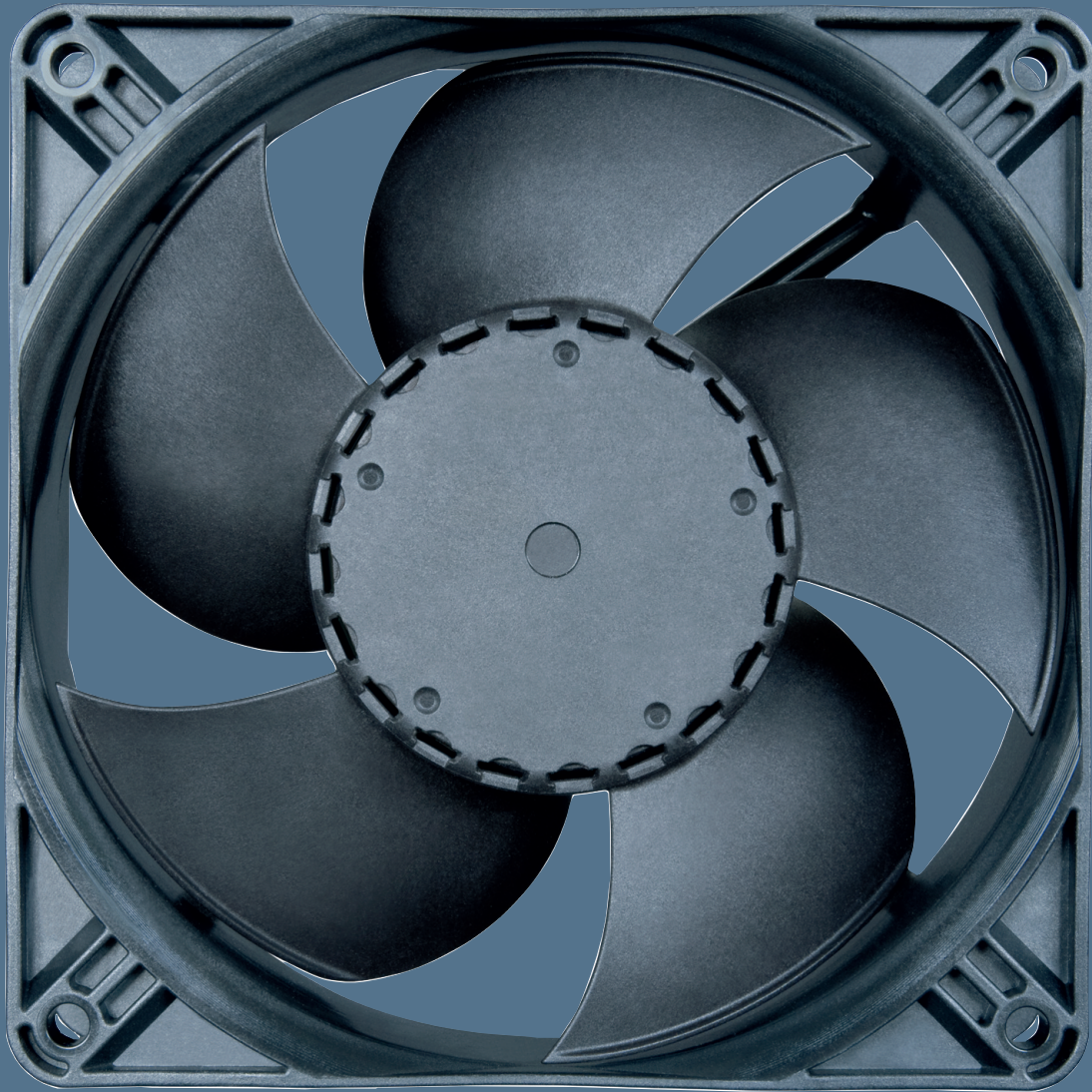


ACmaxx / i-maxx technical information	126
ACmaxx / i-maxx overview	130
ACmaxx / i-maxx axial fans	131



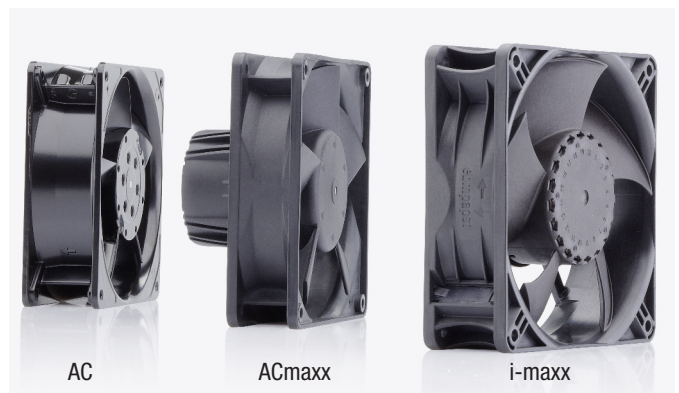
## Technical information

### Progress made by ebm-papst

The best example: The ACmaxx fans from ebm-papst, which, thanks to an ingenious yet simple improvement over conventional AC fans, provide substantial benefits.

The aim in developing the new ACmaxx series was to raise the technology standard of the conventional AC fan significantly and, in the process, facilitate the transition to the new technology by retaining the overall mounting dimensions. In short, to ensure the fans can be replaced 1:1 without any peripheral changes or changes to the voltage situation.

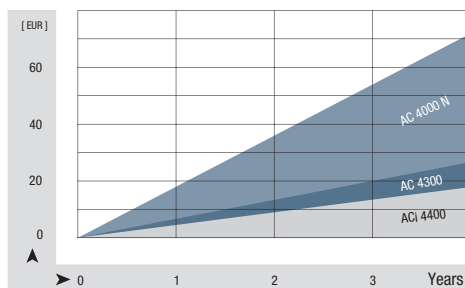
ebm-papst offers two generations of ACmaxx products that meet different needs.



### What ACmaxx and i-maxx have in common:

#### Energy efficiency

The drive concept is based on state-of-the-art GreenTech EC technology with outstanding motor efficiency. Compared to AC fans of the same size, ACmaxx energy consumption is up to 77% lower—for higher cooling capacity! The energy balance alone means that the products pay for themselves after only a few months. The savings over the entire service life, especially in systems with multiple fans, is considerable.

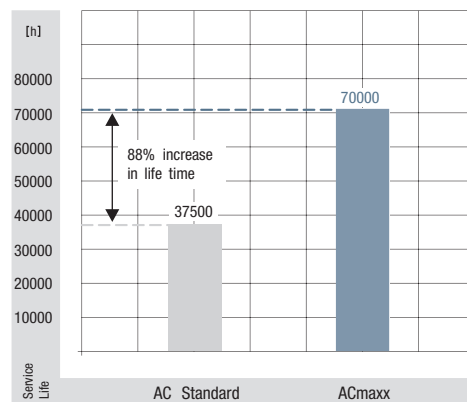


#### Independent of mains frequency and mains voltage

The ACmaxx and i-maxx fans are prepared for direct connection to all AC voltages and frequencies. The speed, and thus important properties of the fan such as air flow and noise, are independent of the power frequency and do not change, even within the defined voltage range. Voltage fluctuations in the power system are automatically compensated for.

#### Long service life

The efficiency of ACmaxx and i-maxx motors is up to 75% higher than that of conventional AC fan variants. This not only saves energy, it also means less intrinsic heating in the motor. The reduced heating has a direct, positive effect on the bearing system, which is why the fans have a service life that is up to 85% longer! This also lengthens the service and maintenance intervals significantly. The expense of replacement fans, and even more expensive downtimes, are kept to a manageable minimum.



## Safety

- Safety certifications: UL, CSA and VDE 0805 / EN60950. VDE 0700 / EN60335 on request.
- Our fans have the CE mark of conformity.
- EMC protection:
  - > EN61000-4-4 Level 1 (1 kV or 2 kV)B
  - > EN61000-4-2 Level 8 kV/15 kV or 4 kV/8 kV
  - > EN61000-4-3
  - > EN61000-4-6
  - > EN61000-4-8
  - > EN55022 Class B

## Ambient influences

AC fans are extremely common and are used in a wide variety of applications. In control cabinet cooling, beer coolers, cooling cabinets, wood-burning stoves, medical devices – all have different requirements for resistance to ambient influences. ACmaxx and i-maxx fans offer the same features for protection against moisture, splash water and rough ambient conditions.

## Particular design features of the i-maxx (ACi 4400):

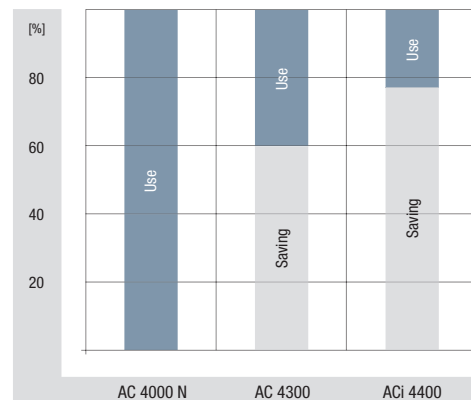
### i-maxx is more compact!

As large as existing AC fans – and not a bit larger. This is the most outstanding feature of the new i-maxx ACi 4400. Even in the hub area, the fan does not differ from typical 119x119x38 mm AC fans. Out with the AC, in with the i-maxx ACi 4400 – it's that simple.



## i-maxx is more efficient!

ACmaxx saves energy, and the i-maxx generation saves even more. While an AC fan at 50 Hz can barely reach an overall efficiency of 5-6%, the ACmaxx makes it to approx. 20-25%. With the new i-maxx ACi 4400, a remarkable level of up to 30% is reached. This is the result of the optimisation of the entire package made up of drive, electronics, AC/DC conversion and aerodynamics. Thus the new i-maxx series boasts energy savings of almost 75% compared to the corresponding AC fan, thus providing significantly higher savings than the 40% level of the old AC 4300 generation.



### i-maxx is quieter!

The i-maxx ACi 4400 is quieter! Quieter than AC fans and quieter than the existing ACmaxx generation. The reason for this is the optimised aerodynamics and the drive, which is optimised for minimum structure-borne noise. Thus the fan is only half as loud at comparable air performance, and is up to 6 dB(A) quieter at some operating points.

### Speed independent of voltage and frequency

For the i-maxx ACi 4400, the speed, and thus the air flow and operating noise, are independent of the supply voltage and power frequency. Versions are available for 115 VAC with a voltage range from 85 to 132 VAC and 230 VAC with a voltage range of 195 to 265 VAC. Voltage fluctuations and frequency differences in the power system are compensated for automatically.

## Technical information

### Particular design features of the ACmaxx:

#### Prepared for all AC voltages

These models have a very wide voltage range from 85 to 265 VAC – the global voltage range, so to speak. This enables the fan to be used around the world, opening up large savings potentials. In addition to reduced logistics effort and stock-keeping, worldwide availability is key. ACmaxx is compatible with every supply voltage—no switching needed. From 85 to 265 volts and mains frequencies of 50 and 60 hertz. Voltage fluctuations in the power system are automatically compensated for.

#### Higher performance

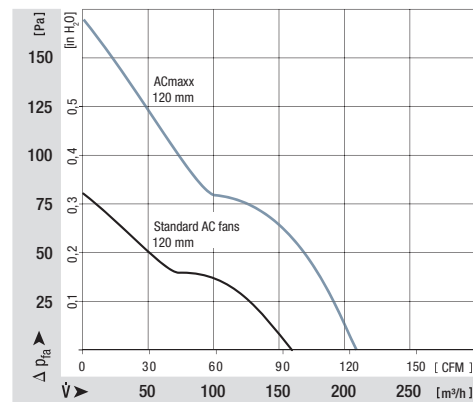
Unlike conventional AC technology, the state-of-the-art drive concept of this fan series is not linked to a fixed power frequency. This allows the motor speed to be increased over a wide range. Thus ACmaxx provides significantly higher air flow and significantly increased pressure.

#### Higher flexibility

The flexibility of ACmaxx is one-of-a-kind. With its intelligent features, ACmaxx can be individually adapted to the specific application: standby mode, overload mode at peak times or night reduction all the way to temperature-controlled quiet operation are all possible. From speed setting to alarm or speed signal outputs, ACmaxx offers optional interfaces with which you can quickly and easily implement operation monitoring.

You can find further information about these fan options in the "Specialised fans" chapter, starting on page 107.

Or you can simply contact our application engineers to discuss your ideal ACmaxx or i-maxx fan.



## Information on pictograms

On the pages of the catalogue and on the following overview pages, the pictograms illustrated below provide information about technically possible special versions in the fan line presented.

Please note that these special versions are not possible for all voltages and speeds, and not in all combinations.

The special versions are designed for specific customers and projects and are not usually available off the shelf.



### Speed signal

The fan uses a separate wire to output information about its speed, and thus about the speed of the rotor. For technical details, please refer to page 110.



### Go / No-go alarm

The fan uses a separate wire to output a static signal when it is stationary, thus providing information about whether or not the rotor is turning. For technical details, please refer to page 117.



### Alarm with limit speed

If the speed drops below a certain level defined in the fan's electronics, the fan will emit a static signal, thus providing information about whether or not the rotor is turning. For technical details, please refer to page 114.



### External temperature sensor

An NTC is connected to the fan via a separate wire and the fan changes its speed depending on the temperature at the NTC. For technical details, please refer to page 120.



### Internal temperature sensor

In this case, the NTC is integrated into the fan and the fan changes its speed depending on the temperature at the NTC. For technical details, please refer to page 120.



### PWM control input

The speed of the fan can be changed via a pulse-width-modulated signal. This signal is applied to a specially provided wire. For technical details, please refer to page 121.



### Analogue control input

The speed of the fan can be changed via a control voltage. This control voltage is applied to a specially provided wire. For technical details, please refer to page 121.



### Multi-option control input

The fan has a control input that the user can trigger either using a PWM signal, an analogue signal or a resistor. For technical details, please refer to page 122.



### Protection against moisture

Protection for the fan's electronics against moisture and condensation. For technical details, please refer to page 123.



### IP 54

Protection of motor and PCB board against splashed water and humidity. For technical details, please refer to page 123.



### Protection against salt spray fog

Protection of fan against the damaging effects of salt spray fog. For technical details, please refer to page 123.

# Fans for AC operation

## Overview of air performance

Dimension	Series	Air flow	Air flow																Page	
			10	20	30	40	50	60	70	80	90	100	200	300	400	500	600	700		800
□ 80 x 32	AC 8300 H	80																	131	
□ 92 x 38	AC 3200 J	144																	132	
□ 119 x 25	AC 4400 FN	205																	133	
□ 119 x 32	AC 4300 H	204																	134	
NEW □ 119 x 38	ACi 4400	100..180																	135	
172 Ø x 51	AC 6100 N	350																	136	
172 Ø x 51	AC 6200 N	350																	137	
NEW 98,5 Ø x 130	AC 100 NR	80..135																	138	

## Overview of technically feasible designs

Series	mm	VDE, UL, CSA	Sinter sleeve bearings / ball bearings	Sensor	Go / No-go alarm	Alarm with limit speed	External temperature sensor	Internal temperature sensor	PWM control input	Analogue control input	Multi-option control input	Humidity protection	IP >= IP54	Salt spray fog protection	Page
AC 8300 H	80 x 80 x 32	*	■	•	•	•	•	•	•	•	•	•	•	•	131
AC 3200 J	92 x 92 x 38	*	■	•	•	•	•	•	•	•	•	•	•	•	132
AC 4400 FN	119 x 119 x 25	*	■	•	•	•	•	•	•	•	•	•	•	•	133
AC 4300	119 x 119 x 32	*	■	•	•	•	•	•	•	•	•	•	•	•	134
NEW ACi 4400	119 x 119 x 38		■	-	-	-	-	-	-	-	-	•	•	•	135
AC 6100 N	172 Ø x 51	*	■	•	•	•	•	•	•	•	•	•	•	•	136
AC 6200 N	172 Ø x 51	*	■	•	•	•	•	•	•	•	•	•	•	•	137
NEW AC 100	100 Ø x 130		■	-	-	-	-	-	-	-	-	•	•	-	138

- not yet available
  - available
  - Sleeve bearings
  - Ball bearings
- \* Partially granted, partially in registration stage.

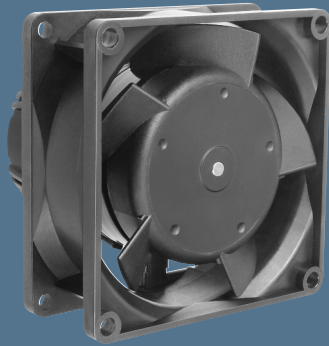
Please note that these special versions are not possible for all voltages and speeds, and not in all combinations. The special versions are designed for specific customers and projects. As a rule they are not available off the shelf and are tied to minimum volumes.

Please consult your customer support representative about the feasibility of your special variant.

max. 80 m<sup>3</sup>/h

# ACmaxx axial fans

Series AC 8300 H 80 x 80 x 32 mm



### Highlights:

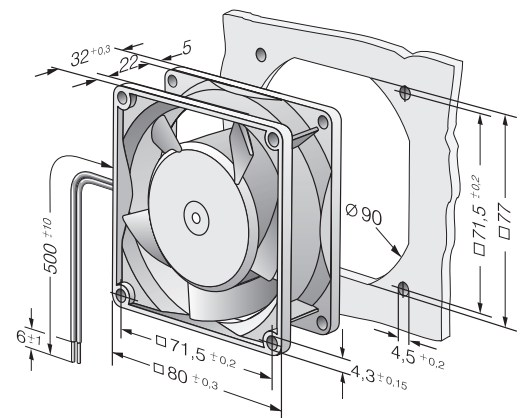
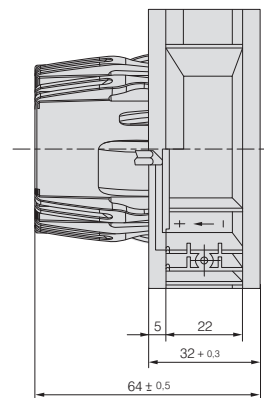
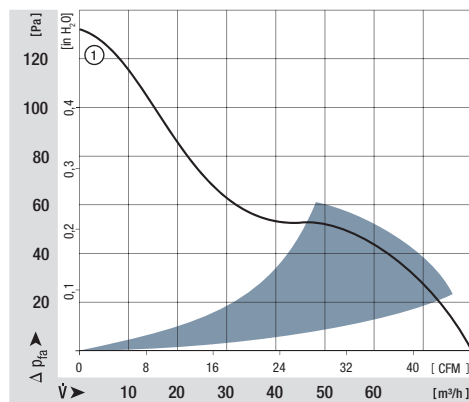
- Universally suitable for all AC voltages between 85 and 265 V.
- Fan speed not dependent on line frequency.
- Significantly reduced power consumption compared to conventional AC fans.
- Open loop speed control, sensor and alarm signal possible on request.

### General attributes:

- Material: fibreglass-reinforced plastic. PA impeller, PBTP housing.
- Fully integrated electronic commutation.
- Protected against locking.
- Connection via single strands AWG 22, TR 64. Bared and tin-plated.
- Air exhaust over struts. Direction of rotation clockwise, seen on rotor.
- Mass: 325 g.

Nominal data		Air flow	Air flow	Nominal voltage	Frequency	Voltage range	Sound pressure level	Sound power level	Sinter sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L <sub>10</sub> at 40 °C	at T <sub>max</sub>	Curve
Type		m <sup>3</sup> /h	CFM	V	Hz	VAC	dB(A)	Bel(A)	□ / ■	Watts	RPM	°C	Hours	Hours	
AC 8300 H		80	47,1	115 / 230	50 / 60	85 ... 265	48	6,2	■	7,5	5 000	-20...+75	55 000 / 25 000		1

Speed variants available on request.



max. 144 m<sup>3</sup>/h

# ACmaxx axial fans

Series AC 3200 J 92 x 92 x 38 mm



### Highlights

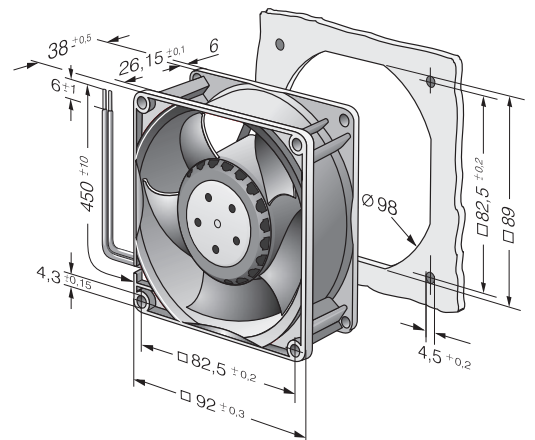
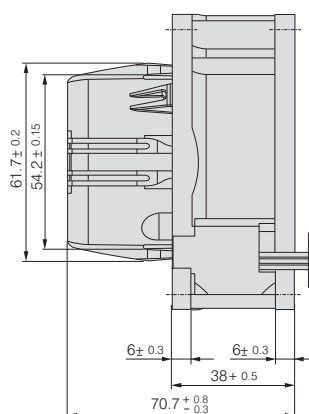
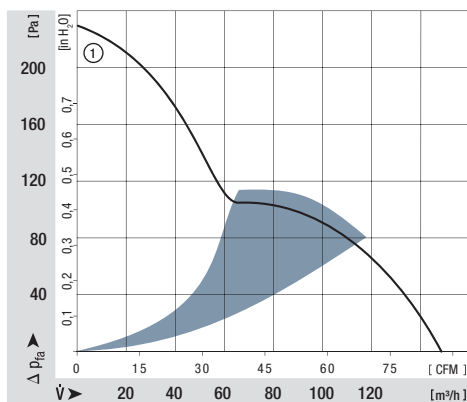
- Universally suitable for all AC voltages between 85 and 265 V.
- Fan speed independent of power frequency.
- Significantly reduced power consumption compared to conventional AC fans.
- Open loop speed control, sensor and alarm signal possible on request.
- Rigid compression curve for high air flow at high pressure.
- Innovative impeller with winglets for low noise levels.

### General attributes:

- Material: fibreglass-reinforced plastic. PA impeller, PBTP housing.
- Fully integrated electronic commutation. Protected against locking.
- Connection via single strands AWG 22, TR 64. Bared and tin-plated.
- Air exhaust over struts. Direction of rotation clockwise, seen on rotor.
- Mass: 325 g.

Nominal data		Air flow	Air flow	Nominal voltage	Frequency	Voltage range	Sound pressure level	Sound power level	Sintec sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L <sub>10</sub> at 40 °C	at T <sub>max</sub>	Curve
Type		m <sup>3</sup> /h	CFM	V	Hz	VAC	dB(A)	Bel(A)	□ / ■	Watts	RPM	°C	Hours	Hours	
AC 3200 JH		144	84,8	115 / 230	50 / 60	85 ... 265	55	6,4	■	11	6 800	-20...+70	70 000 / 35 000		1

Speed variants available on request.





max. 205 m<sup>3</sup>/h

# ACmaxx axial fans

Series AC 4400 FN 119 x 119 x 25 mm



### Highlights:

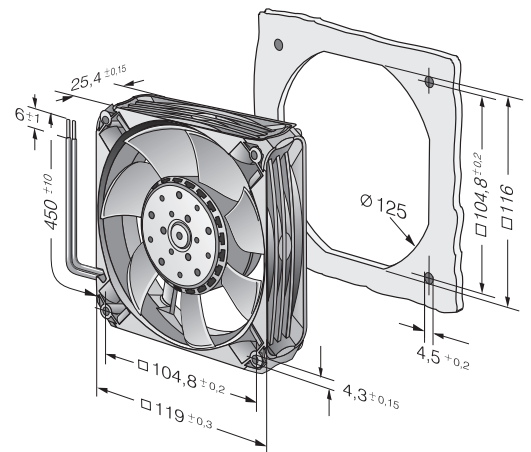
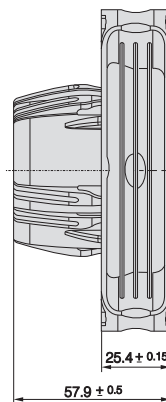
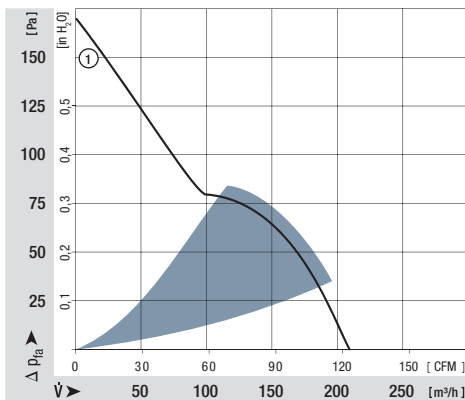
- Universally suitable for all AC voltages between 85 and 265 V.
- Fan speed independent of power frequency.
- Significantly reduced power consumption compared to conventional AC fans.
- Open loop speed control, sensor and alarm signal possible on request.
- Rigid compression curve for high air flow at high back pressure.
- Innovative impeller with winglets for low noise levels.

### General attributes:

- Material: fibreglass-reinforced plastic. PA impeller, PBTP housing.
- Fully integrated electronic commutation. Protected against locking.
- Connection via single strands AWG 22, TR 64. Bared and tin-plated.
- Air exhaust over struts. Direction of rotation counter-clockwise, seen on rotor.
- Mass: 370 g..

Nominal data		Air flow	Air flow	Nominal voltage	Frequency	Voltage range	Sound pressure level	Sound power level	Sinter sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L <sub>10</sub> at 40 °C	at T <sub>max</sub>	Curve
Type		m <sup>3</sup> /h	CFM	V	Hz	VAC	dB(A)	Bel(A)	□ / ■	Watts	RPM	°C	Hours	Hours	
AC 4400 FNN		205	120,7	115 / 230	50 / 60	85 ... 265	53	6,2	■	12	4 850	-20...+70	60 000 / 30 000		1

Speed variants available on request.



max. 204 m<sup>3</sup>/h

# ACmaxx axial fans

Series AC 4300 119 x 119 x 32 mm



### Highlights:

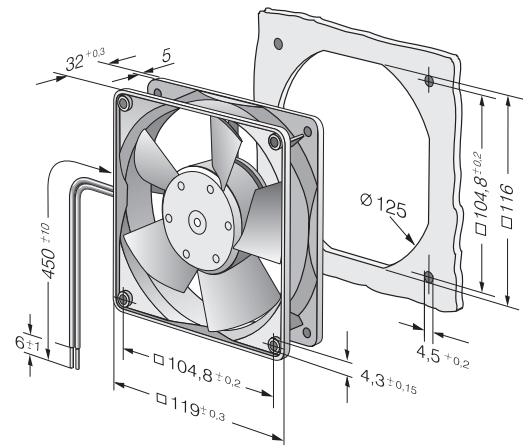
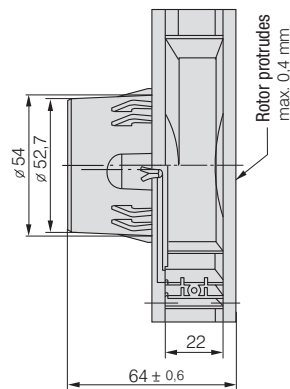
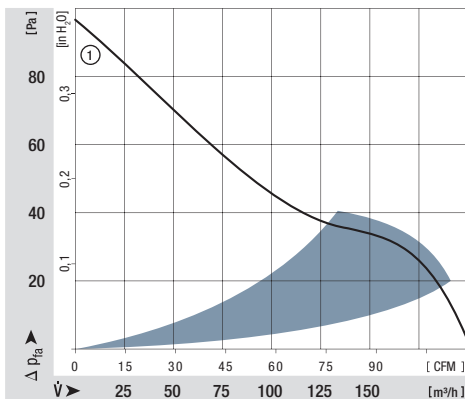
- Universally suitable for all AC voltages between 85 and 265 V.
- Fan speed independent of power frequency.
- Significantly reduced power consumption compared to conventional AC fans.
- Open loop speed control, sensor and alarm signal possible on request.

### General attributes:

- Material: fibreglass-reinforced plastic. PA impeller, PBTP housing.
- Fully integrated electronic commutation.
- Protected against locking.
- Connection via single strands AWG 22, TR 64. Bared and tin-plated.
- Air exhaust over struts. Direction of rotation clockwise, seen on rotor.
- Mass: 325 g.

Nominal data	Air flow		Nominal voltage	Frequency	Voltage range	Sound pressure level	Sound power level	Sinter sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L <sub>10</sub>		Curve
	m <sup>3</sup> /h	CFM										V	Hz	
AC 4300 H	204	120,1	115 / 230	50 / 60	85 ... 265	51	6,4	■	11	3 400	-20...+70	45 000 / 22 500	1	

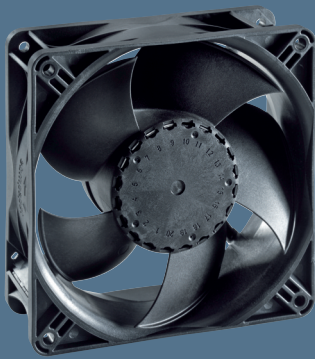
Speed variants available on request.



max. 180 m<sup>3</sup>/h

# i-maxx axial fans

Series ACi 4400 119 x 119 x 38 mm



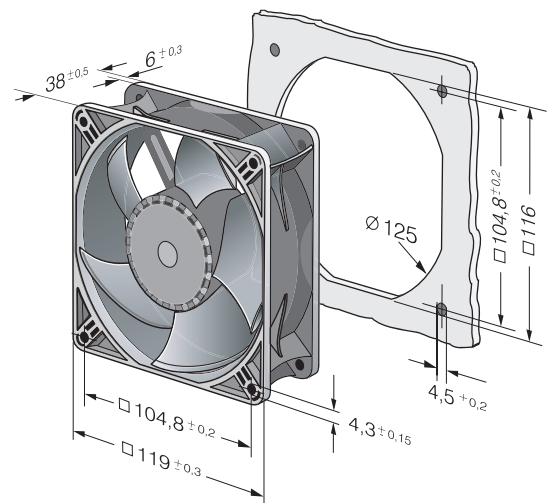
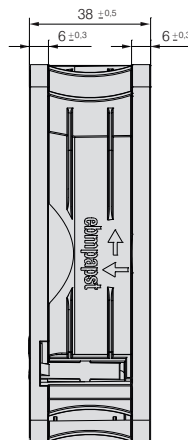
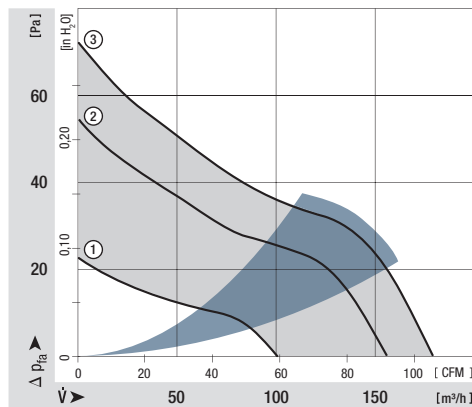
### Highlights:

- Energy efficient AC fan with EC technology.
- Conversion and drive electronics fully integrated.
- Significant lower power consumption than **existing** AC fans.
- Significantly lower noise than existing AC fans.
- Significant higher service life than existing AC fans.
- Fan speed not dependent on line frequency.

### General characteristics:

- Material: fibreglass-reinforced plastic. Impeller PA, housing PBT.
- Electronic locked rotor protection.
- Electrical connection via 2 flat plugs 2,8 x 0,5 mm, flying leads optional.
- Air exhaust over struts, direction of rotation clockwise, seen on rotor.
- Mass: 250 g.

Nominal data		Air flow	Air flow	Nominal voltage	Voltage range	Sound pressure level	Sound power level	Sinter sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L <sub>10</sub> (40 °C) ebm-papst Standard	Service life L <sub>10</sub> (T <sub>max</sub> ) ebm-papst Standard	Life expectancy L <sub>10</sub> Δ (40 °C)	Curve
Type		m <sup>3</sup> /h	CFM	VAC	VAC	dB(A)	Bel(A)	■ / ■	Watts	RPM	°C	Hours	Hours		
NEW ACi 4420 ML		100	58,8	230	195...265	25	4,1	■	1,4	1 850	-20...+75	80 000 / 30 000	160 000	1	
NEW ACi 4420 H		160	94,1	230	195...265	39	5,1	■	3,3	3 000	-20...+75	70 000 / 30 000	140 000	2	
NEW ACi 4420 HH		180	105,9	230	195...265	42	5,3	■	4,4	3 350	-20...+75	62 500 / 30 000	125 000	3	
NEW ACi 4410 HH		180	105,9	115	85...132	42	5,3	■	4,4	3 350	-20...+75	62 500 / 30 000	125 000	3	



max. 350 m<sup>3</sup>/h

# ACmaxx axial fans

Series AC 6100 N 172 ø x 51 mm



### Highlights:

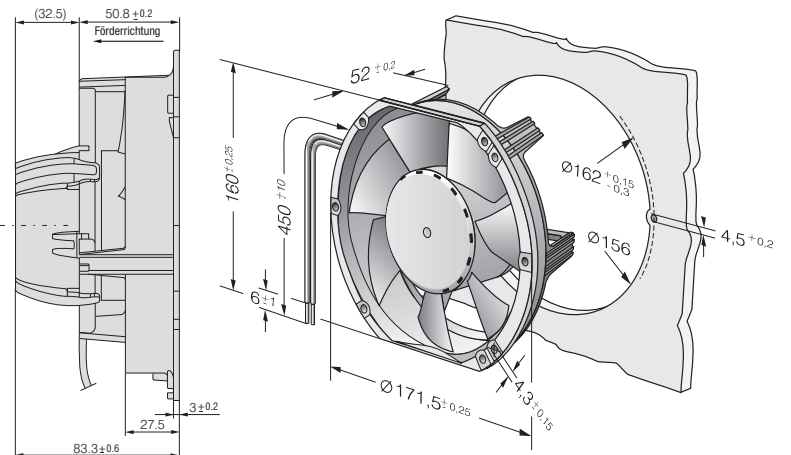
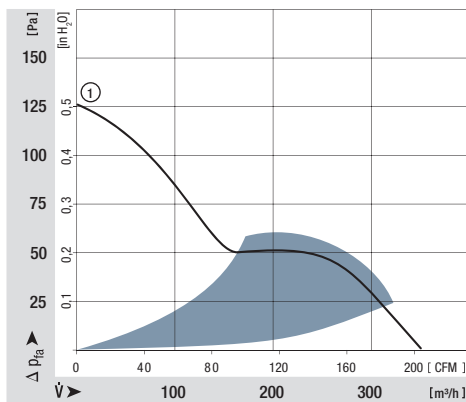
- Universally suitable for all AC voltages between 85 and 265 V.
- Fan speed independent of power frequency.
- Significantly reduced power consumption compared to conventional AC fans.
- Open loop speed control, sensor and alarm signal possible on request.

### General attributes:

- Material: fibreglass-reinforced PA housing and impeller.
- Fully integrated electronic commutation.
- Protected against locking.
- Connection via single strands AWG 22, TR 64. Bared and tin-plated.
- Air exhaust over struts. Direction of rotation clockwise, seen on rotor.
- Mass: 760 g.

Nominal data		Air flow	Air flow	Nominal voltage	Frequency	Voltage range	Sound pressure level	Sound power level	Sintec sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L <sub>10</sub> at 40 °C	at T <sub>max</sub>	Curve
Type		m <sup>3</sup> /h	CFM	V	Hz	VAC	dB(A)	Bel(A)	□ / ■	Watts	RPM	°C	Hours	Hours	
AC 6100 NM		350	206,0	115 / 230	50 / 60	85 ... 265	52	6,1	■	14	2 850	-20...+70	80 000 / 37 500		1

Speed variants available on request.



max. 350 m<sup>3</sup>/h

# ACmaxx axial fans

Series AC 6200 N 172 ø x 51 mm



### Highlights:

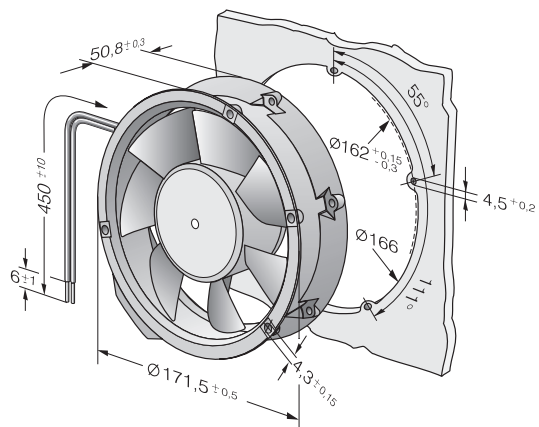
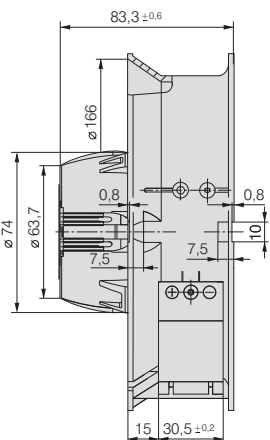
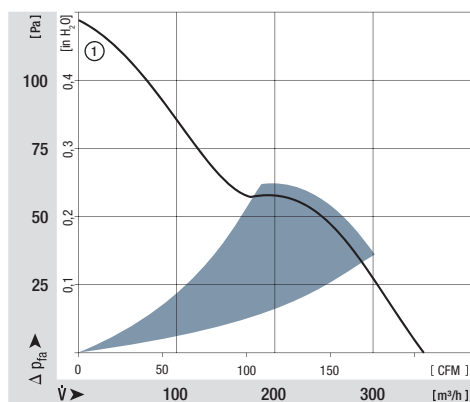
- Universally suitable for all AC voltages between 85 and 265 V, 50-60 Hz.
- Fan speed independent of power frequency.
- Significantly reduced power consumption compared to conventional AC fans.
- Open loop speed control, sensor and alarm signal possible on request.

### General attributes:

- Material: aluminium housing, fibreglass-reinforced PA impeller. Housing with grounding lug for screw M4 x 8 (Torx).
- Fully integrated electronic commutation.
- Protected against locking.
- Connection via single strands AWG 22, TR 64. Bared and tin-plated.
- Air exhaust over struts. Direction of rotation counter-clockwise, seen on rotor.
- Mass: 900 g.

Nominal data		Air flow	Air flow	Nominal voltage	Frequency	Voltage range	Sound pressure level	Sound power level	Sintec sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L <sub>10</sub> at 40 °C	at T <sub>max</sub>	Curve
Type		m <sup>3</sup> /h	CFM	V	Hz	VAC	dB(A)	Bel(A)	□ / ■	Watts	RPM	°C	Hours	Hours	
AC 6200 NM		350	206,0	115 / 230	50 / 60	85 ... 265	50	5,7	■	14	2 850	-20...+70	80 000 / 40 000		1

Speed variants available on request.



max. 135 m<sup>3</sup>/h

# ACmaxx in-line duct fan

Series AC 100 NR    Ø 98,5 x 130 mm



### Highlights:

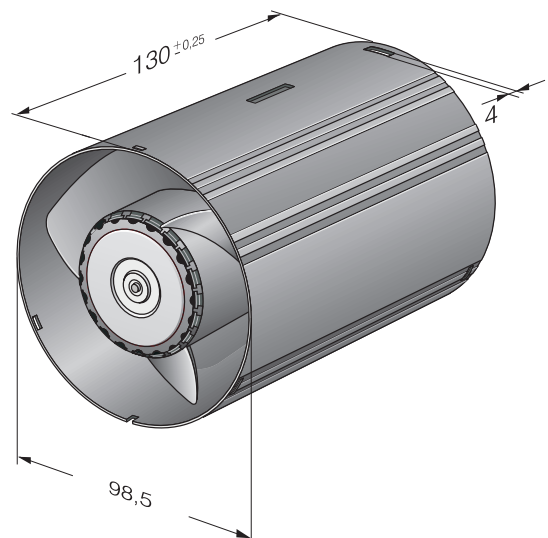
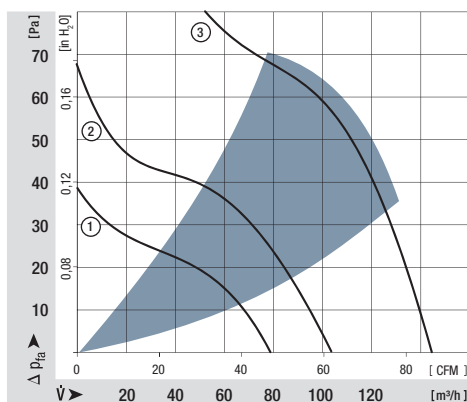
- Highest energy efficiency thanks to EC technology.
- Protection class IP44 (IP45 possible depending on mounting position).
- Speed-boost function via mains voltage switch.
- Vibration-isolated motor.
- Global voltage - one product applicable for all line voltages and frequencies between 85-265 VAC and 50/60 Hz. Fan speed independent from power frequency.

### General features:

- Material: fibreglass-reinforced plastic, housing PP, impeller PA.
- Electrical connection via 3-pole terminal block, max. 1.5 mm<sup>2</sup>.
- Protection class 2.
- Approvals: VDE 60335-3-80. UL, CE, CSA on request.
- Mass: 400 g.

Nominal data		Air flow	Air flow	Nominal voltage	Frequency	Voltage range	Sound pressure level	Sound power level	Sintec sleeve bearings Ball bearings	Power input	Nominal speed	Temperature range	Service life L <sub>10</sub> at 40 °C	at T <sub>max</sub>	Curve
Type		m <sup>3</sup> /h	CFM	V	Hz	VAC	dB(A)	Bel(A)	□ / ■	Watts	RPM	°C	Hours	Hours	
NEW <small>nominal</small> <small>boost</small> AC 100 NR		80	47,1	115/230	50-60	85...265	35	4,7	■	2,5	2 750	-10...+55	70 000 / 40 000		1
		105	61,8				42	5,3		4,5	3 500				2

Optional: Max. speed at 135 m<sup>3</sup>/h (Curve 3).

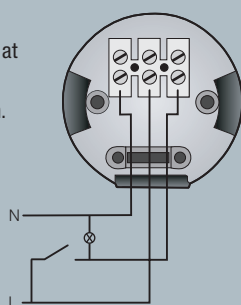


**Highest energy efficiency:** 0.03 - 0.045 W/m<sup>3</sup>/h free air (Specific fan power).  
**Boost speed setting:** 2 speed settings possible via boost function.  
**Vibration isolation:** Reduced transmission of vibrations from motor to housing.  
**Intelligence:** Speed settings and control outputs optional.

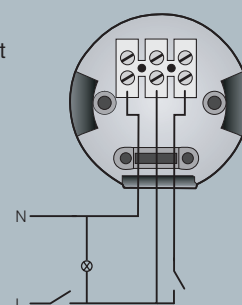
## Connection



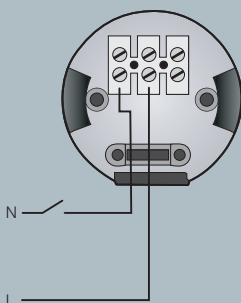
**Example 1:**  
Continuous operation at nominal speed boost speed via light switch.



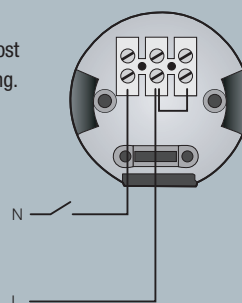
**Example 2:**  
Nominal speed via light switch, separate boost switch.



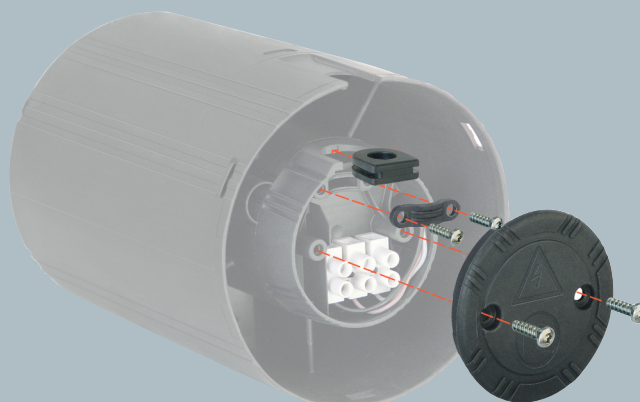
**Example 3:**  
Simple connection, nominal speed without switching.



**Example 4:**  
Simple connection, boost speed without switching.



## Scope of delivery



Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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