NovAx[™] Axial fans

Standard, Hot smoke, ATEX and EX



Product facts

Specifications depend on fan configuration.

Product

The Novenco® NovAx™ series of axial fans are renowned in design, application and performance with fan efficiencies up to 83%.

Environments and fan types

- **ATEX:** ACN-ACW
- **Hot-smoke:** ACN-ACW-ARN-ACG-ACP
- **Marine and marine EX:** ACW
- **Standard temperature:** ACN-ACW-ARN-ACG-ACP

Applications

The NovAx fans are for comfort and industrial ventilation. Versions include types for temperatures between -20 to +50 °C and for extremely strenuous application areas.

Ranges

Fans are for in-duct installation, attachment to inlets or outlets, or in-AHU and other closed compartment installations.

A part of the ACN type fan range for standard and hot-smoke temperatures is available as Standard Range fans as a number of fixed size-airflow-pressure combinations.

Fan specifications

Air pressures: Up to 2000 Pa

Airflow rates: 0.1 to 65 m³/s

Blade angles: Adjustable 25° to 70°

Housing thicknesses: 2, 2.5, 3, 4, 6 or 10 mm

Enclosures: IP55 to IP66

Environments: ATEX, hot-smoke, marine, marine EX, and standard temperatures

Fan efficiencies, excl. motors: Up to 83%

Hub sizes: ø160, ø230, ø280, ø330, ø380, ø403, or ø578 mm

Impeller diameters: ø250, ø315, ø400, ø500, ø560, ø630, ø710, ø800, ø900, ø1000, ø1120, ø1250, ø1400, or ø1600 mm

Reverse operation: Shorter periods up to max. allowable RPM for normal direction. Airflow is reduced to 50% and pressure to 25% for the same system characteristics.

Motors

Dimension standard: IEC-72

Efficiency classes: IE1 to IE3

Electrical standard: IEC-34

Insulation: Class B, F or H

Mounting: Enclosed in motor mount or outside the mount through a long hub

Speed control: Direct or VFD

Structural shape: B5 or B14 for flanges

Terminal boxes, standard temperature:

Terminal boxes of steel or plastic on fan housing or motor

Terminal boxes, ATEX: Aluminium terminal boxes and shielded motor cables

Terminal boxes, hot-smoke: Steel terminal boxes and shielded motor cables

Voltages: 3x220 - 3x690 V at 50 or 60 Hz

Materials

Blades: Aluminium or glass-fibre reinforced polyester (GRP).

Impellers with hub sizes ø403 and ø578 mm have aluminium blades.

Hot-smoke fans have blades of aluminium.

Fan housings: Hot-rolled, hot-dip galvanised sheet steel

Inner hubs: Aluminium or hot-dip galvanised steel for most sizes. Hot-dip galvanised steel for ACN-ACW with motor size 280 and for ACP-ACG with hub size ø578

Classifications

Environments: Unheated, low-corrosion environments in accordance with EN 12944-2 and corrosion category C3

For special cases, fans can be delivered according to corrosion class C4.

The fan housings are also available in stainless steel as AISI 316L and with aluminium impellers, all in corrosion class C5 high.

Flange standards: Eurovent 1/2, except for ACW which follows DIN 24154 R4

Sound: ANSI/AMCA 300-14; AMCA 311-16

Technical capacity: EN 5801; EN 21940-11; EN 21940-14

Temperature ranges

ATEX: Classes T4 for gas and T135 for dust according to EN 60079-0

Hot-smoke: F200, F300 and F400 according to EN 12101-3 for all fans for at least

2 hours at 200 °C, 300 °C and 400 °C, respectively.

Standard: -20 to +50 °C and max. -40 to +120 °C; GRP-blades limited to max. +70 °C.

At -40 to -20 °C and +40 to +120 °C, RPM are reduced and special motors required.

Certifications

ATEX: According to directive 2014/34/EU and marked as

II 2G c Ex de IIB T4 (gas)

II 2 D Ex tD A21 T135°C (dust)

Calculation software: AirBox™ program is certified by TÜV.

Marine EX: According to IACS F29/2005

Accessories

- Acoustic diffusers
- Anti-vibration mounts
- Certification options
- Counter flanges
- Dampers
- Diffusers
- Fan housing options
- Flexible connections (PERL / Maritex)
- Frequency converters
- Inlet cones
- Inspection hatches
- Kit for lubrication of motor
- Measuring pipes
- Outlet guide vane arrangement
- Roof hoods
- Silencers
- Spark-proof linings
- Spigots for ducts or welding
- Support frames
- Thermal motor options
- Vertical mounting plates
- Wire guards



Description

NovAx are compact, robust, series produced axial fans with pre-settable blades. The fans are well-suited for ventilation and air-conditioning systems with varying airflow rate requirements.

The fans are installed in a wide range of ventilation systems on land and off-shore. These include systems for comfort, industrial, process, parking and tunnel ventilation as well as environment-enhancement systems. The fans require little space, are easy to install and offer high operational reliability. ATEX and marine EX versions are available for hazardous environments.

Fan types

The NovAx impeller consists of a pressed, two-part, assembled hub with grooves in which the blades are fixed. The impeller has a hub boss for mounting onto the motor.

Hub \varnothing D [mm]	Number of blades
\varnothing 160	4
\varnothing 230	6
\varnothing 280	8
\varnothing 330	10
\varnothing 380	12
\varnothing 403	6
\varnothing 578	10

Number of blades

The impeller blades are seamlessly adjustable from 25° to 70° and mounted according to fan size and desired performance.

The impeller is integrated with the motor in different designs of fan housings to constitute five fan types with several applications.

- ACN and ARN — duct installation
- ACW for heavy duty — duct installation
- ACG with inlet cone and outlet guide vane arrangement — duct connection
- ACP with inlet cone — duct connection

Blade materials and motors

The impellers are fitted with blades of either aluminium or glass fibre reinforced polyester (GRP). Hot-smoke fans, however, are entirely made with blades of aluminium. The two blade types have identical performance characteristics.



Impellers with hub sizes \varnothing 403 and \varnothing 578 mm are only made with aluminium blades.

In the temperature range -20 to +40 °C the lighter and more corrosion resistant GRP blades are standard. In the ranges -20 to -40 °C and +40 to +70 °C both blade types can be used. This is, however, with reduced RPM and special motor lubricant.

In the range 70° to 120°C, aluminium blades are used exclusively and at reduced RPM.

All fan types use flange motors.

Classifications

The fans are as standard delivered for operation in unheated low corrosive environments according to EN 12944-2 and corrosion category C3. Versions in stainless steel for category C5 are optionally available.

The NovAx fan types ACN-ACG-ACP-ARN are approved for hot-smoke environments according to EN 12101-3.

The fan types ACN-ACW are certified in accordance with the ATEX directive 2014/34/EU.

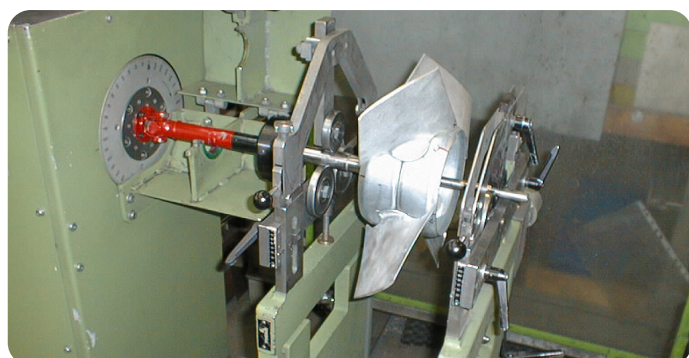
Adjustment of blade angles

The impeller blade angle that matches a specific capacity is calculated with the AirBox program. The blades are adjusted in the factory with a precision machine and the impeller is aligned and balanced.

AirBox calculation program

The AirBox program is Novenco's calculation and configuration tool. Input to the program are requirements for airflow and pressure as well as specific characteristics of the operating environment. Further requirements for the fan, motor and accessories are also input and form the basis for calculation of possible solutions.

Novenco AirBox is free and available on www.novenco-building.com. It is certified by TÜV Süd in Germany, requires registration and checks automatically for updates.



Motors

The fans are fitted with 50 Hz motors as standard, and are available with 60 Hz

motors also. Alternatively, fans can be speed controlled with frequency converters. See maximum RPM in the below table.

Nominal RPM for 50 Hz motors are found in the performance curves on pages 9 through 14.

Hub øD [mm]	Motor sizes
ø160 - ACN/W - ACP/G	71 - 80 71 - 100
ø230	71 - 100
ø280	71 - 112
ø330	80 - 132
ø380	90 - 180
ø403	112 - 180
ø578	132 - 250 / 280 (ACN)

Motor sizes

The motors are furthermore offered with a wide range of options for thermal protection, space heaters, lubrication, low temperature operation, marine classification and more.

Frequency regulation

The fans are prepared for frequency converter operation with RFI filters according to the product standard EN 61800-3, class 2.

The use of frequency converters removes the limitations caused by net frequencies of 50 or 60 Hz.

Axial fans can almost always be placed within the maximum efficiency of up to 83%, while it remains possible to regulate the air quantities.

Hot-smoke fans may, however, not run frequency regulated during fire. The frequency converter must in this case be bypassed, so that the motor runs at the maximum synchronous RPM. Selection of hot-smoke fans with frequency converters is done based on the synchronous RPM of the motors.

In most cases, the motors are run over-frequently in the range 70 - 80 Hz.

This is due to the non-existent fall in power output for the motors in the range 50 - 100 Hz. Additionally, the best performance for fans is often found in just the over-frequent area.

Fans for frequency converter operation require installation according to the EU standard for electromagnetic compatibility (EMC). The shielding and connection to ground eliminate interference and protect the fan motor bearings and windings.

Investment, operational cost as well as space requirements are lower for NovAx fans with frequency regulation compared to fans without.

Hub øD [mm]	Fan sizes [mm]													
	ø250	ø315	ø400	ø500	ø560	ø630	ø710	ø800	ø900	ø1000	ø1120	ø1250	ø1400	ø1600
ø160	3865	3865	3865	3865										
ø230			4000	4000	3865	3575	3275	2980						
ø280				4012	3755	3536	3230	2930	2571					
ø330				3977	3686	3448	3215	2973	2660					
ø380					3674	3397	3097	2859	2651	2324				
ø403									2179	2025	1885	1730	1575	
ø578									2128	1957	1804	1685	1595	1410

Maximum RPM for frequency regulated NovAx impellers ^{1 2 3}

1. All RPM are at 20 °C.
2. The maximum RPM is reduced at higher and lower temperatures.
3. The maximum RPM for the motors are considerably higher than those for the impellers – typically 3600 - 6000 RPM.

Fan types

ACN, ACW and ARN for ducts

The ACN, ACW and ARN fans are designed for duct installation. The ACW has a thicker fan housing, is extra durable and made for heavy duty. The ARN has straight guide vanes for 100% reversible airflows and is otherwise identical to the ACN.



Front and rear of ACN axial fan

The ACN-ACW range of axial fans comprises 14 fan sizes with impeller diameters from ø250 to ø1600 mm for standard temperatures and ATEX. For hot-smoke applications there are 12 fan sizes with impeller diameters ø400 to ø1600 mm.

There are seven hub diameter sizes from ø160 to ø578 mm for the ACN and ACW. The ARN range of axial fans comprises six fan sizes with impeller diameters from ø900 to ø1600. It has two hub diameter sizes; ø403 and ø578 mm.

The hot-smoke fan range is F200, F300 and F400 approved according to EN 12101-3 to run for at least 120 min. at 200 °C, 300 °C and 400 °C, respectively.

The fan housings are cylindrical with connection flanges at both ends. The fan housings have welded motor suspensions of sheet steel that also function as outlet guide vane arrangements. This produces extremely high efficiencies. The fan housings and motor suspensions are hot-dip galvanised. Each fan housing has an inspection hatch.

The impeller unit is mounted directly on the motor shaft. If the motor cannot fit in the motor mount, it is displaced outside of this and connected to the impeller through a long hub.

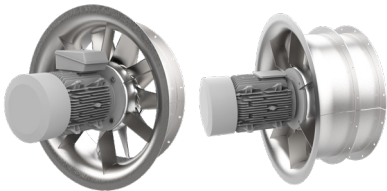
The flange pitch diameters, number of holes and hole sizes are as standard in accordance with Eurovent 1/2 for ACN-ARN and according to DIN 24154 for ACW.

Mounting positions are in accordance with Eurovent for ACN-ARN – configuration D, motor position B. See also section "Calculation examples" on page 28.

The motors are flange motors, mounted on the outlet side, and provided with electrical cables that pass out through the fan housings to terminal boxes for electrical connection. The direction of airflow for ACN-ACW-ARN fans is impeller - motor.

ACG for duct connection ACP for wall mounting

The ACG is designed for connection to duct ends. The ACP is for direct air transport through walls.



ACP (left) and ACG axial fans

The ACG-ACP range of axial fans comprises 14 fan sizes with impeller diameters from ø250 to ø1600 mm for standard temperatures and 12 fan sizes with impeller diameters ø400 to ø1600 mm for hot-smoke. There are seven hub diameter sizes from ø160 to ø578 mm for both fan types.

The F300 hot-smoke range is approved according to EN 12101-3 to run for at least 60 min. at 300 °C.

The ACG-ACP fan housings are short and tubular and feature cone-shaped inlets for direct air intake. The motor in each fan is in the centre of and faces the inlet air intake. The motor suspension is welded with struts to form an inlet guide vane arrangement to the impeller. The fan outlet is flange-terminated. The ACG is furthermore fitted with a short duct piece after the impeller that houses an outlet guide vane arrangement.

The inlets are fitted with wire guards. On the ACG, the outlet guide vane arrangement helps achieve a very high efficiency. The flange pitch diameter, number of holes and hole sizes are as standard in accordance with Eurovent 1/2. Mounting positions are in accordance with Eurovent for ACG – configuration B, motor position A and for ACP – configuration A, motor position A. See section "Calculation examples" on page 28. The motors are flange motors with electrical connection in terminal boxes.

The direction of airflow for ACG-ACP fans is motor - impeller.

Environments		Fan types	
		ACN-ACW	ARN
Airflow rates [m³/s]	Std. temp., ATEX and EX	0.1 to 65	5 to 50
	Hot-smoke	0.2 to 65	
Air pressures [Pa]	Std. temp., ATEX and EX	Up to 2000	Up to 1200
	Hot-smoke	Up to 1800	

Airflow and pressures

Environments		Fan types
		ACG-ACP
Airflow rates [m³/s]	Std. temp.	0.1 to 65
	Hot-smoke	0.2 to 65
Air pressures [Pa]	Std. temp.	Up to 2000
	Hot-smoke	Up to 2000

Airflow and pressures

Motor and fan combinations

The combinations of motors and fans are general.

Precise combinations of motors from specific suppliers and fans are available on direct request or via the AirBox calculation program.

ARN fans are available with hub sizes ø403 and ø578.

• = Standard temperature and ATEX fans

! = Standard Range fans (ACN)

Δ = Hot-smoke fans

Hub øD [mm]	Motor sizes	Fan sizes [mm]													
		ø250	ø315	ø400	ø500	ø560	ø630	ø710	ø800	ø900	ø1000	ø1120	ø1250	ø1400	ø1600
ø160	71	•	•	•	•										
	80		•	•	•										
	90			•	•										
ø230	71			•	•	•	•	•	•						
	80			•!	•	•	•	•	•						
	90			Δ	•Δ!	•Δ	•Δ	•Δ	•Δ						
	100			Δ	•Δ	•Δ	•Δ	•Δ	•Δ						
ø280	71				•	•	•	•	•	•					
	80				•	•	•	•	•	•					
	90				•Δ	•Δ!	•Δ	•Δ	•Δ	•Δ	•Δ				
	100				•Δ	•Δ	•Δ	•Δ!	•Δ	•Δ	•Δ				
	112				•Δ	•Δ!	•Δ	•Δ	•Δ	•Δ	•Δ				
ø330	80				•!	•	•	•	•	•					
	90				•Δ	•Δ	•Δ	•Δ	•Δ	•Δ	•Δ				
	100				•Δ	•Δ	•Δ!	•Δ	•Δ	•Δ	•Δ				
	112				•Δ	•Δ	•Δ	•Δ!	•Δ!	•Δ!	•Δ				
	132				•Δ	•Δ	•Δ!!	•Δ!	•Δ!	•Δ!	•Δ				
ø380	90					•Δ!	•Δ	•Δ	•Δ	•Δ	•Δ				
	100					•Δ	•Δ	•Δ	•Δ	•Δ	•Δ				
	112					•Δ	•Δ	•Δ	•Δ	•Δ	•Δ				
	132					•Δ	•Δ	•Δ	•Δ!	•Δ!	•Δ				
	160					•Δ	•Δ	•Δ!	•Δ	•Δ	•Δ!				
	180						•Δ	•Δ!	•Δ	•Δ	•Δ				
ø403	112											•Δ	•Δ		
	132									•Δ	•Δ	•Δ	•Δ	•Δ	
	160									•Δ	•Δ	•Δ!	•Δ	•Δ	
	180										•Δ	•Δ!	•Δ!	•Δ!	
ø578	132										•Δ	•Δ	•Δ		
	160									•Δ	•Δ	•Δ	•Δ	•Δ	
	180									•Δ	•Δ	•Δ!!	•Δ	•Δ	
	200										•Δ	•Δ!	•Δ!	•Δ!	•Δ
	225											•Δ	•Δ!	•Δ	•Δ
	250												•Δ!	•Δ	•Δ
	280 (ACN)													Δ	Δ

ACN, ACW and ARN

Hub øD [mm]	Motor sizes	Fan sizes [mm]													
		ø250	ø315	ø400	ø500	ø560	ø630	ø710	ø800	ø900	ø1000	ø1120	ø1250	ø1400	ø1600
ø160	71	•	•	•	•										
	80	•	•	•	•										
	90		•	•Δ	•Δ										
	100			•Δ	•Δ										
ø230	71			•	•	•	•	•	•						
	80			•	•	•	•	•	•						
	90			•Δ	•Δ	•Δ	•Δ	•Δ	•Δ						
	100			•Δ	•Δ	•Δ	•Δ	•Δ	•Δ						
ø280	71				•	•	•	•	•	•					
	80				•	•	•	•	•	•					
	90				•Δ	•Δ	•Δ	•Δ	•Δ	•Δ					
	100				•Δ	•Δ	•Δ	•Δ	•Δ	•Δ					
	112				•Δ	•Δ	•Δ	•Δ	•Δ	•Δ					
ø330	80				•	•	•	•	•	•					
	90				•Δ	•Δ	•Δ	•Δ	•Δ	•Δ					
	100				•Δ	•Δ	•Δ	•Δ	•Δ	•Δ					
	112				•Δ	•Δ	•Δ	•Δ	•Δ	•Δ					
	132				•Δ	•Δ	•Δ	•Δ	•Δ	•Δ					
ø380	90					•Δ	•Δ	•Δ	•Δ	•Δ	•Δ				
	100					•Δ	•Δ	•Δ	•Δ	•Δ	•Δ				
	112					•Δ	•Δ	•Δ	•Δ	•Δ	•Δ				
	132					•Δ	•Δ	•Δ	•Δ	•Δ	•Δ				
	160					•Δ	•Δ	•Δ	•Δ	•Δ	•Δ				
	180						•Δ	•Δ	•Δ	•Δ	•Δ				
ø403	112									Δ	Δ	•Δ			
	132									•Δ	•Δ	•Δ	•Δ		
	160									•Δ	•Δ	•Δ	•Δ	•Δ	
	180									•Δ ¹	•Δ	•Δ	•Δ	•Δ	
ø578	132									•Δ	•Δ	•Δ			
	160									•Δ	•Δ	•Δ	•Δ	•	
	180									•Δ	•Δ	•Δ	•Δ	•	
	200										•Δ	•Δ	•Δ	•Δ	•Δ
	225											•Δ	•Δ	•Δ	•Δ
	250												Δ	•Δ	•Δ

ACG and ACP ²

1. Hot-smoke fans with hub diameter ø403, motor size 180 and fan size ø900 are only made as type ACP.

2. ACG and ACP fans are unavailable for ATEX environments.

Standard Range

The fans in the Standard Range are based on sales statistics to include a number of the most sought after ACN type fans and are available with short delivery times. The analysis shows a demand for relatively small and high efficient fans. Bigger fans and fans with high air volumes are, however, also in the Standard Range.

The Standard Range comprises fans for temperatures from -20 to +50 °C as well as fans for hot-smoke applications. Hub sizes are between ø230 and ø578, and fan sizes between ø400 and ø1400.

The standardisation encompass impeller diameters, hub sizes, blade angles and motors. The fan configurations are locked with

respect to these parameters. It is, however, possible to fit parts from the accessory programme.

The Standard Range configurations are available in AirBox and calculate the same way as custom configurations.

Fans in the Standard Range are marked in the ACN performance curves for 1470 and 2900 RPM on the next pages. Please note that not all Standard Range fans are shown for all RPM.

Refer to AirBox and our website for fan details.

Item no.	ACN fan type	Airflow [m3/s]	Airflow [m3/h]	Total pressure [Pa]	Static pressure [Pa]	Fan eff. [%]	Power input [kW]	Fan RPM	Fan max. RPM
30041558	500/330-10 50°	1.4	5,000	330	300	66.2	0.868	1420	3977
30041559	400/230-6 40°	1.4	5,000	473	400	71.0	1.144	2830	4000
30041561	560/380-12 47°	2.1	7,500	343	300	64.9	1.315	1450	3674
30041565	500/230-6 39°	2.8	10,000	521	401	75.0	2.348	2870	4000
30041560	560/280-8 51°	2.8	10,000	276	200	73.9	1.240	1455	3755
30041564	630/330-10 52°	4.2	15,000	307	200	70.4	2.145	1435	3448
30041563	560/280-8 39°	4.2	15,000	672	500	75.0	4.186	2900	3755
30041562	710/280-8 51°	5.6	20,000	318	200	80.3	2.486	1440	3230
30041568	630/330-10 38°	5.6	20,000	790	600	73.2	6.919	2930	3448
30041566	710/330-10 58°	6.9	25,000	384	200	71.1	4.425	1450	3215
30041567	800/330-10 49°	6.9	25,000	415	301	79.0	4.150	1450	2973
30041570	630/330-10 44°	6.9	25,000	897	600	71.2	10.306	2925	3448
30041572	800/330-10 55°	8.3	30,000	465	300	74.7	5.925	1460	2973
30041569	800/380-12 56°	8.3	30,000	565	400	70.9	7.418	1460	2859
30041574	710/330-10 41°	8.3	30,000	966	700	77.5	11.950	2925	3215
30041571	710/380-12 40°	8.3	30,000	1,066	800	72.1	14.258	2945	3097
30041573	900/380-12 54°	11.1	40,000	583	400	74.7	9.861	1465	2651
30041576	710/380-12 47°	11.1	40,000	1,272	800	68.8	22.114	2950	3097
30041575	1000/380-12 52°	13.9	50,000	587	400	75.6	11.972	1465	2324
30041579	1120/578-10 40°	13.9	50,000	1,019	900	77.2	20.252	1470	1804
30041577	1120/403-6 45°	16.7	60,000	672	500	80.6	15.953	1465	1885
30041578	1120/403-6 47°	16.7	60,000	772	600	78.9	18.571	1470	1885
30041580	1120/578-10 47°	19.4	70,000	1,033	800	75.5	29.679	1470	1804
30041582	1120/578-10 51°	22.2	80,000	1,105	800	73.1	36.921	1480	1804
30041581	1250/403-6 49°	25.0	90,000	849	600	80.1	28.736	1470	1730
30041584	1400/403-6 45°	27.8	100,000	795	600	79.9	30.222	1470	1575
30041585	1400/578-10 41°	27.8	100,000	995	800	81.4	38.211	1480	1595
30041583	1250/578-10 46°	27.8	100,000	1,007	700	77.7	37.881	1480	1685
30041586	1250/578-10 49°	27.8	100,000	1,207	900	77.3	47.194	1475	1685
30041587	1250/578-10 50°	27.8	100,000	1,307	1,000	76.5	51.339	1480	1685

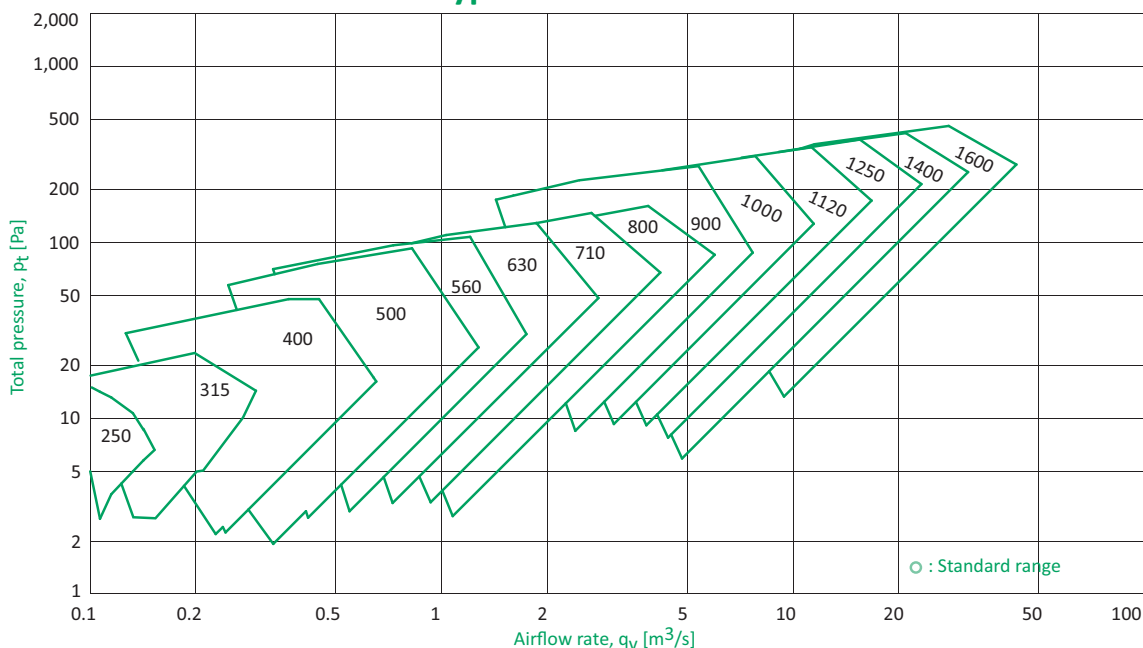
Performance curves — ACN

The diagrams show the coverage for each fan size without consideration of the hub diameter.

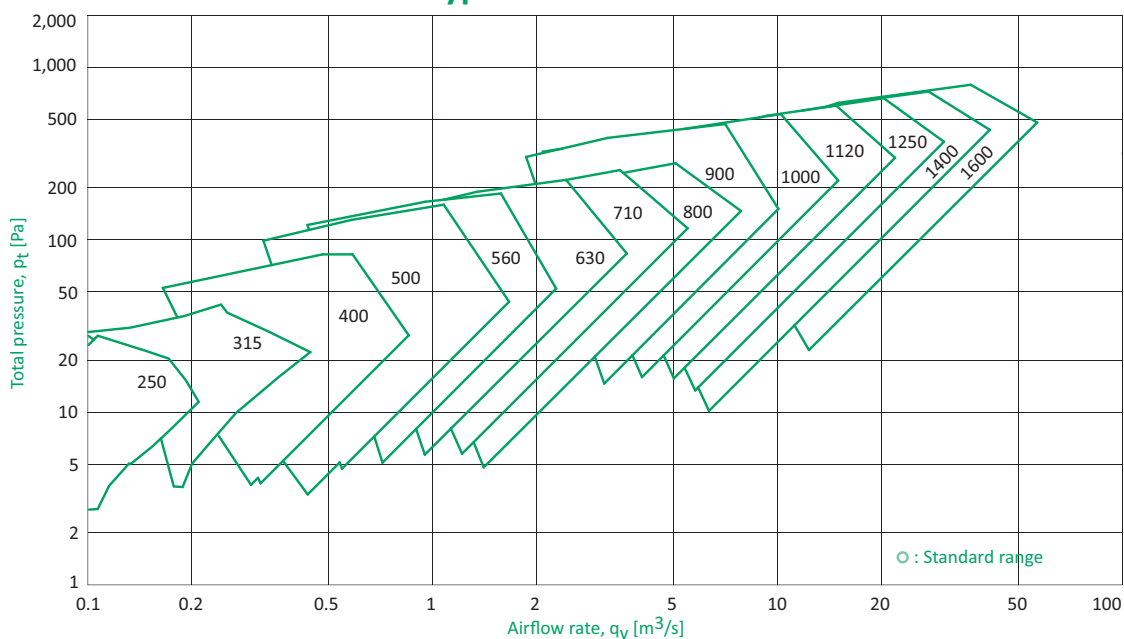
Final dimensioning, including calculation of blade angles, choice of motor, power consumption and sound calculation, is done with AirBox. See section "AirBox calculation program" on page 3.

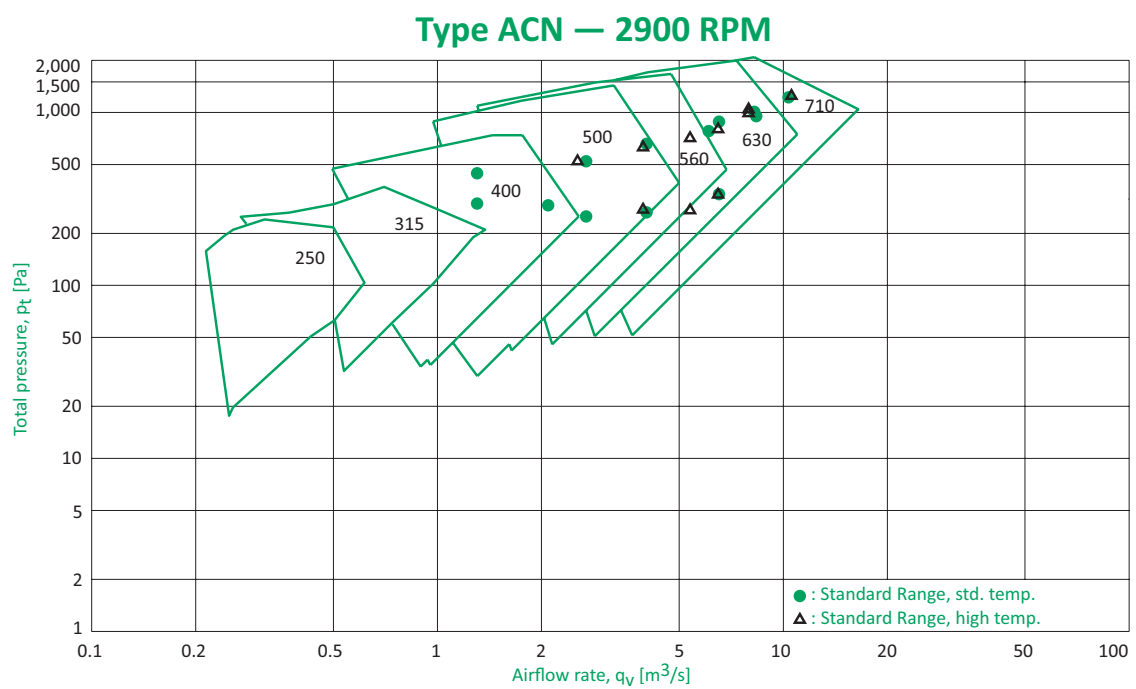
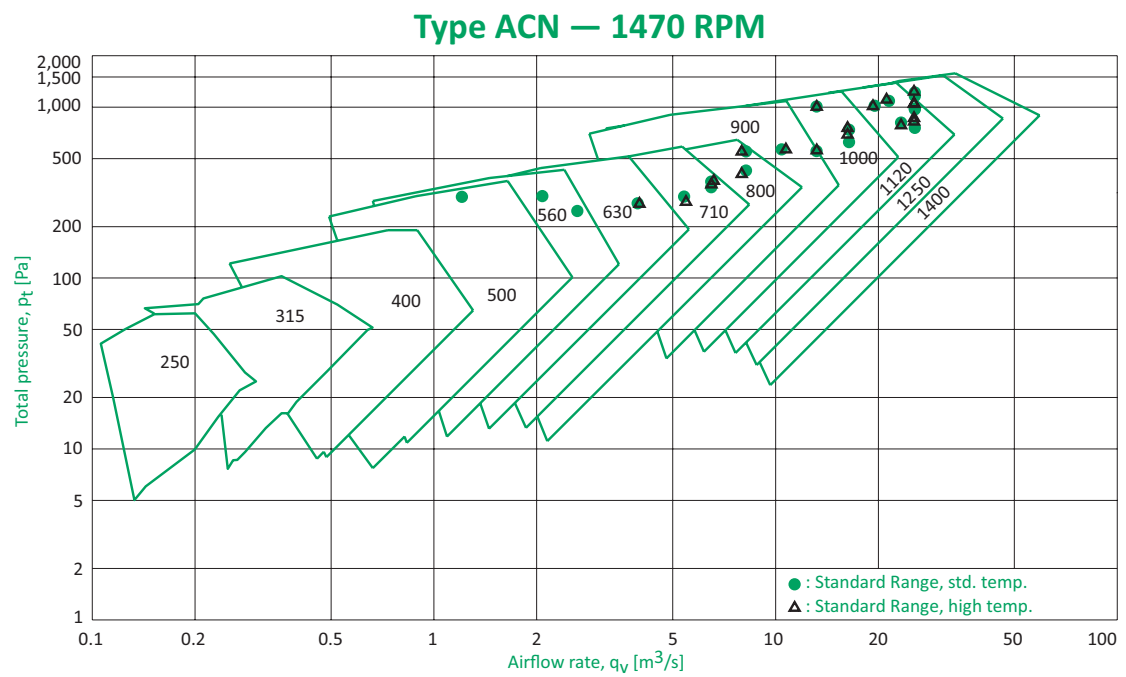
The capacities are based on fan installation in accordance with EN 5801, category D configuration, i.e. with an inlet duct and an outlet duct. Other installation types yield other data. The air density is $\rho = 1.20 \text{ kg/m}^3$.

Type ACN — 725 RPM



Type ACN — 970 RPM





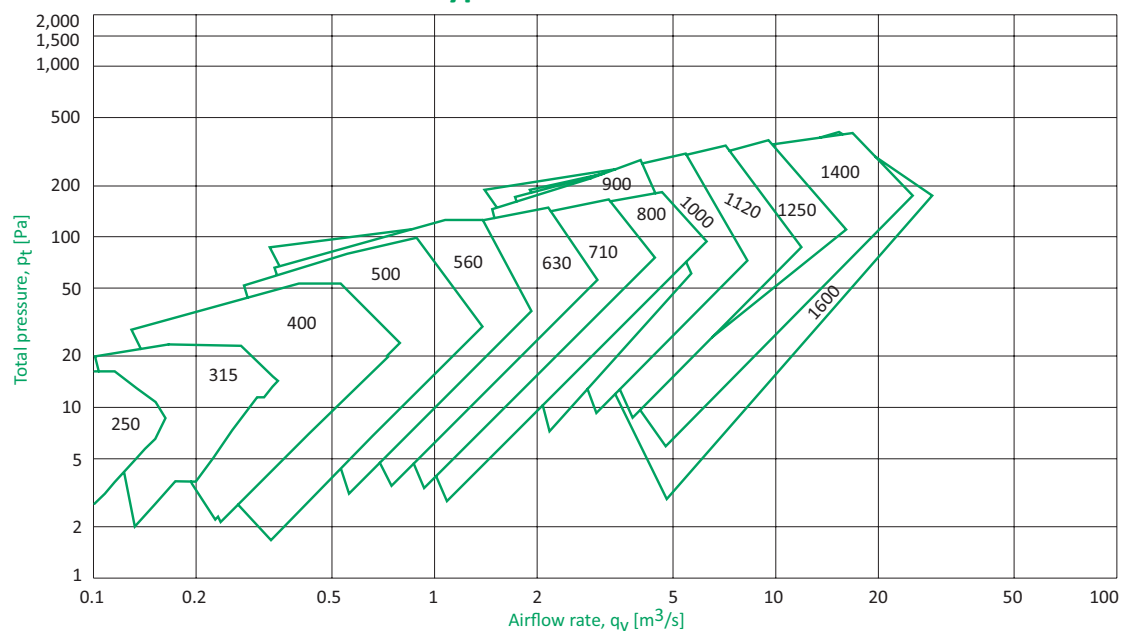
Performance curves — ACG

The diagrams show the coverage for each fan size without consideration of the hub diameter.

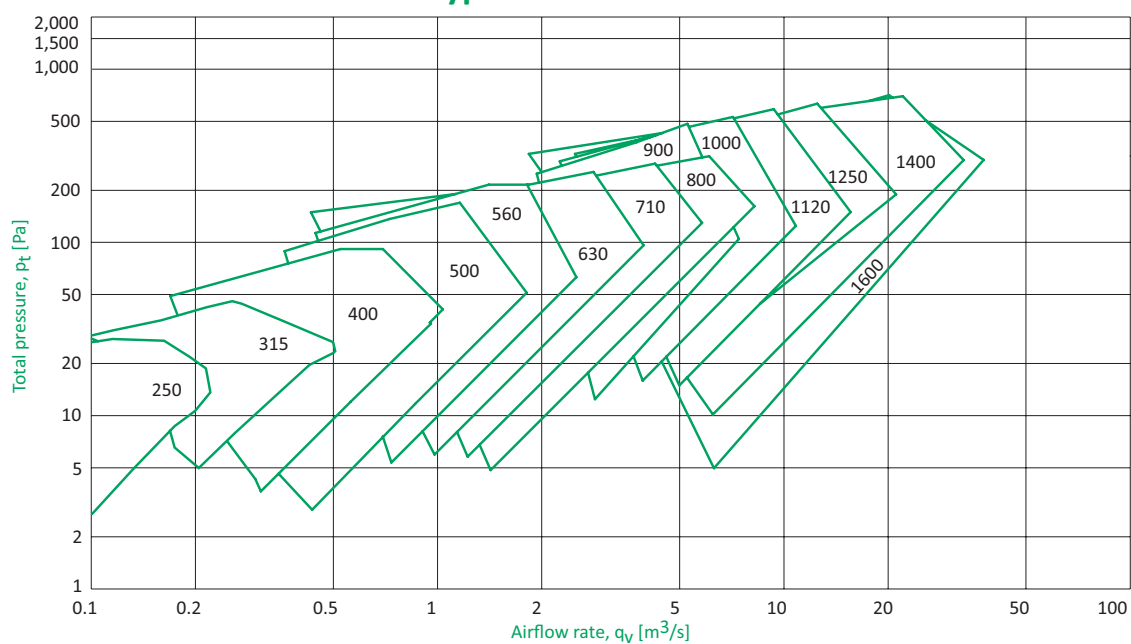
Final dimensioning, including calculation of blade angles, choice of motor, power consumption and sound calculation, is done with AirBox. See section "AirBox calculation program" on page 3.

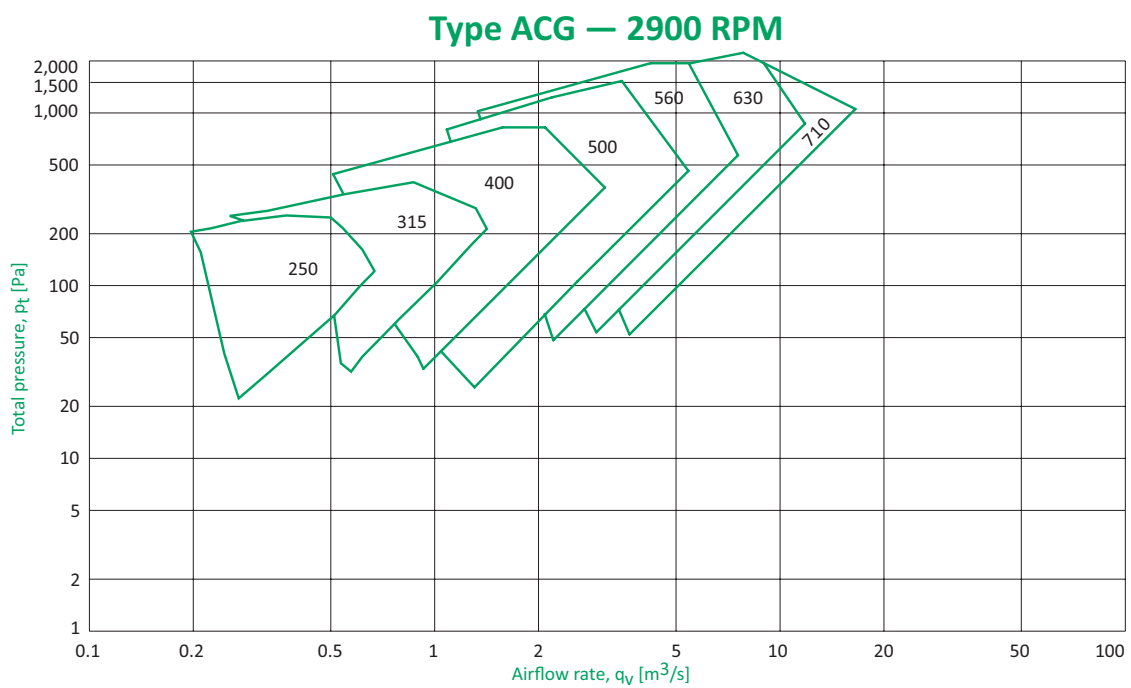
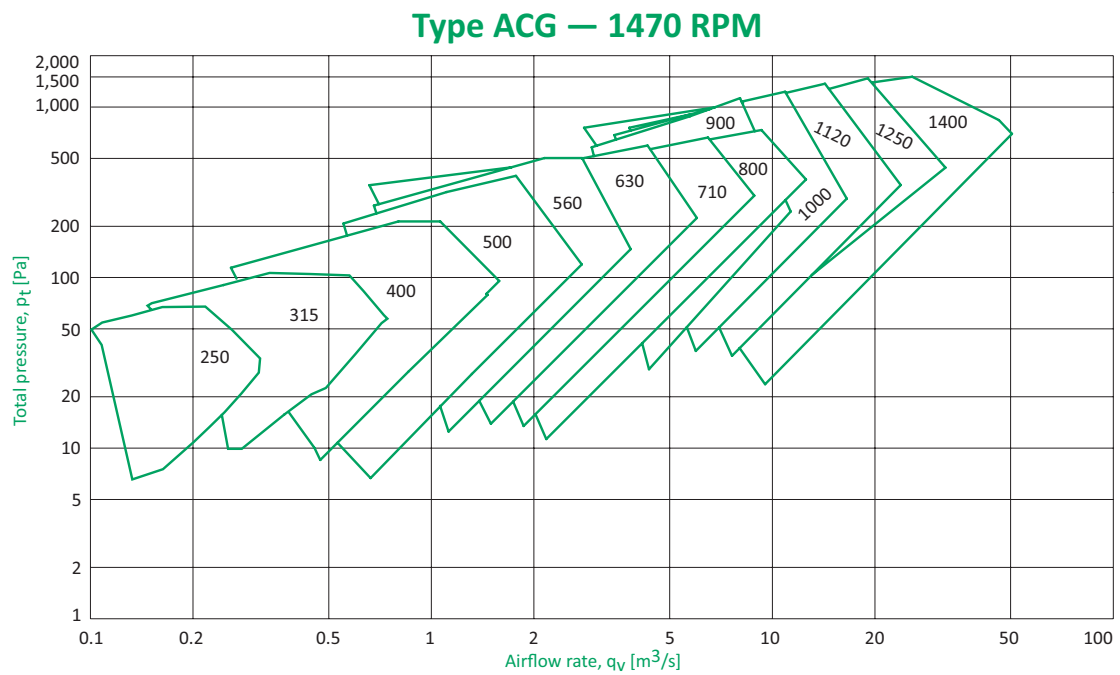
The capacities are based on fan installation in accordance with EN 5801, category B configuration, i.e. with free inlet and an outlet duct. Other installation types yield other data. The air density is $\rho = 1.20 \text{ kg/m}^3$.

Type ACG — 725 RPM



Type ACG — 970 RPM



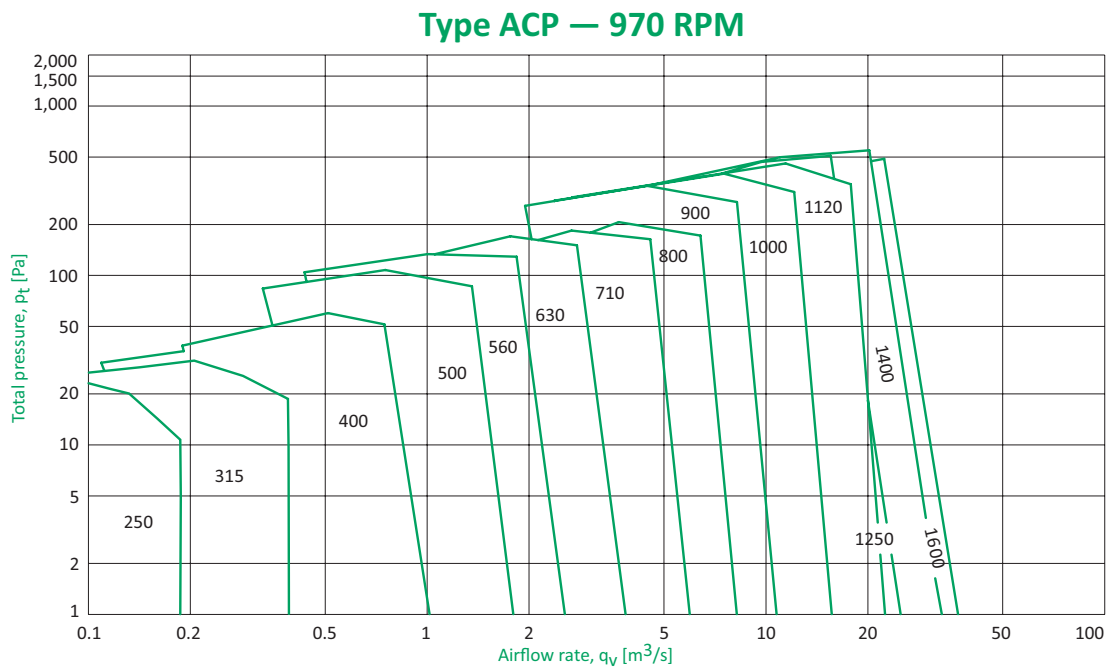
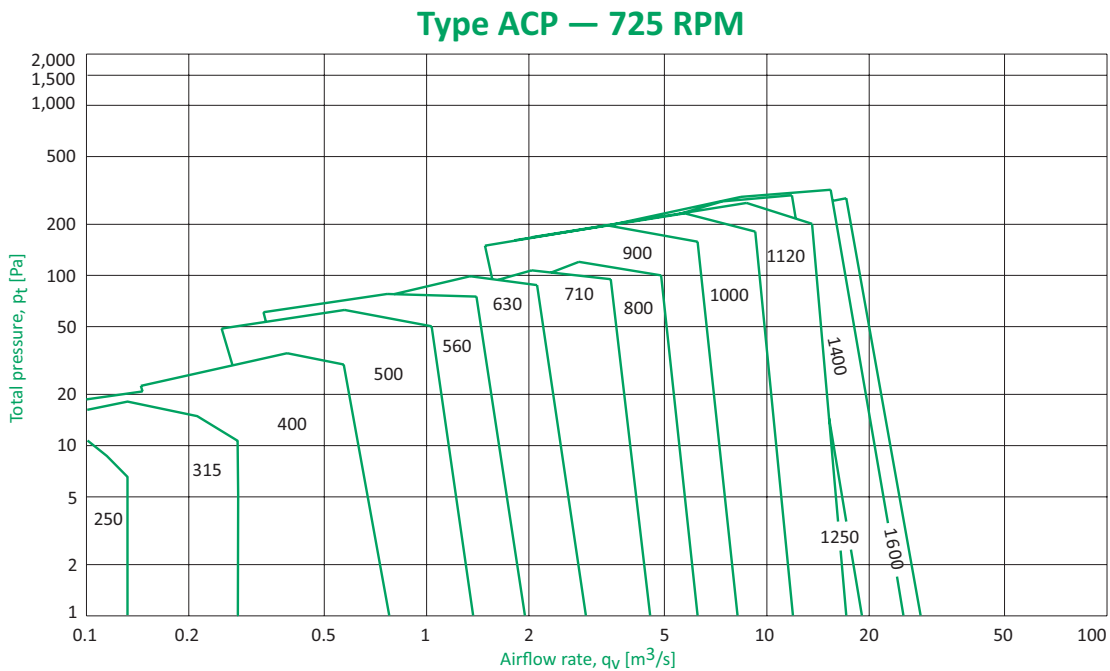


Performance curves — ACP

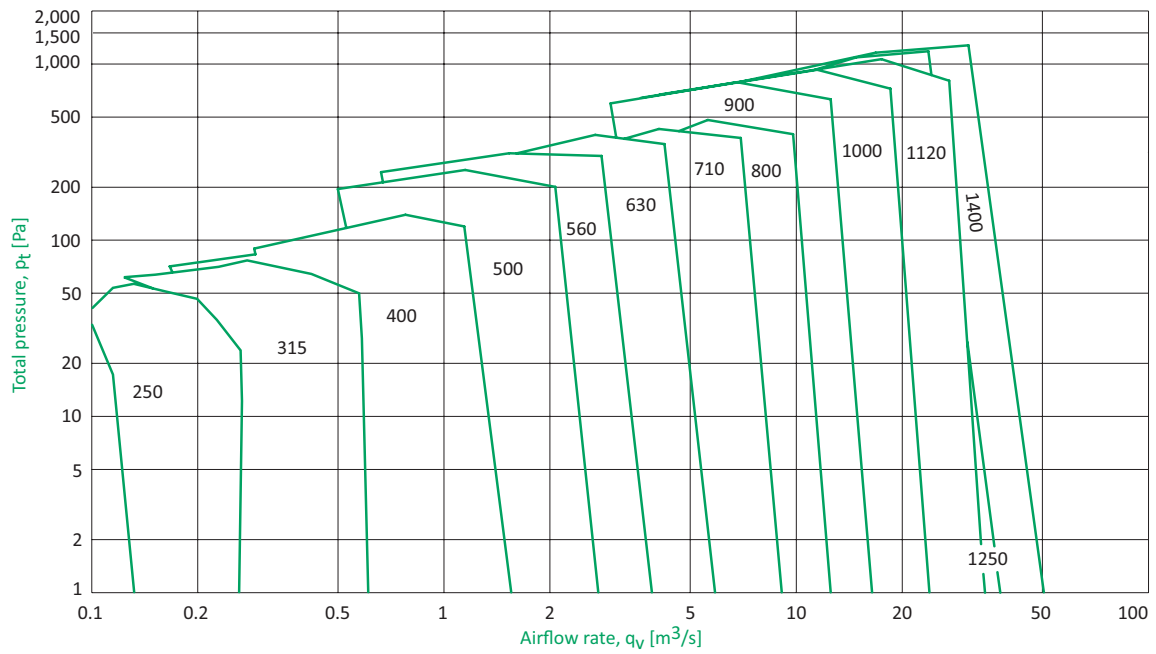
The diagrams show the coverage for each fan size without consideration of the hub diameter.

Final dimensioning, including calculation of blade angles, choice of motor, power consumption and sound calculation, is done with AirBox. See section "AirBox calculation program" on page 3.

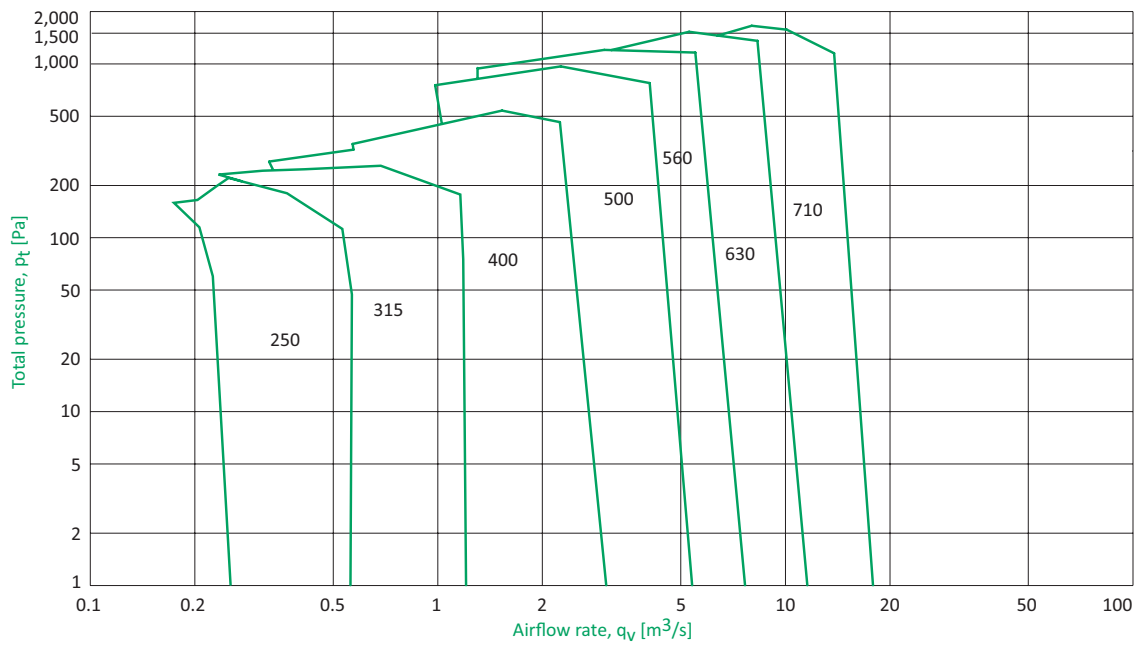
The capacities are based on fan installation in accordance with EN 5801, category B configuration, i.e. with free inlet and an outlet duct. Other installation types yield other data. The air density is $\rho = 1.20 \text{ kg/m}^3$.



Type ACP — 1470 RPM

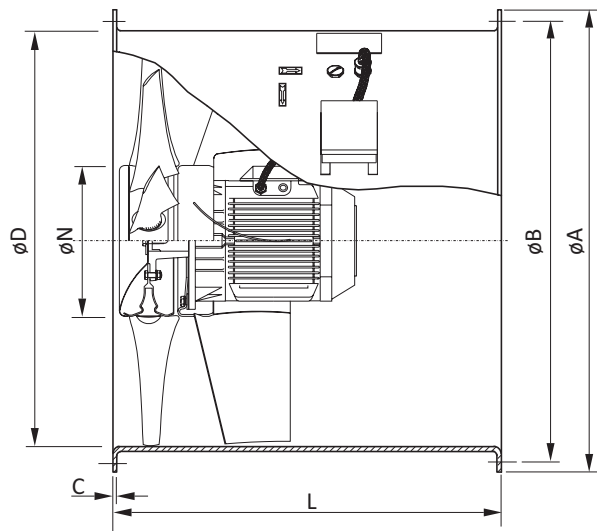
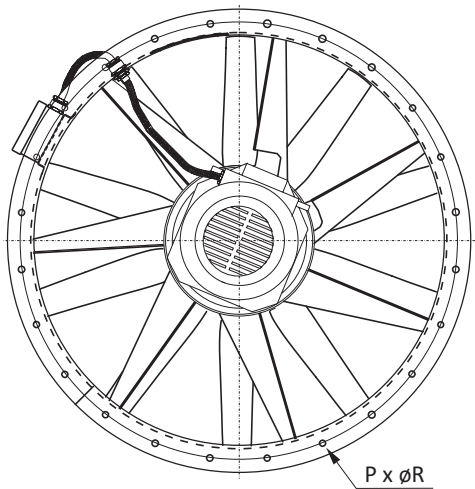


Type ACP — 2900 RPM



Dimensions

ACN, ACW and ARN



Hub diameter ØN [mm]	Motor size	Fan sizes [mm] ²																				
		ø250	ø315	ø400	ø500	ø560	ø630	ø710	ø800	ø900	ø1000	ø1120	ø1250	ø1400	ø1600							
øA ⁵	All	All	310	385	480	590	650	720	800	890	1000	1100	1220	1360	1510	1720						
			334	409 or 407	494 or 492	594 or 592	674 or 672	744 or 742	824 or 822	914 or 912	1015 or 1012	1115 or 1113	1255 or 1263	1385 or 1393	1535 or 1543	1745 or 1753						
280			355	450	560	620	690	770	860	970	1070	1190	1320	1470	1680							
292			366	448	551	629	698	775	861	958	1067	1200	1337	1491	1663							
250			315	400	500	560	630	710	800	900	1000	1120	1250	1400	1600							
4			8	8	12	12	12	16	16	16	16	20	20	20	24							
8			8	12	12	16	16	16	24	24	24	32	32	32	40							
10			10	12	12	12	12	12	12	15	15	15	15	15	19							
12			12	12	12	14	14	14	14	14	14	18	18	18	18							
C ³			All	All	2	2	3	3	3	3	3	3	3 or 4 ¹	3 or 4 ¹	3 or 4 ¹	4	4					
	6	6 or 10			6 or 10	6 or 10	6 or 10	6 or 10	6 or 10	6 or 10	6 or 10	6 or 10	6 or 10	6 or 10	6 or 10	6 or 10						
L	160-380		360	400	520	560	620	620	730	750	850	900										
Max. weight, without motor [kg] ⁵			11	14	27	42	55	60	73	82	98	134										
			23	32 or 44	48 or 68	69 or 96	90 or 123	99 or 137	121 or 172	138 or 195	166 or 239	190 or 278										
L	403		112											650	750							
			132											850	750	650	750	850				
			160											850	750	750	750	850				
			180												900	850	850	850				
Max. weight, without motor [kg] ⁵													117	154	167	184	202					
													182 or 256	207 or 294	260 or 365	306 or 437	351 or 506					
L	578		132											750	650	750						
			160											850	750	750	750	850				
			180											850	900	850	850	850				
			200												900	950	950	950	900			
			225																950	950	950	1120
			250																	1060	1120	1120
			280																			1120
Max. weight, without motor [kg] ⁵													153	192	219	269	329	366				
													217 or 291	243 or 330	300 or 405	350 or 481	425 or 580	497 or 675				

1. Depends on motor size

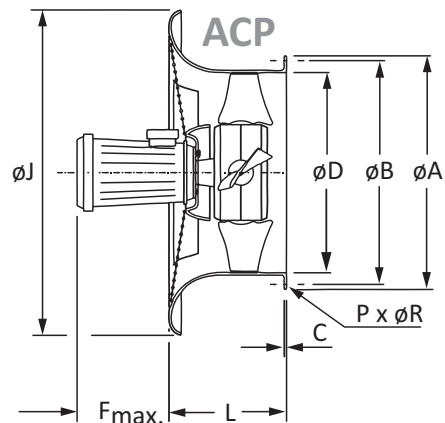
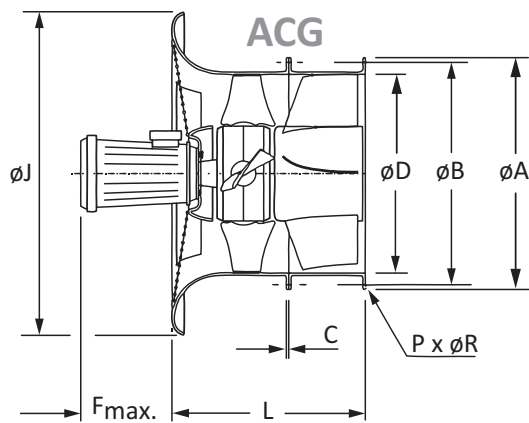
2. ARN fans are limited to fan sizes Ø900 to Ø1600.

3. Top values indicate fan housing thickness for ACN and ARN. Bottom values are for ACW.

4. Top values apply to ACN and ARN. Bottom values are for ACW. Single values apply to all fan types.

5. Top values apply to ACN and ARN. Bottom values are for ACW with fan housing thicknesses of 6 (1st) or 10 mm.

ACG AND ACP



	Hub diameter øN [mm]	Motor size	Fan sizes [mm] ⁴													
			ø250	ø315	ø400	ø500	ø560	ø630	ø710	ø800	ø900	ø1000	ø1120	ø1250	ø1400	ø1600
øA	All	All	310	385	480	590	650	720	800	890	1000	1100	1220	1360	1510	1720
øB			280	355	450	560	620	690	770	860	970	1070	1190	1320	1470	1680
øD			250	315	400	500	560	630	710	800	900	1000	1120	1250	1400	1600
P			4	8	8	12	12	12	16	16	16	16	20	20	20	24
øR			10	10	12	12	12	12	12	12	15	15	15	15	15	19

ACG and ACP

	Hub diameter øN [mm]	Motor size	Fan sizes [mm] ⁴														
			ø250	ø315	ø400	ø500	ø560	ø630	ø710	ø800	ø900	ø1000	ø1120	ø1250	ø1400	ø1600	
C	All	All	2.5	2.5	3	3	3	3	3	3	3	3	3	4	4	4	
øJ			333	420	545	675	760	840	950	1055	1200	1333	1500	1650	1800	2000	
L																	
F _{Max}			197	235	259	259											
Max. weight, no motor [kg]			13	16	24	30											
L	230-578	All	355			355	410	415	415	410	430/665 ²	450/687 ²	715	739	739	739	
F _{Max}			197	235	250	370	479	544	505	510	490	470	610	579	644	644	
Max. weight, no motor [kg]					26	40	52	57	65	72	139 ³	171 ³	188 ³	234 ³	258 ³	297 ³	

ACG

	Hub diameter øN [mm]	Motor size	Fan sizes [mm] ⁴															
			ø250	ø315	ø400	ø500	ø560	ø630	ø710	ø800	ø900	ø1000	ø1120	ø1250	ø1400	ø1600		
C	All	All	2.5	2.5	3	3	3	3	3	3	3	3	3	4	4	4		
øJ			333	420	545	675	768	840	950	1055	1200	1332	1500	1650	1800	2000		
L																		
F _{Max}			160	200	200	205	205											
Max. weight, no motor [kg]			197	235	259	259												
			9	11	15	19												
L	230-578	All	200	200	205	205	260	265	265	260	280/415 ²	300/437 ²	465	489	489	489		
F _{Max}			197	235	250	370	479	544	505	510	490	470	610	579	644	644		
Max. weight, no motor [kg]					18	28	38	42	48	53	106 ³	134 ³	147 ³	188 ³	207 ³	238 ³		

ACP

1. F_{Max} is the maximum dimension based on motor make type ABB.

2. Values on the left are for fan size ø900 with ø280 hub and for fan size ø1000 with ø380 hub. Values on the right are for all other hub diameters.

3. For hub diameter ø578 mm. The weight is lower for other hub diameters.

4. ACP-ACG fans size ø1250 with ø578 hubs and motor size 132 are unavailable.

Accessories

Anti-vibration mounts

The prevention of vibrations spreading between fan units and the installation environment, and vice versa, is effectively achievable with anti-vibration mounts. The kind of mounts depends on the fan size. Smaller and medium fans are typically fitted with cylindrical rubber discs on the support frame or on the mounting plates. Larger fans are fitted with steel springs as rubber discs cannot provide sufficient damping due to heavy weight and low speeds.

The anti-vibration mounts are available in different size combinations. Types and sizes are dimensioned by Novenco based on fan type and size, air pressure and accessories.

Counter flanges

Counter flanges duplicate the hole patterns of the fan flanges. They are produced in different kinds of materials depending on the intended use. Counter flanges in sheet steel are for welding on to existing ducts to enable fan attachment, while counter flanges

in galvanised material are for installation as backing on wall-like surfaces.



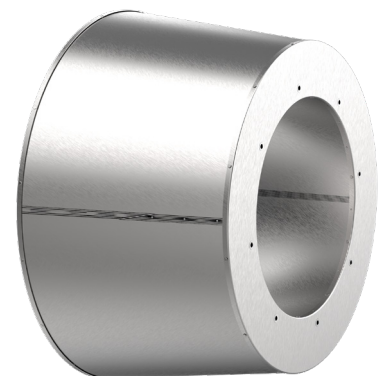
Anti-vibration mounts

Dampers

Dampers shut off, regulate and mix airflows in ventilation systems and air-handling installations.

Diffusers and acoustic diffusers

The diffusers are for use in installations for comfort and industrial ventilation. The basic versions have limited noise reduction capabilities, smooth airflow, reduce pressure loss and are available in short or long lengths. The acoustic diffusers attenuate noise well and are available with cores for removal of high frequency sounds.



Acoustic diffuser type YAD

Fan features	ACN-ARN	ACW	ACG	ACP
Acoustic diffusers with or without cores	YAD	YAD	YAD	YAD
Certificates (works, weight, balancing, test)	•	•	•	•
Diffusers for outlet (short or long)	•	•	•	•
Duct pieces with wire guards	•	•	•	•
Inlet cone with wire guard ⁵	•	•		
Inspection hatch	•	•		
Measuring pipes			•	•
Outlet guide vane arrangement ⁴				•
Silencers with or without cores ¹	YAH	YAH	YAH	YAH
Spark-proof linings ³	o	o		
Wire flange (pressure side)	•	•		
Wire guards for inlet and outlet ^{2 5}	•	•	•	•
Connection				
Counter flanges	•	•	•	•
Duct spigots	•	•	•	•
Flexible connections (PERL / Maritex)	•	•	•	•
Welding spigots	•	•	•	•
External				
Dampers	SBC	SBA	SBC	SBC
Roof hoods	HAN	HAT		
Motor				
Frequency converters	•	•	•	•
Kit for lubrication ⁶	•	•		
Low temperature	•	•		•
Marine classification	•	•	•	•
Space heater	•	•	•	•
Thermal protection	•	•	•	•
Mounting				
Anti-vibration mounts	•		•	•
Support frames for horizontal mounting	•	•	•	•
Vertical mounting plates	•		•	•

• = All versions ; o = Limited programme availability

1. A standard clamping ring is used for joining two silencers type YAH. It is inadvisable to join more than two silencers with standard clamping rings.
2. Wire guards for fan housings come with an installation duct for sizes up to and including ø1000.
3. The number of versions with spark-proof lining is limited by the blade angle. Information on versions offered with spark-proof linings is available on request and in the AirBox calculation program.
4. The ACG is as standard fitted with outlet guide vanes. The ACP can be retrofitted with outlet guide vanes and is then identical to the ACG.
5. Installation of a wire guard in the inlet cone reduces the total pressure by 2%. A wire guard in the duct reduces the dynamic pressure by 5%.
6. The kits are for WEG motor sizes 160 and 180. Smaller sizes are greased for life and bigger sizes are fitted with grease nipples as standard. Refer to the motor manufacturer's documentation.

Duct and welding spigots

Duct spigots mount on to the fan flanges and allow for connection to ducts by clamping rings.

Welding spigots mount on the fan flanges and allow for connection to ducts by welding ducts directly on to the spigots.

Flexible connections

The flexible material in these connections absorb vibrations from the fans and ducts. The pressure loss is minimal due to the strength and short length of the material. Versions with one or two connection spigots are available.



Flexible connection

Inlet cones

Inlet cones screw directly on to the fan flanges. They even out the inlet airflow, improve performance and reduce the noise level.

Inspection hatches

The hatches are square holes in the fan housing, which are closed off with metal hatches. The hatches are for verification purposes.

Roof hoods

The roof hoods prevent ingress of wind, rain and objects in the ventilation systems with subsequent noise-generation and clogging. The design and materials of the hoods are very durable.

Silencers

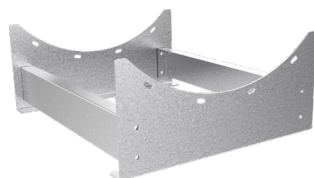
Silencers have round connection profiles, attenuate noise in installations and are available with or without cores. Versions with cores remove high frequency sounds. Two silencers can be joined with a standard clamping ring. More than two silencers in series require other measures for joining.

Spark-proof linings

The linings prevent flying of sparks from blade tips in case these come in contact with the fan housing. The material is either aluminium for ATEX or brass for EX fans. Brass executions are primarily for marine environments.

Support frames and vertical mounting plates

Support frames are for fan installations where the configurations become too heavy or where there, for example, is a need for an elevated fan position. The frames are of sheet steel and can be fitted with anti-vibration mounts.



Support frame

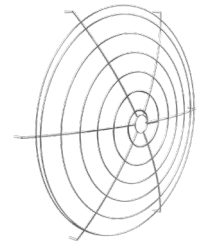
Mounting plates for installation on to walls or other plane surfaces are also part of the mounting accessory programme.

Wire guards for inlet cones and ducts

Wire guards for mounting on fans with free inlets prevent contact with the impellers and stop objects from entering the fans. These guard nets attach with screws to inlet cones or in ducts.

Duct pieces and inlet cones with integrated wire guards for flange mounting are also available.

Use of wire guards causes a loss of 2% of the total pressure when fitted on inlet cones and a loss of 5% of the dynamic pressure when fitted in ducts.



Wire guard for inlet cone

Frequency converters

Frequency converters facilitate full and optimal fan control, enable efficient operation and reduce energy consumption through effective management of energy and fan motors. This is possible as the converters remove the limitations of fixed power grid frequencies. The converters can be used with all NovAx fan types and environments.

The use of permanent magnet (PM) motors with NovAx fans requires connection and control through frequency converters. Direct connection of PM motors to power sources damages the motors and voids the warranty. Additionally, alternating current (AC) motors can also be used with frequency converters.

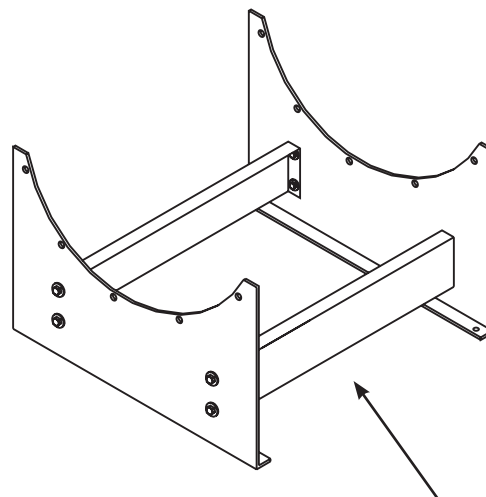
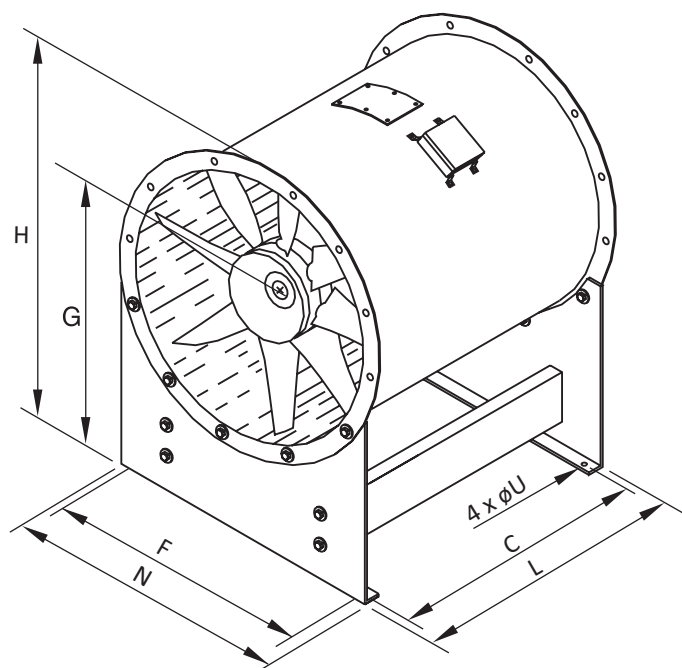
Benefits

- Reduction of fan and motor wear through smooth control
- Better motor reversal control
- Reduction of harmonics
- Higher power factor
- Lower noise levels
- Reduction of operation and maintenance costs, i.e. low total cost of ownership (TCO)
- Flexible integration with new and existing automation systems
- Manual and remote operation possible

Calculation of the total system efficiency is done by multiplication of all the system component efficiencies.

$$\text{Total efficiency} = \text{Fan} \times \text{Motor} \times \text{Frequency converter}$$

Support frames for ACN, ACW and ARN



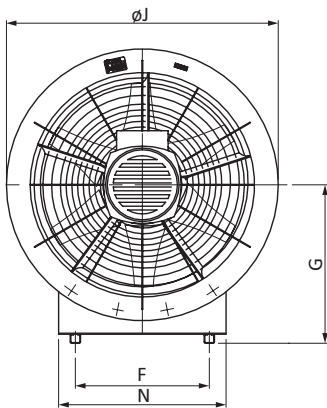
Two braces from size 630 to 1600

	Fan sizes [mm]													
	ø250	ø315	ø400	ø500	ø560	ø630	ø710	ø800	ø900 ¹	ø1000 ¹	ø1120	ø1250	ø1400	ø1600
G	240	280	330	390	440	480	530	580	680	740	800	850	925	1025
H	395	473	570	685	765	840	930	1025	1180	1290	1410	1530	1680	1885
C ²	296	336	454	494	554	554	664	684	794/784	834/832	882	992	1052	1052
L ²	360	400	520	560	620	620	730	735	835	885	950	1060	1120	1120
F ²	170	200	250	325	370	400	450	520	590	680/670	750	810	920	1060
N	260	290	360	435	480	530	580	650	720	800	880	980	1090	1230
øU	8	8	8	10	12	12	12	12	12	12	14	14	14	14
Weight [kg]	1.5	2.8	3.8	4.4	7.2	11.4	13.2	14.9	21.0	23.5	26.0	32.6	34.6	46.5

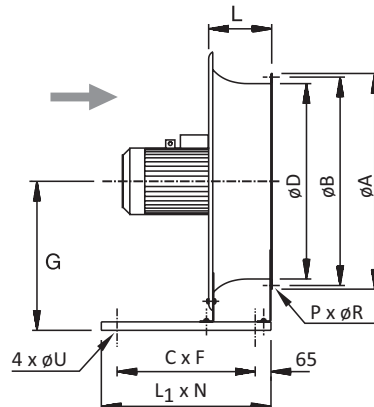
1. In cells with dual values, the values on the left are for hub diameters ø230- ø380 while values on the right are for hub diameters ø403- ø578.

2. The specified data is based on maximum fan housing length. Other lengths have other data.

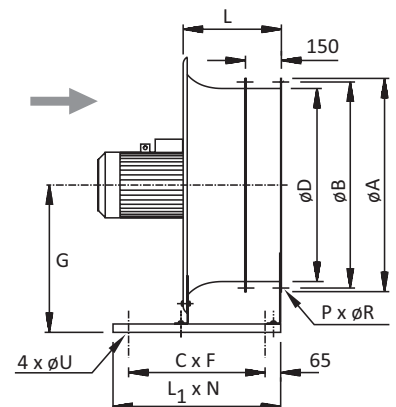
Support frames for ACG AND ACP - vertical mounting plates for all fans



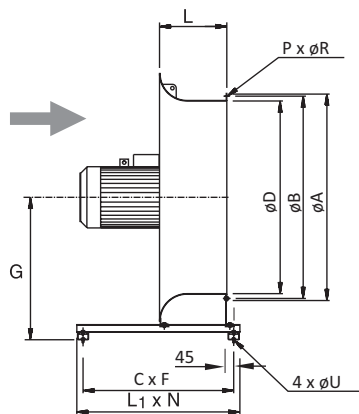
Support frame for ACG and ACP
all hub sizes



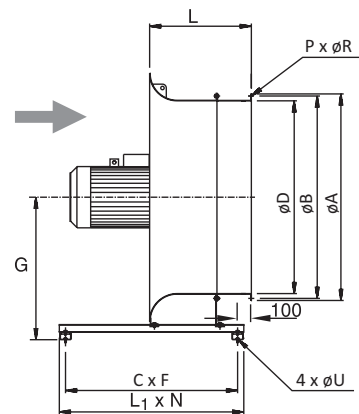
Support frame for ACP
hub sizes $\phi 160 - \phi 380$



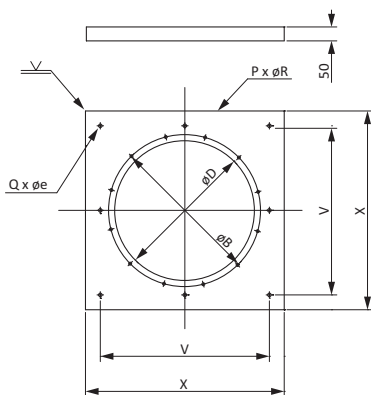
Support frame for ACG
hub sizes $\phi 160 - \phi 380$



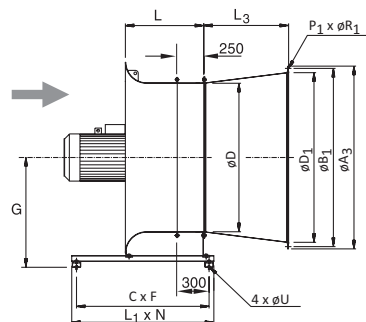
Support frame for ACP
hub sizes $\phi 403$ and $\phi 578$



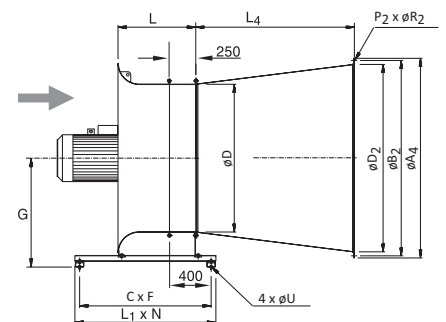
Support frame for ACG
hub sizes $\phi 403$ and $\phi 578$



Vertical mounting plate



Support frame for ACG with
short diffuser - hub sizes $\phi 403$ and $\phi 578$



Support frame for ACG with
long diffuser - hub sizes $\phi 403$ and $\phi 578$

The ϕA , ϕB , ϕD , L , P and ϕR dimensions are found on pages 15 to 16. Other dimensions are on the next page.

		Fan sizes [mm]													
		ø250	ø315	ø400	ø500	ø560	ø630	ø710	ø800	ø900	ø1000	ø1120	ø1250	ø1400	ø1600
Vertical mounting plates	øB	280	355	450	560	620	690	770	860	970	1070	1190	1320	1470	1680
	øD	250	315	400	510	570	640	720	810	910	1010	1130	1260	1410	1610
	øe	8	8	12	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5
	Q ⁴	8	8	8	4	4	4	4	4	4	4	4	4	4	4
	P	4	8	8	12	12	12	16	16	16	16	20	20	20	24
	øR	10	10	12	12	12	12	12	12	15	15	15	15	15	19
	V	544	544	544	745	805	875	954	1044	1142	1242	1362	1492	1640	1850
	X	600	600	600	830	890	960	1040	1130	1230	1330	1450	1580	1730	1930
	Weight [kg]	9.8	9.1	8.0	12.4	13.7	15.2	20.2	22.6	33.6	37.5	42.2	47.6	66.2	77.3
Support frames for ACG / ACP	øJ	333	420	545	675	768	840	947	1055	1200	1333	1500	1650	1800	2000
	G ¹	275	315	365	425	475	515	565	615	715/790	775/850	910	960	1035	1135
	C	420	420	420	420	420	570	570	570	570/1120 /1000 ²	770/1120 /1000 ²	1120	1250 /1120 ³	1250	1250
	F	170	200	250	325	370	400	450	520	590	670	750	810	920	1060
	L ₁ ¹	550	550	550	550	550	700	700	700	700/1210	900/1210	1210	1340	1340	1340
	N ¹	260	290	360	435	480	530	580	650	720/900	800/1000	1120	1250	1400	1600
	øU	12	12	12	12	12	12	12	12	12	12	12	12	12	12
	Weight [kg]	5.7	5.7	5.7	6.3	8.5	10.2	11.2	12.2	15.3	18.1	61.8	62.1	68.6	76.7

	Support frame for ACG with short diffusers					
	ø900	ø1000	ø1120	ø1250	ø1400	ø1600
L3	400	500	560	600	800	800
øD1	1000	1120	1250	1400	1600	1800
øB1	1070	1190	1320	1470	1680	1880
øA3	1103	1223	1363	1513	1723	1923
P1	16	20	20	20	24	24
øR1	15	15	15	15	19	19
Weight, diffuser [kg]	33	40	48	57	77	86
G	790	850	910	960	1035	1135
C	1120 /1000 ³	1120 /1000 ³	1120	1250 /1120 ³	1250	1250
F	590	670	750	810	920	1060
L1	1210	1210	1210	1340	1340	1340
N	900	1000	1120	1250	1400	1600
øU	12	12	12	12	12	12
Weight, support frame [kg]	52.4	57.2	61.8	62.1	68.6	76.7

	Support frame for ACG with long diffusers					
	ø900	ø1000	ø1120	ø1250	ø1400	ø1600
L4	900	1000	1100	1400	1600	1600
øD2	1120	1250	1400	1600	1800	2000
øB2	1190	1320	1470	1680	1880	2080
øA4	1223	1363	1513	1723	1923	2123
P2	20	20	20	24	24	24
øR2	15	15	15	15	19	19
Weight, diffuser [kg]	52	62	74	102	123	139
G	790	850	910	960	1035	1135
C	1120 /1000 ³	1120 /1000 ³	1120	1250 /1120 ³	1250	1250
F	590	670	750	810	920	1060
L1	1210	1210	1210	1340	1340	1340
N	900	1000	1120	1250	1400	1600
øU	12	12	12	12	12	12
Weight, support frame [kg]	52.4	57.2	61.8	63.8	68.6	76.7

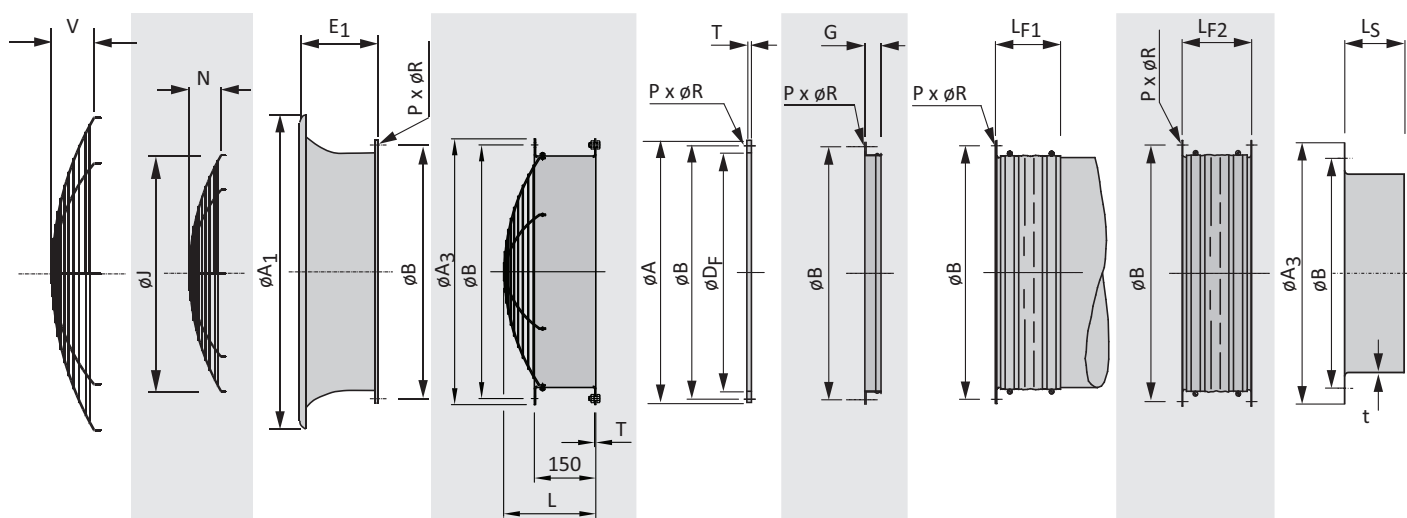
1. In cells with two values, the right are for hub diameters ø403 and ø578.

2. The first value is for hub diameters ø160 to ø380. The second and third values are for hub diameters ø403 and ø578.

3. The first value is for ACG and the second is for ACP.

4. Vertical mounting plates for fan sizes ø400 and up have a fixation bolt in each corner.

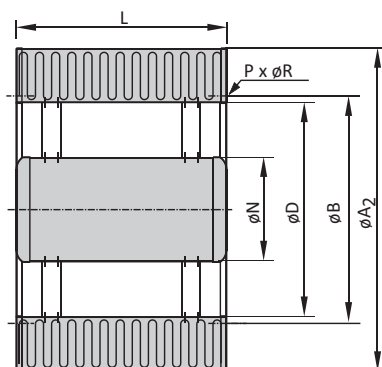
Wire guards, flanges, spigots etc. for all NovAx types



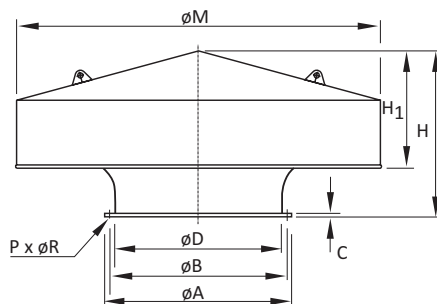
		Fan sizes [mm]													
		$\phi 250$	$\phi 315$	$\phi 400$	$\phi 500$	$\phi 560$	$\phi 630$	$\phi 710$	$\phi 800$	$\phi 900$	$\phi 1000$	$\phi 1120$	$\phi 1250$	$\phi 1400$	$\phi 1600$
Wire guards for inlet cones	V	29	43	68	55	69	87	111	137	85	106	133	133	171	218
	Weight [kg]	0.1	0.2	0.3	0.5	0.6	0.8	0.9	1.1	2.5	3.0	3.6	3.6	4.2	5.7
Wire guards for ducts	N	19	29	43	68	88	55	69	87	111	137	85	106	133	171
	ϕJ	246	310	396	496	556	626	706	796	896	996	1114	1244	1394	1594
	Weight [kg]	0.1	0.1	0.2	0.3	0.3	0.5	0.6	0.8	0.9	1.1	2.5	3.0	3.6	4.2
Inlet cones	E1	200	200	205	205	260	265	265	260	280	300	325	355	383	420
	ϕA_1	333	420	545	675	760	840	947	1055	1200	1333	1520	1650	1800	2000
	Weight [kg]	4.5	5.5	9.5	12.5	17	19	22	26	32	38	45	51	57	66
Duct pieces with wire guard	L	155	164	178	203	223	190	204	222	246	272				
	T	2	2	3	3	3	3	3	3	3	3				
	Weight [kg]	2.6	3.5	6.8	8.9	10	11.3	12.8	14.5	17	18.9				
Counter flanges	T	4	4	4	4	4	4	4	4	8	8	8	8	8	8
	ϕD_F	260	325	410	510	570	640	720	810	910	1010	1130	1260	1410	1610
	Weight [kg]	0.7	1.1	1.5	2.2	2.4	2.7	3.0	3.4	8.5	9.4	10.2	12.2	14.2	17.2
Duct spigots	G	55	55	55	55	55	55	55	55	85	85	85	85	85	85
	Weight [kg]	1.0	1.4	1.9	2.4	2.7	3.1	3.5	3.9	5.9	6.6	7.4	8.5	9.5	11.3
Flexible connections	L_F	Min. 65 - Max. 100									Min. 110 - Max. 175				
	Weight w.1 spigot [kg]	1.3	1.7	2.3	3.0	3.5	3.8	4.3	5.0	7.8	8.9	10.0	11.6	13.1	20.0
	L_F	Min. 120 - Max. 145									Min. 210 - Max. 250				
	Weight w.2 spigots [kg]	2.3	3.0	4.2	5.5	6.2	6.9	7.8	8.8	13.7	15.5	17.4	20.2	22.7	26.6
Welding spigots	L_S	100	100	100	100	100	120	120	120	120	150	150	150	150	150
	t	4	4	4	4	4	6	6	6	6	6	6	6	6	6
	ϕB	280	355	450	560	620	690	770	860	970	1070	1190	1320	1470	1680
	ϕA_3	310	385	480	590	650	720	800	890	1000	1100	1220	1360	1510	1720
	Weight [kg]	3.1	3.9	5.4	6.7	7.5	15.0	16.9	19.0	21.4	29.0	32.4	36.2	40.5	46.3

The ϕA and $P \times \phi R$ dimensions are found on pages 15 and 16.

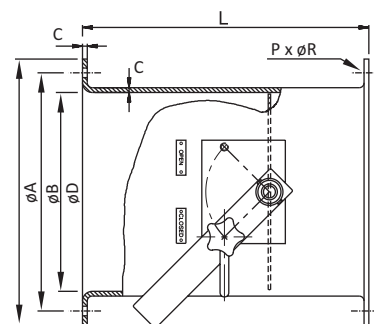
Silencers, hoods and dampers



Silencer type YAH



Hood type HAN



Damper type SBC

		Fan sizes [mm]													
		Ø250	Ø315	Ø400	Ø500	Ø560	Ø630	Ø710	Ø800	Ø900	Ø1000	Ø1120	Ø1250	Ø1400	Ø1600
All	ØD	250	315	400	500	560	630	710	800	900	1000	1120	1250	1400	1600
	ØB	280	355	450	560	620	690	770	860	970	1070	1190	1320	1470	1680
	ØA	310	385	480	590	650	720	800	890	1000	1100	1220	1360	1510	1720
	P [number]	4	8	8	12	12	12	16	16	16	16	20	20	20	24
	ØR	10	10	12	12	12	12	12	12	15	15	15	15	15	19
Silencers type YAH	L	250	315	400	500	560	630	710	800	900	1000	1120	1250	1400	1600
	ØN	125	160	200	250	280	315	355	400	450	500	560	578	578	578
	ØA ₂	463	526	614	715	775	845	925	1015	1115	1215	1335	1463	1613	1813
	ØR	M8	M8	M10	M10	M10	M10	M10	M10	M12	M12	M12	M12	M12	M16
	Weights without core [kg]	6.2	8.9	12.5	19.1	22.8	27.6	33.8	41.3	50.6	61.1	74.5	140	168	192
	Weights with core [kg]	7.9	11.5	16.8	26.5	32.8	40.8	52.1	69.2	86.8	109.6	134.4	170	205	247
Hoods type HAN	H	361	412	476	540	641	694	744	811	868	890	1140	1252	1402	1602
	H ₁	180	228	290	364	405	450	506	569	645	710	800	853	983	1153
	ØM	598	724	906	1106	1266	1406	1586	1766	2016	2236	2436	2810	3110	3510
	C	2.5	2.5	3	3	3	3	3	3	3	3	3	4	4	4
	Weights [kg]	13	19	40	58	79	97	120	151	206	250	313	625	776	1020
Dampers type SBC	L	360	400	520	560	620	670	730	810	910	1010	1130	1250	1400	
	C	2	2	3	3	3	3	3	3	3	4	4	5	6	
	Weights [kg]	9.5	12.5	24	32	41.5	49	63	86	107	164	200	274	386	

Technical data for silencer YAH

YAH - pressure loss

Without core: Insignificant

With core: $0.2 \times p_{dF}$

Two YAH in series: $0.35 \times p_{dF}$ (dynamic pressure)

Inlets on ACN use silencers without cores

Example

- YAH-800 with core
- Airflow rate, $q_v = 5 \text{ m}^3/\text{s}$
- Air speed, inlet = 10 m/s
- $p_{dF} = 60 \text{ Pa}$
- Pressure loss: $0.2 \times 60 \text{ Pa} = 12 \text{ Pa}$

Average values for sound attenuation

Type	Octave band [Hz]							
	63	125	250	500	1k	2k	4k	8k
Without core [dB]	0	1	10	13	11	9	7	7
With core [dB]	2	4	10	17	17	15	12	11

Acoustic diffuser type YAD

Acoustic diffusers type YAD are standard products for use in normal installations for comfort and industrial ventilation.

The YAD is available in 14 external diameters from $\varnothing 250$ to $\varnothing 1600$ mm with or without cores. Cores are made in seven sizes from $\varnothing 160$ to $\varnothing 578$ mm and are fitted according to the fan hub sizes.

Environment

Acoustic diffusers type YAD are designed for the temperature range -40 to +120 °C.

The basic version is, in terms of materials, designed to operate in the environmental category C3. Refer to EN 12944.

Please note that sound data and attenuation values are based on measurements with the NovAx axial fan type ACG.



Acoustic diffuser type YAD

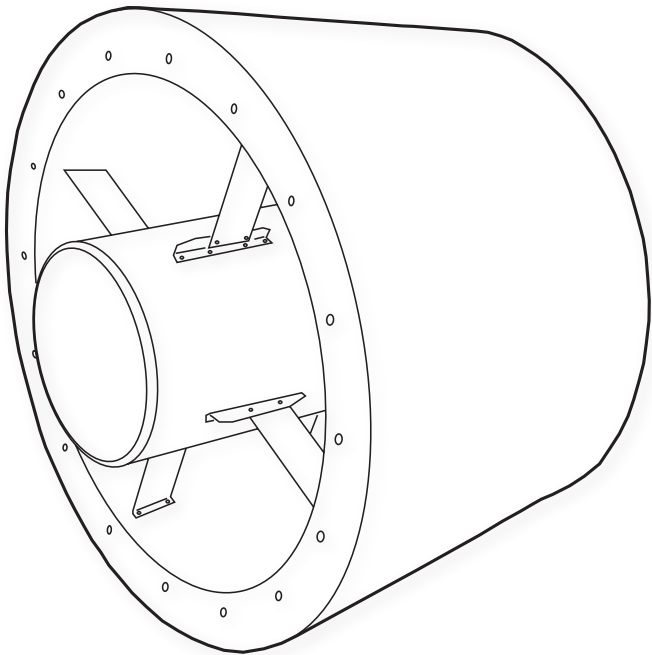
Fans and connections $\varnothing D$ [mm]	Hubs and cores $\varnothing D$ [mm]	w/ cores							
		Octave band [Hz]							
		63	125	250	500	1k	2k	4k	8k
250	160	1	1	2	9	11	11	8	5
315	160	1	1	2	9	11	11	8	5
400	160	0	2	3	12	11	11	7	4
500	160	0	1	4	10	12	10	6	4
400	230	0	2	2	11	14	13	10	6
500	230	0	2	9	12	12	12	8	5
560	230	0	1	4	12	13	11	7	5
630	230	0	2	5	13	13	10	6	5
710	230	1	3	6	13	12	9	6	5
800	230	0	1	8	14	12	9	6	4
500	280	0	2	2	12	15	15	11	7
560	280	0	2	10	13	12	13	9	5
630	280	0	1	4	12	14	11	7	5
710	280	0	3	7	14	13	9	7	5
800	280	0	1	8	15	13	10	6	4
900	280	1	3	7	13	11	7	6	5
500	330	0	2	3	15	18	18	13	8
560	330	0	3	4	17	16	16	10	6
630	330	0	2	10	13	13	13	9	5
710	330	1	2	5	15	15	12	7	5
800	330	1	3	7	15	14	10	7	5
900	330	0	1	9	15	14	10	7	4

w/o cores							
Octave band [Hz]							
63	125	250	500	1k	2k	4k	8k
1	0	2	8	5	1	1	2
1	0	2	8	5	1	1	2
0	0	3	11	6	1	1	1
0	1	4	11	7	3	3	2
0	0	2	10	8	3	3	3
0	0	9	11	7	3	2	2
0	1	4	12	8	4	4	3
0	2	5	13	8	4	3	3
0	3	6	13	9	4	3	3
0	1	8	14	7	4	3	2
0	0	2	11	9	5	4	4
0	0	10	12	7	3	3	2
0	1	4	12	8	5	4	3
0	3	7	14	10	5	4	3
0	1	9	15	8	5	3	3
1	3	7	13	5	2	3	4
0	0	3	14	12	8	6	5
0	0	4	16	11	6	4	3
0	0	10	12	8	4	3	3
0	2	5	15	10	5	4	3
0	3	7	15	10	5	4	4
0	1	9	15	8	5	4	3

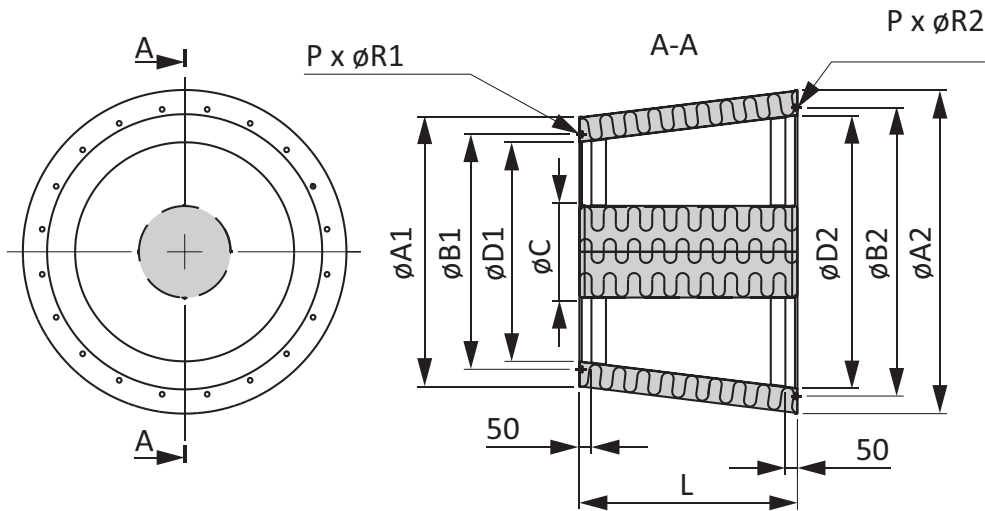
Attenuation values for YAD with or without core [dB]

Fans and connections øD [mm]	Hubs and cores øD [mm]	w/ cores								w/o cores							
		Octave band [Hz]								Octave band [Hz]							
		63	125	250	500	1k	2k	4k	8k	63	125	250	500	1k	2k	4k	8k
560	380	0	2	3	15	19	18	14	8	0	0	3	14	13	8	7	5
630	380	0	2	11	15	15	15	11	6	0	1	11	13	9	6	4	3
710	380	0	1	5	14	16	13	9	6	0	1	5	15	11	6	5	4
800	380	1	3	8	16	15	11	7	6	0	3	8	16	12	6	5	4
900	380	0	1	9	16	15	11	7	5	0	1	9	16	9	6	4	3
1000	380	1	3	7	14	11	8	6	6	1	3	7	14	6	3	4	4
900	403	0	1	10	17	15	11	7	5	0	1	10	17	10	6	4	3
1000	403	1	4	7	15	12	8	7	6	1	4	7	15	6	3	4	4
1120	403	1	3	7	14	11	8	6	5	1	3	7	11	6	4	4	4
1250	403	2	2	7	9	10	7	6	5	1	2	7	5	4	4	4	3
1400	403	2	2	7	8	9	7	5	4	1	2	7	5	4	3	3	3
900	578	0	1	6	18	20	16	11	7	0	1	6	18	15	10	7	5
1000	578	0	4	9	19	18	13	9	7	0	4	9	19	14	8	6	5
1120	578	0	1	11	19	17	13	8	5	0	1	11	19	12	8	5	4
1250	578	1	4	8	16	13	9	7	6	1	4	8	13	7	5	5	5
1400	578	2	3	8	10	11	8	6	5	1	3	8	6	5	5	5	4
1600	578	2	3	8	9	10	8	6	5	1	3	8	6	5	4	4	4

Attenuation values for YAD with or without core [dB], continued



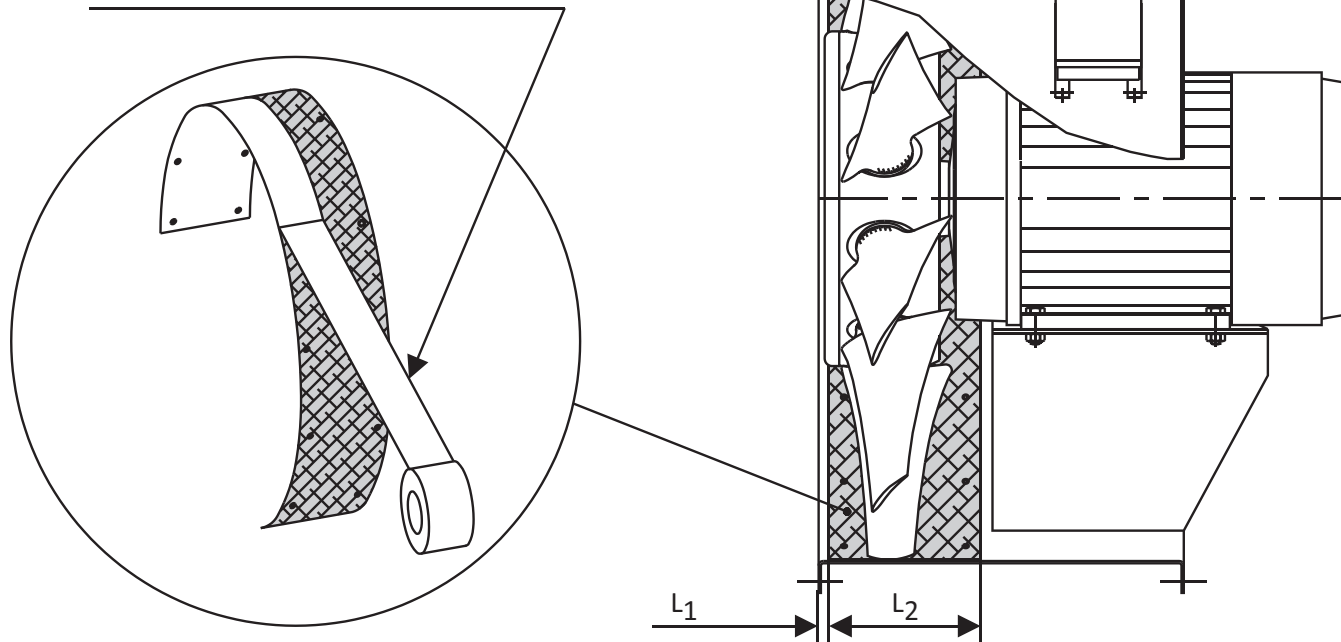
Dimensions and weights for YAD



	Fan ϕD [mm]	Hub ϕC [mm]	Fan side dimensions [mm]			$P \times \phi R1$ [Qty. x size]	Duct side dimensions [mm]			$P \times \phi R2$ [Qty. x size]	L	Weight [kg]
			$\phi A1$	$\phi B1$	$\phi D1$		$\phi A2$	$\phi B2$	$\phi D2$			
Micro hubs	250	160	463	280	253	4 x M8	614	450	404	8 x M10	250	12.0
	315		526	355	318	8 x M8	716	560	504	12 x M10	315	17.5
	400		614	450	404	8 x M8	776	620	564	12 x M10	400	23.0
	500		716	560	504	12 x M10	846	690	634	12 x M10	500	30.5
Medium hubs	400	230	614	450	404	8 x M10	776	620	564	12 x M10	400	24.5
		230										32.5
	500	280	716	560	504	12 x M10	846	690	634	12 x M10	500	34.0
		330										40.0
		230										40.0
		280										41.5
	560	330	776	620	564	12 x M10	926	770	714	16 x M10	560	44.0
		380										46.5
		230										46.0
		280										40.0
	630	330	846	690	634	12 x M10	1011	860	804	16 x M10	630	51.5
		380										56.0
		230										62.0
		280										64.0
	710	330	926	770	714	16 x M10	1116	960	904	16 x M12	710	70.5
		380										73.0
		230										77.0
		280										79.5
	800	330	1016	860	804	16 x M10	1216	1070	1004	16 x M12	800	83.0
		380										86.5
		280										94.5
	900	330	1116	970	904	16 x M12	1336	1190	1124	20 x M12	900	98.5
		380										109
	1000	380	1216	1070	1004	16 x M12	1466	1320	1254	20 x M12	1000	122
Maxi hubs	900	403	1116	970	904	16 x M12	1336	1190	1124	20 x M12	900	116
		578										132
	1000	403	1216	1070	1004	16 x M12	1466	1320	1254	20 x M12	1000	138
		578										157
	1120	403	1333	1190	1124	20 x M12	1613	1470	1404	20 x M12	1120	154
		578										175
	1250	403	1466	1320	1254	20 x M12	1816	1680	1604	24 x M12	1250	193
		578										216
	1400	403	1613	1460	1404	20 x M12	2013	1880	1804	24 x M12	1400	248
		578										274
	1600	578	1816	1680	1604	24 x M12	2216	2080	2004	24 x M12	1600	320

Spark-proof lining for ACN, ACW and ARN

To prevent galvanic corrosion special tape is applied to the back of the lining before installation.



		Fan sizes [mm]													
		ø250	ø315	ø400	ø500	ø560	ø630	ø710	ø800	ø900	ø1000	ø1120	ø1250	ø1400	ø1600
Spark-proof lining hub ø160 - ø380 ¹	L ₁	14	14	14	14	14	14	14	14	14	14				
	L ₂	150	150	150	150	150	150	150	150	150	150				
	S _{Min} ²	1.7	2.0	3.0	4.0	4.5	5.5	5.5	5.5	5.5	6.5				
	Aluminium [kg]	0.7	0.8	1.1	1.3	1.4	1.6	1.8	2.1	2.3	2.5				
	Brass [kg]	1.0	1.3	1.6	2.0	2.2	2.5	2.9	3.2	3.6	4.0				
Spark-proof lining hub ø403 and ø578	L ₁									24	24	24	24	24	24
	L ₂									212	212	212	212	212	212
	S _{Min} ²									5.5	6.5	7.5	8.5	9.0	9.0
	Aluminium [kg]									3.2	3.6	4.1	4.5	5.1	5.8
	Brass [kg]									5.1	5.7	6.3	7.1	8.0	9.1

1. Tape with aluminium is used with ATEX fans, while tape with brass is used with EX fans.

2. S_{Min} is the minimum blade clearance of the impeller along the circumference of the fan housing. The value depends on the motor shaft diameter.

Calculation examples

Basis

NovAx fans are measured corresponding to the normal installation of the fans. See the following configurations A, B, C and D.

Installing ACN or ACG fans with free outlet (cfg. C) causes loss of the entire velocity energy. However, fitting a diffuser on the outlet side lowers the outlet velocity, whereby some of the dynamic pressure loss is recovered as static pressure. Hence, the energy consumption of the fans is reduced. Novenco diffusers are designed to achieve optimal recovery of the dynamic energy.

A-factor

This is a loss factor, which is used if the fan is used with free outlet (cfg. A and C). The a-factor is related to the speed loss (Δp_d)

	Symbols	Units	Formula
Air quantity, volume flow	q_v	m^3/s	$\frac{q_m}{\rho}$
Correction factor	a		
Density	ρ	kg/m^3	
Dynamic pressure of fan	p_{dF}	Pa	$0.5 \rho \times c^2$
Dynamic pressure of plane	p_{dx}	Pa	$0.5 \rho \times c^2$
Flow area	A	m^2	
Inlet diameter	D_1	mm	
Mass flow	q_m	kg/s	
Mean speed of plane	c_x	m/s	$\frac{q_v}{A_x}$
Outlet diameter	D_2	mm	
Power consumption	P	kW	
Static pressure of fan	p_{sF}	Pa	$P_{tF} - P_{dF}$
Static pressure of plane	p_{sx}	Pa	
System loss	p_t	Pa	
Total pressure of fan	p_{tF}	Pa	
Total pressure of plane	p_{tx}	Pa	$P_{sx} + P_{dx}$

resulting from the difference in air speed between the net inlet area and the total outlet area.

The effect of the a-factor is reduced if a diffuser is mounted on the outlet side.

The AirBox program compensates for the a-factor when the fan outlet is to a duct or as free outlet.

For fans with duct connections on the outlet and otherwise unchanged dimensions (cfg. B and D) the a-factor is included in the performance data and no correction is necessary.

Examples

Fan type ACG

1470 RPM with free outlet

$q_v = 20 m^3/s$; $p_s = 500 Pa$

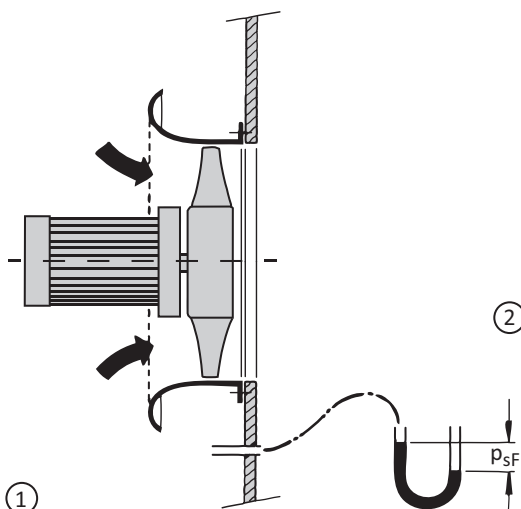
The following is found with AirBox.

- ACG -1250 / 403-6-42°
Required power with or without long diffuser is 14.7 or 17.5 kW, respectively. Hence, 2.8 kW is saved by mounting a long diffuser.
- ACG - 1400 / 403-6-38°
Required power with or without long diffuser is 14.2 or 15.8 kW, respectively. Hence, 1.6 kW is saved by mounting a long diffuser.

Cfg. A - free inlet and outlet

Type ACP

$$p_{sF} = p_{s2} - p_{t1}$$



Formulas for pressure

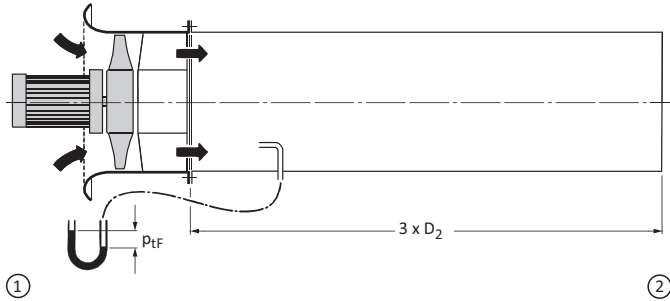
$$\begin{aligned}
 p_{tF} &= p_{t2} - p_{t1} \\
 &= p_{s2} + p_{d2} - (p_{s1} + p_{d1}) \\
 &= (p_{s2} - p_{s1}) + (p_{d2} - p_{d1}) \\
 p_{sF} &= p_{tF} - p_{dF} \text{ (Definition)}
 \end{aligned}$$

All inlet sizes of the fan are designated by sub-index 1 and all outlet sizes by sub-index 2.

Cfg. B - free inlet and duct on outlet

Type ACG

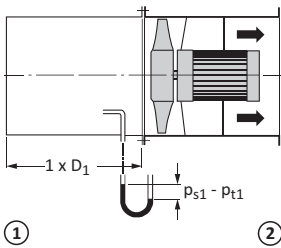
$$\begin{aligned} p_{tf} &= p_{t2} - p_{t1} \\ &= (p_{s2} + p_{d2}) - (p_{s1} + p_{d1}) \end{aligned}$$



Cfg. C - duct on inlet and free outlet

Type ACN

$$\begin{aligned} p_{tf} &= p_{t2} - p_{t1} \\ &= p_{s2} + a \times p_{d2} - (p_{s1} + p_{d1}) \end{aligned}$$

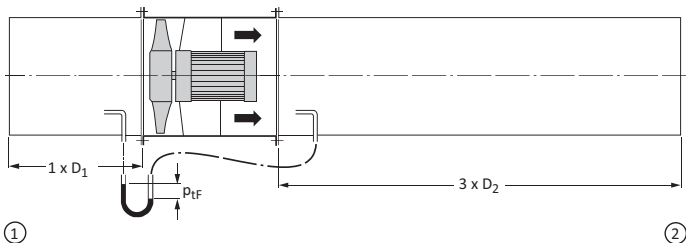


Cfg. D - duct on inlet and outlet

Type ACN

$$\begin{aligned} p_{tf} &= p_{t2} - p_{t1} \\ &= (p_{s2} - p_{s1}) + (p_{d2} - p_{d1}) \end{aligned}$$

if $p_{d2} = p_{d1}$; then $p_{tf} = p_{s2} - p_{s1}$



Run-up time

The run up time of the axial fan is calculated with the following formula.

$$t_s = \frac{0.24 \times n^2 \times (I_m + I_v)}{10^4 \times P \left(\frac{M_s}{M} + \frac{M_k}{M} - \frac{P_v}{P} \right)} \quad \text{where}$$

t_s = Run up time [s]

P = Rated output of motor [kW]

P_v = Required power of fan [kW]

n = Fan speed [RPM]

$\frac{M_s}{M}$ = The ratio between the starting torque of the motor and the nominal torque

$\frac{M_k}{M}$ = The ratio between the maximum torque of the motor and the nominal torque

I_v = Polar moment of inertia for the fan [kgm²]

I_m = Polar moment of inertia for the motor [kgm²]

According to international standards the torque of the motor can vary within the following limits.

M_s : -15% + 25% of the catalogue value

M_k : -10% + 0% of the catalogue value

The above factors may increase the run time more than calculated.

Finding the total efficiency

The total efficiency tells how effective the complete configuration is. The efficiency is found with the following formula.

$\eta_{total} = \eta_{fan} \times \eta_{motor}$, where

η_{total} = Total efficiency

η_{fan} = Fan efficiency

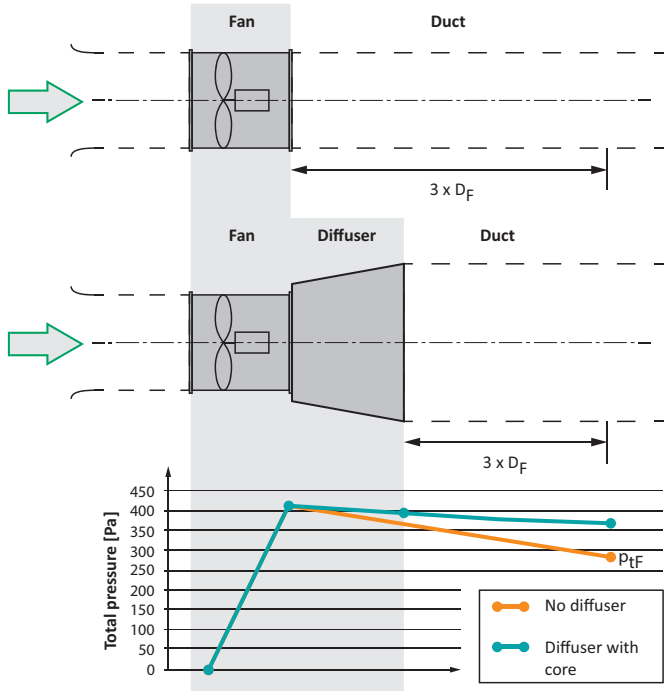
η_{motor} = Motor efficiency

Pressure loss example

The air pressure builds up across the fan whereafter it decreases. In this example an acoustic diffuser controls the profile of the airflow and most importantly recovers a large part of the pressure loss. AirBox calculates the desired total pressure available at the system outlet. Here this is the diffuser outlet.

The example here calculates with AirBox for the following fan and conditions.

Blade angle	: 60°
Efficiency	: 88%
Fan diameter, D_F	: $\varnothing 500$ mm
Fan type	: ACN
Hub size	: $\varnothing 330$ mm
Total pressure, p_{tF}	: 369 Pa
Volume flow	: $3\text{ m}^3/\text{s}$



Pressure loss example

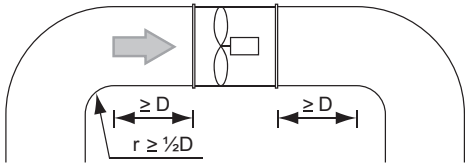
Installation considerations

Whether NovAx fans are built into ducts or installed as part of other installations, minimum distances to nearby objects in the airflow path must be observed.

The space at the inlet side must be optimum to ensure a smooth and undisturbed airflow. At less than optimum conditions, the fan speed must be reduced.

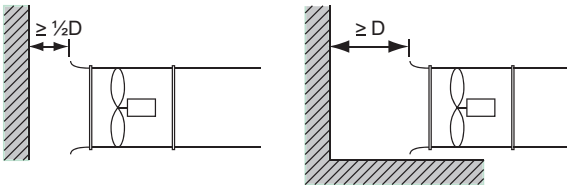
Free inlet requires an inlet cone to get optimum performance with regard to efficiency and sound.

Built into duct



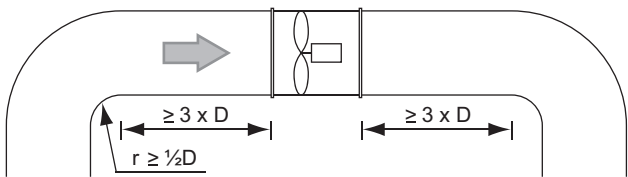
Free inlet

D = Fan diameter



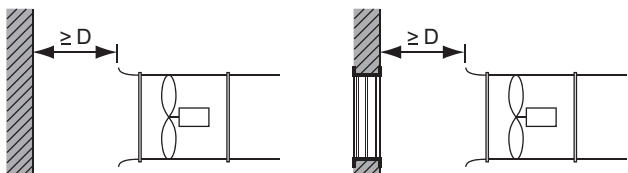
Minimum installation

Built into duct



Free inlet

D = Fan diameter



Optimum installation

Quality and service



Rest assured

The production of Novenco NovAx axial fans meets our standards for high quality, inspection and test of all units.

Additionally, we offer technical guidance on installation, test of function and training.

Warranty

The 12-month statutory warranty period applies from when the product leaves the factory unless otherwise agreed. In addition, Novenco Building & Industry A/S offers a supplementary warranty as described in the terms and conditions of sale and delivery found on our website. Wear parts are not covered by the warranty. Special warranty provisions may be agreed upon.

Important

This document is provided 'as is'. Novenco Building & Industry A/S reserves the right to changes without further notice due to continuous product development.

Pictures in the catalogue may show products with accessories fitted.

The fans are designed for continuous operation. The following kinds of operation may cause fatigue break in the impeller and endanger people.

- Operation in stall area, i.e. with counter pressure that pulsates – called pump mode
- Operation with exceedingly starts and stops
- Uneven flow velocity through fan

If in doubt, Novenco should be contacted to assess the suitability of the fans.

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Quality and environment

Novenco Building & Industry A/S is certified in accordance with ISO 9001 and 14001.



Products from Novenco Building & Industry A/S are designed, developed and manufactured in Denmark.





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