EC axial fans - HyBlade®
for ventilation technology

Edition 2016-06

ebmpapst

The engineer's choice

GREEN TECH

The new EC axial fans for ventilation technology

Energy-efficient fans are also becoming increasingly important in agriculture.

Motivated by legal requirements and increasing energy costs, the market is demanding new, energy-efficient solutions.

To accommodate this trend, ebm-papst has introduced the new axial fan series with energy saving EC technology, fully in line with the GreenTech philosophy.

This brochure contains a selection of axial fans, starting from an outer diameter of 500 mm all the way up to an outer diameter of 1250 mm. This corresponds to an air performance of up to 58.000 m³/h (34.000 cfm).

The fans have EC motors and consume, depending on the operating cycle, up to 70% less electrical energy than comparable AC fans.

Installation could not be easier: the fan is installed in the exhaust duct or wall of the building using the attached wall ring plate. Alternatively, the fan is integrated directly into a customer-side exhaust duct using an optional support structure.

Depending on the required air performance, customers can choose between a version with low pressure increase and a version for higher pressure drops, such as those encountered in biofilters.

Depending on the attainable air performance, the fans are available in single-phase or three-phase design, 50 or 60 Hz power supply system.

The fans are controlled via the standard 0-10V interface or an integrated bus interface.

Comprehensive corrosion protection measures have been taken that allow the fans to be used in almost all climatic applications with outstanding operating reliability.

Contents

About ebm-papst.

As a leader in technologies for ventilation and drive engineering, ebm-papst is in demand as an engineering partner in many sectors. With over 15,000 different products, we provide the right solution for just about any challenge. Our fans and drives are reliable, quiet and energy-efficient.

Six reasons that make us the ideal partner:

Our systems expertise.
You want the best solution for every project. The interrelationships between ventilation and drive engineering must thus be considered as a whole. And that's what we do – with **motor technology** that sets standards, sophisticated **electronics** and **aerodynamic designs** – all from a single source and perfectly matched. These system solutions release unique synergies worldwide. And in particular – they relieve you of a lot of work, so that you can concentrate on your core competency.

The ebm-papst spirit of invention.
In addition to our wide range of products, we are always able to develop customized solutions for you. A diversified team of 600 engineers and technicians works at our three locations in Germany: Mulfingen, Landshut and St. Georgen. Contact us to discuss your next project.

Our lead in technology.
As pioneer and trail-blazer for developing highly efficient EC technology, we are way ahead of other motor manufacturers. Almost our entire product range is also available with GreenTech EC technology. The list of benefits is long: higher efficiency, maintenance-free, longer service life, sound reduction, intelligent control characteristics and incomparable energy efficiency with savings of up to 80 % compared to conventional AC technology. Let our technology be your competitive advantage as you lead in your industry.

Proximity to our customers.
ebm-papst owns 57 sales offices worldwide, of which 47 are subsidiaries with an extensive network of sales representatives and distributors. You will always have a local contact, someone who speaks your language and knows your market.

Our standard of quality.
Of course you can rely on the highest standards of quality with our products. Our quality management is uncompromising, at every step in every process. This is underscored by our certification according to international standards including DIN EN ISO 9001, ISO/TS 16949-2 and DIN EN ISO 14001.

Our sustainable approach.
Assuming responsibility for the environment, for our employees and for society is an integral part of our corporate philosophy. We develop products with an eye to maximum environmental compatibility, in particular resource-preserving production methods. We promote environmental awareness among our young staff and are actively involved in sporting, cultural activities and education. That's what makes us a leading company – and an ideal partner for you.

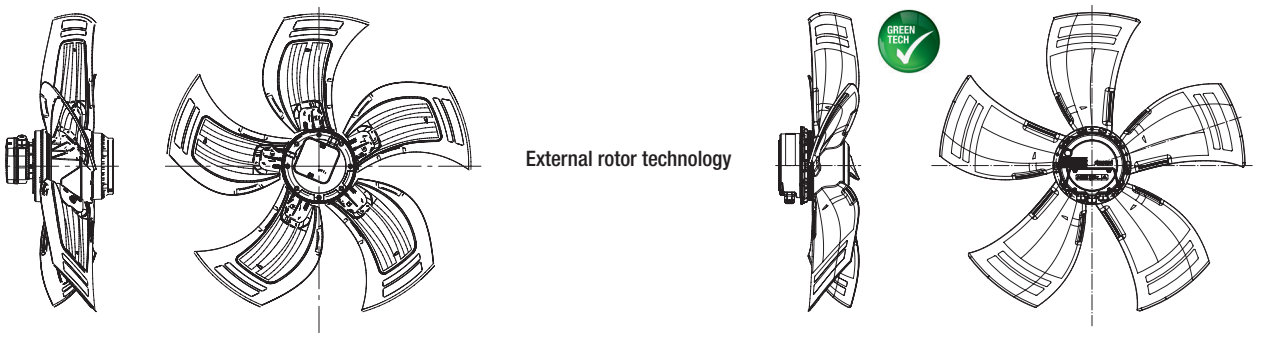
The story of our success to market and technology pioneer.

1963	Founding of **Elektrobau Mulfingen GmbH & Co. KG** by Gerhard Sturm and Heinz Ziehl.
1965	First tubeaxial fan developed in EC/DC technology.
1966	ebm-papst's success takes off with the new 68 motor.
1972	The first ebm-papst foreign subsidiary is established in Sweden.
1988	Gerhard Sturm is awarded the Federal Cross of Merit.
1990	The sixty-millionth external-rotor fan is produced.
1992	Acquisition of **PAPST Motoren GmbH** in St. Georgen.
1997	Buyout of the **Landshut** (mvl) plant.
1998	Development of first fans with integrated electronics.
2003	Change of name to **ebm-papst**.
2008	The **HyBlade®** range of fans sets new efficiency standards.
2010	**GreenTech** – our sign for energy efficiency and resource preservation.
2011	**RadiCal** defines a new standard for EC centrifugal fans.
2013	ebm-papst takes over the gearbox specialist Zeitlauf and wins the **German Sustainability Award**.
2014	Team partnership with Mercedes AMG PETRONAS Formula 1 team.
2015	**RadiPac** pushes the limits of efficiency.

Energy comparison: axial fans size 800

The controlled ventilation of agricultural sheds is carried out primarily using axial fans. The fans are driven using single-phase asynchronous motors installed in the hub, with speeds that are adjusted by changing the supply voltage. The disadvantage of this system is the relatively poor energy balance. New motor and control configurations provide a significant improvement in energy balance. The following comparison between a conventional asynchronous fan and a GreenTech EC fan demonstrates this impressively.

AC axial fan **< >** **GreenTech EC axial fan**

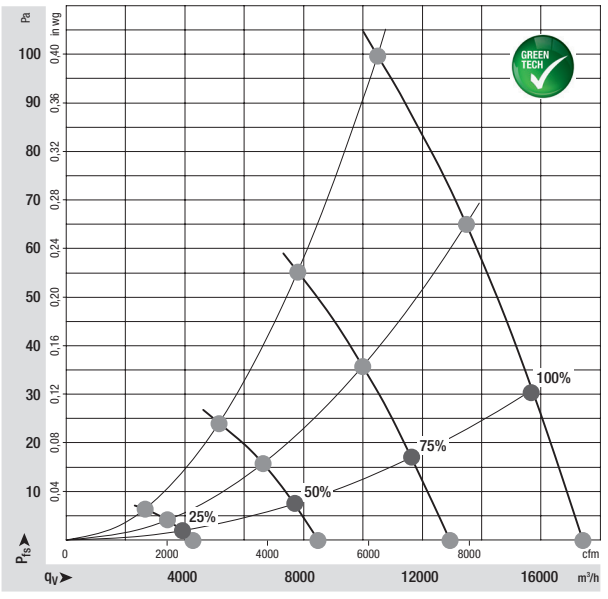


External rotor technology

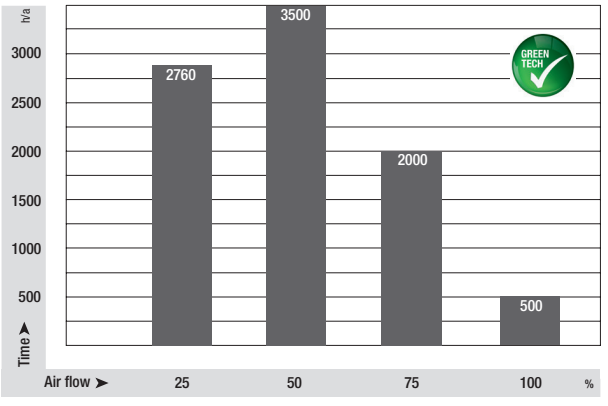
Asynchronous motor / AC motor
External voltage control, 3~400 V

Permanent magnet motor / GreenTech EC motor
Integrated frequency inverter control, 1~230 V

Comparison: 15.800 m³/h
@ 30 Pa and partial-load operation



Load profile



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Energy comparison: axial fans size 800

If both fans are operated over the year with the specified load profile, the GreenTech EC fan provides significant cost savings. This is shown in the following image as a function of the energy costs. For example, if the electricity price is 0.10 EUR per kWh, annual savings of 149 EUR can be expected.

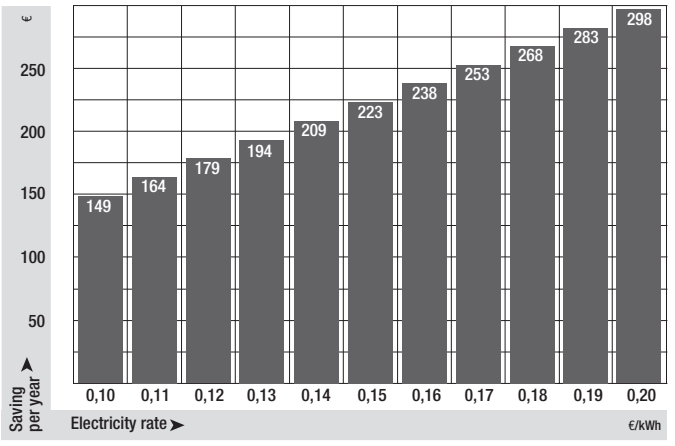


Figure: Annual savings as a function of the energy costs

The following figure provides the view over a longer period. Here, the annual operating costs of both fan concepts are added up over the years. The load profile shown above also served as the basis for the calculation here. The energy costs have been set at 0.10 EUR per kWh.

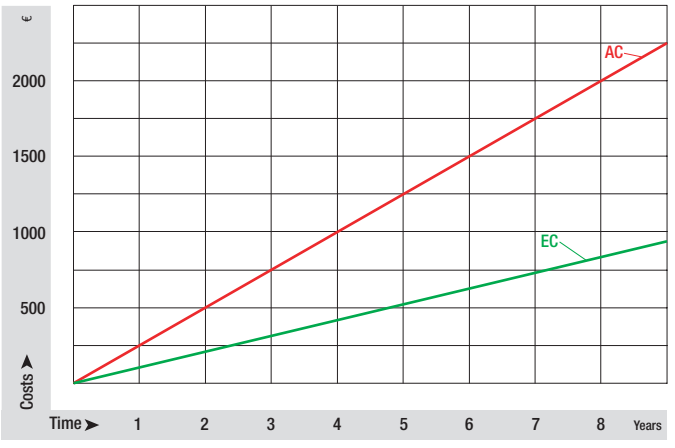


Figure: Operating costs over time at 0.10 EUR/kWh

The specific output of fans is an important and widely used statistic for their efficiency. This is shown by the power requirement in watts relative to a delivery volume of 1000 m³/h . The graph shows the specific output of both fan concepts, starting at the design operating point of 15.800 m³/h @ 30Pa. The GreenTech EC technology shows its advantages particularly well in partial-load operation, i.e. at reduced speed. That is precisely where barn fans are primarily operated. Another reason to decide in favour of groundbreaking EC technology.

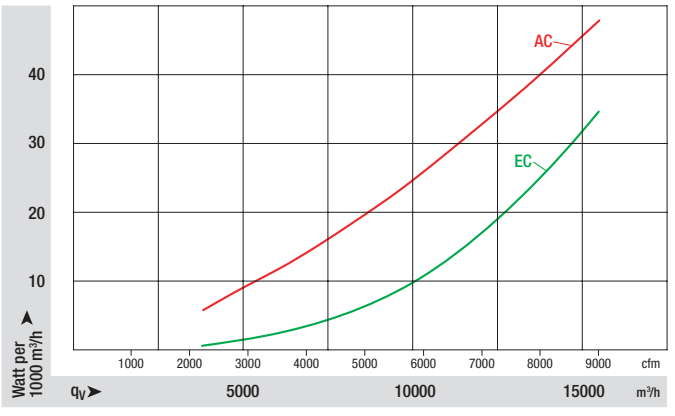


Figure: Comparison of specific fan power

EC axial fans “low pressure”

EC axial fans “low pressure”

Ø 560 - Ø 1250

- **Material:**
  Carrying ring: Steel, galvanized and coated in black plastic (RAL 9005)
  Wall ring: Sheet steel, galvanized and coated in black plastic (RAL 9005)
  Blades: Ⓑ Ⓓ Ⓔ (5) Painted press-fitted sheet steel blank, over-molded with PP plastic
  Ⓐ Ⓒ Ⓕ (5) Painted aluminium insert, over-molded with PP plastic
  Ⓖ Ⓗ (3) Die-cast aluminium, painted black
  Rotor: Painted black
  Electronics housing: Die-cast aluminium, painted black
- **Direction of rotation:** Ⓐ Ⓑ Ⓒ clockwise, Ⓓ Ⓔ Ⓕ Ⓖ Ⓗ counter-clockwise viewed toward rotor
- **Degree of protection:** Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ IP 54, Ⓕ Ⓖ Ⓗ IP 55
- **Insulation class:** Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ "B" ("F" applying to the main components as per EN)
  Ⓕ Ⓖ Ⓗ "F"
- **Installation position:** Shaft horizontal or rotor on top; rotor on bottom on request

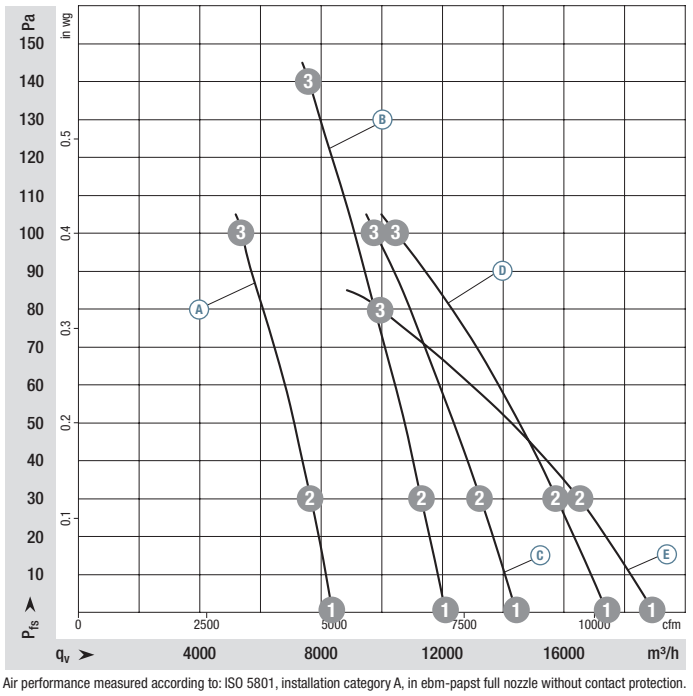
Nominal data

Type	Motor	Blade pitch	Curve	Nominal voltage range	Frequency	Speed[1]	Max. input power[1]	Max. input current[1]	Max. back pressure	Perm. ambient temp.	Weight without attachments	Techn. features and connection diagram
				VAC	Hz	rpm	kW	A	Pa	°C	kg	
*3G 560	M3G 112-EA	-5°	Ⓐ	1~200-277	50/60	1000	0,40	1,80	100	-25..+60	7,2	P. 35 / P2)
*3G 630	M3G 112-GA	-5°	Ⓑ	1~200-277	50/60	1000	0,72	3,20	140	-25..+60	9,3	P. 35 / P2)
*3G 710	M3G 112-IA	0°	Ⓒ	1~200-277	50/60	830	0,70	3,10	100	-25..+60	12,0	P. 35 / P2)
*3G 800	M3G 112-IA	0°	Ⓓ	1~200-277	50/60	710	0,73	3,20	100	-25..+60	12,1	P. 35 / P2)
*3G 910	M3G 112-IA	0°	Ⓔ	1~200-277	50/60	590	0,58	2,60	80	-25..+60	12,2	P. 35 / P2)
*3G 990	M3G 150-FF	-5°	Ⓕ	1~200-277	50/60	820	1,39	6,10	70	-25..+60	22,8	P. 36 / L9)
*3G Z50	M3G 150-NA	0°	Ⓖ	1~200-277	50/60	520	1,50	6,50	75	-25..+60	36,0	P. 36 / L9)
*3G Z50	M3G 150-NA	0°	Ⓗ	3~380-480	50/60	570	1,78	2,70	75	-25..+65	36,0	P. 34 / L5)

Subject to change

(1) Nominal data at operating point with maximum load and 230 or 400 VAC.

Curves:



	n rpm	P_{ed} kW	I A	L_{WA} dB(A)	SFP W/(1000m³/h)
Ⓐ 1	1000	2,93	1,29	67	35,1
Ⓐ 2	1000	3,31	1,46	66	43,3
Ⓐ 3	1000	4,00	1,80	69	74,1
Ⓑ 1	1000	4,62	2,11	71	38,2
Ⓑ 2	1000	5,18	2,36	69	45,9
Ⓑ 3	1000	7,20	3,20	71	94,8
Ⓒ 1	830	4,48	2,10	69	31,1
Ⓒ 2	830	5,25	2,41	68	39,6
Ⓒ 3	830	7,00	3,10	73	71,5
Ⓓ 1	710	4,62	2,15	70	26,5
Ⓓ 2	710	5,41	2,49	67	34,3
Ⓓ 3	710	7,30	3,20	69	69,6
Ⓔ 1	590	3,46	1,64	67	18,2
Ⓔ 2	590	4,45	2,07	65	27,0
Ⓔ 3	590	5,80	2,60	71	58,5

Air performance measured according to: ISO 5801, installation category A, in ebm-papst full nozzle without contact protection. Intake-side sound level: Lw_A according to ISO 13347, Lp_A measured at 1 m distance from fan axis. The values given are only applicable under the specified measuring conditions and may differ depending on the installation conditions. In the event of deviation from the standard configuration, the parameters must be checked in installed condition. See Page 38 ff for detailed information.

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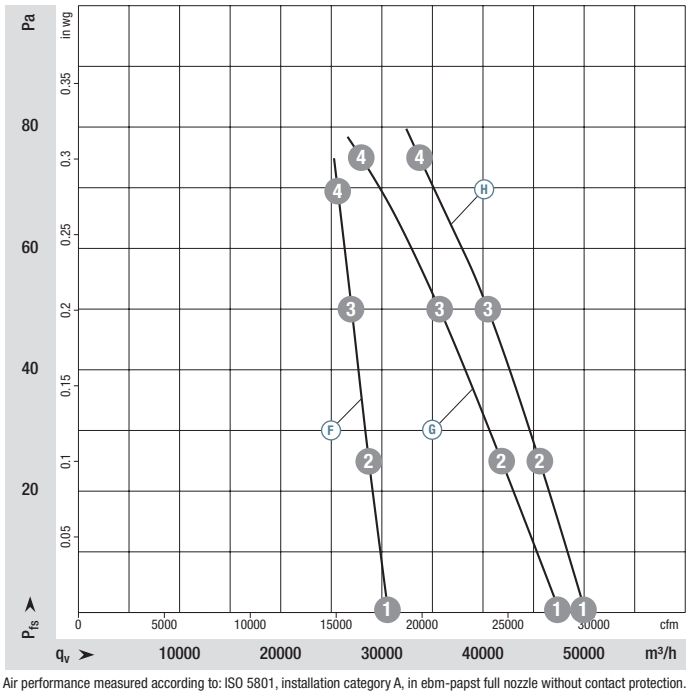
- **Technical features:** See connection diagram P. 34 ff.
- **EMC:** Ⓗ Interference emission according to EN 61000-6-4
  Ⓗ Immunity to interference according to EN 61000-6-2
- **Touch current:** <= 3,5 mA according to IEC 60990 (measuring circuit Fig. 4)
- **Terminal box:** Electrical connection via terminal strip
- **Protection class:** I (with customer connection of protective earth)
- **Conformity with standards:** CE
- **Approvals:**
  Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ CCC; EAC is planned; UL, CSA, VDE on request
  Ⓕ Ⓖ Ⓗ EAC, cURus
- **Condensation drainage holes:** Stator side
- **Mode:** Continuous operation (S1)
- **Mounting:** Maintenance-free ball bearings
- **Efficiency:** Ecodesign EU regulation EU 327/2011

Air flow direction	 "A" ›	Weight without attachments	 "A" ›	Weight with square / round full nozzle
	without attachments	kg	with square [2] /round [3] full nozzle	kg
"A"	A3G 560-AP68 -35	7,2	W3G 560-DP68 -35 [2]	18,9
"A"	A3G 630-AQ37 -35	9,3	W3G 630-DQ37 -35 [2]	24,3
"A"	A3G 710-AO85 -35	12,0	W3G 710-DO85 -35 [2]	26,9
"A"	A3G 800-AO81 -35	12,1	W3G 800-DO81 -35 [2]	33,3
"A"	A3G 910-AO84 -35	12,2	W3G 910-DO84 -35 [2]	37,0
"A"	A3G 990-AW30 -55	22,8	W3G 990-DW30 -55 [2]	52,7
"A"	A3G Z50-AK07 -55	36,0	W3G Z50-CK07 -55 [3]	80,0
"A"	A3G Z50-AK15 -35	36,0	W3G Z50-CK15 -35 [3]	80,0

Curves:



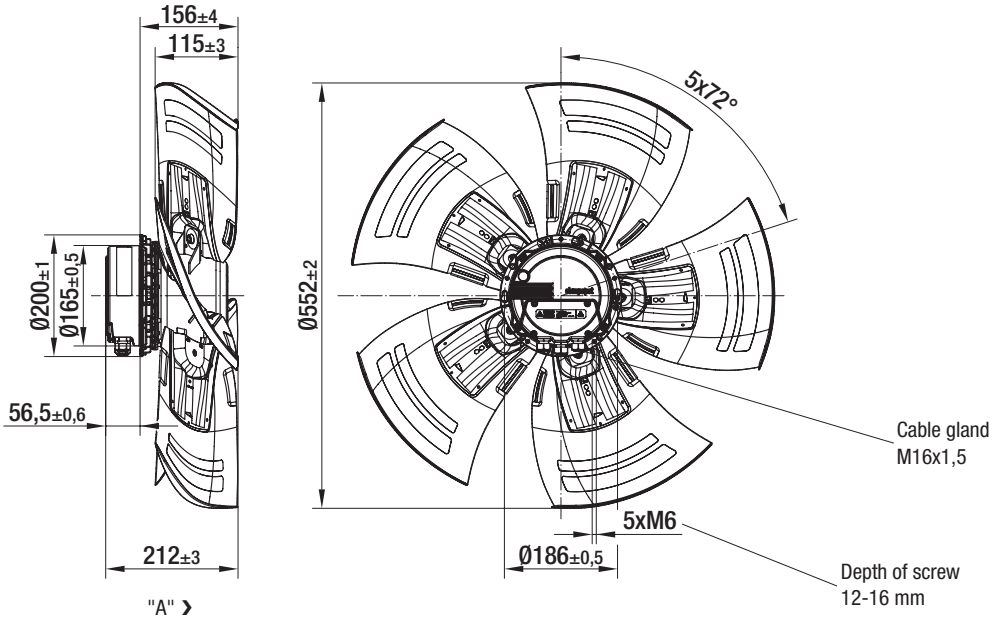
	n rpm	P_{ed} kW	I A	L_{WA} dB(A)	SFP W/(1000m³/h)
Ⓕ 1	820	0,99	4,34	81	32,4
Ⓕ 2	820	1,15	5,01	80	40,2
Ⓕ 3	820	1,29	5,69	79	47,9
Ⓕ 4	820	1,39	6,10	79	54,4
Ⓖ 1	580	1,50	6,50	72	31,9
Ⓖ 2	560	1,50	6,50	72	35,7
Ⓖ 3	540	1,50	6,50	73	42,3
Ⓖ 4	520	1,50	6,50	74	54,5
Ⓗ 1	605	1,67	2,55	65	33,4
Ⓗ 2	595	1,74	2,65	65	38,2
Ⓗ 3	585	1,78	2,70	65	43,9
Ⓗ 4	570	1,78	2,70	66	52,4

Air performance measured according to: ISO 5801, installation category A, in ebm-papst full nozzle without contact protection. Intake-side sound level: Lw_A according to ISO 13347, Lp_A measured at 1 m distance from fan axis. The values given are only applicable under the specified measuring conditions and may differ depending on the installation conditions. In the event of deviation from the standard configuration, the parameters must be checked in installed condition. See Page 38 ff for detailed information.

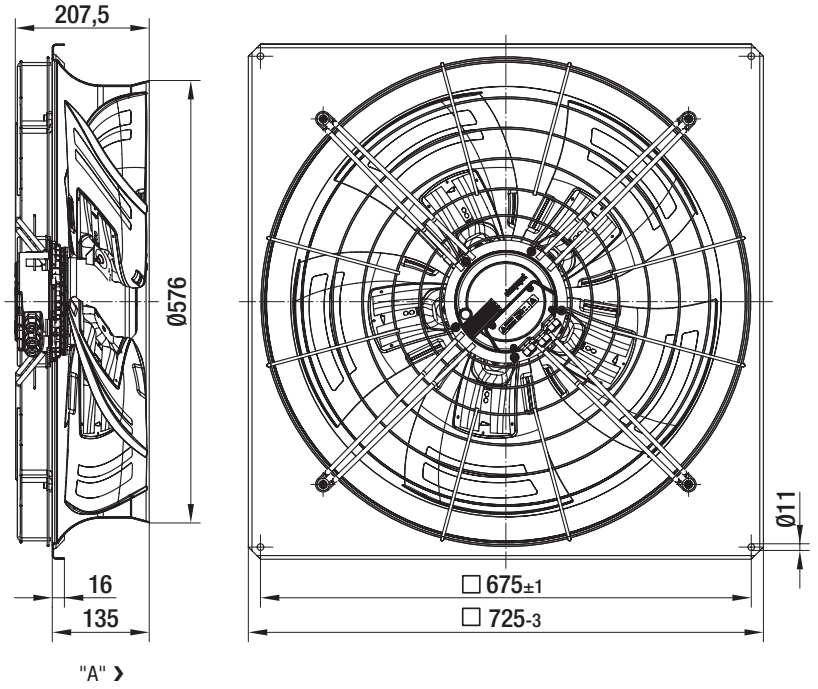
EC axial fans “low pressure”

Ø 560 with motor M3G112, drawings for direction of air flow "A"

A3G 560-AP68-35 (Without attachments)



W3G 560-DP68-35 (With full square nozzle)



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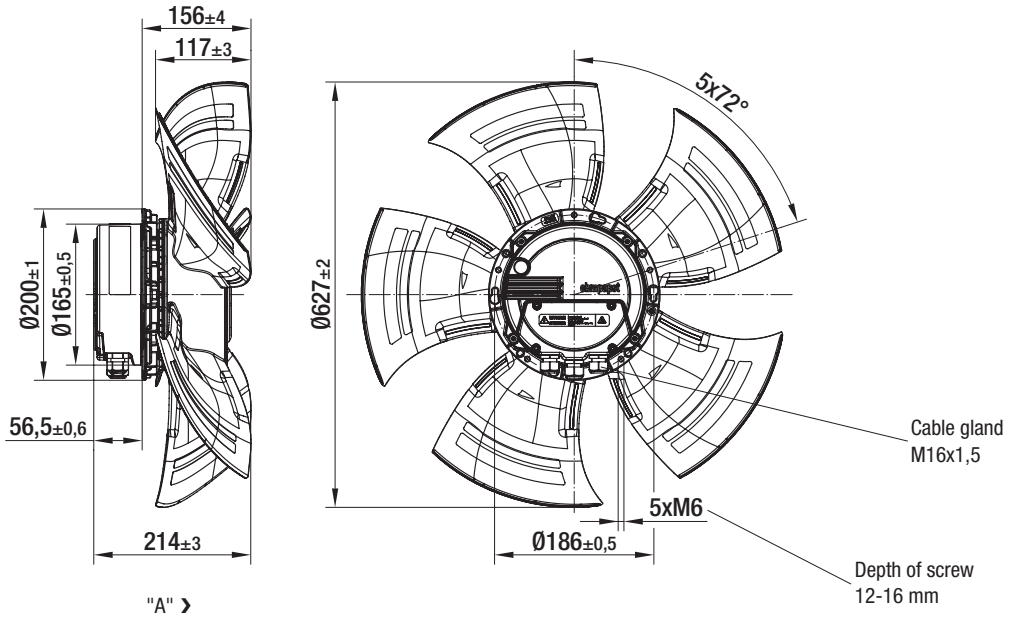
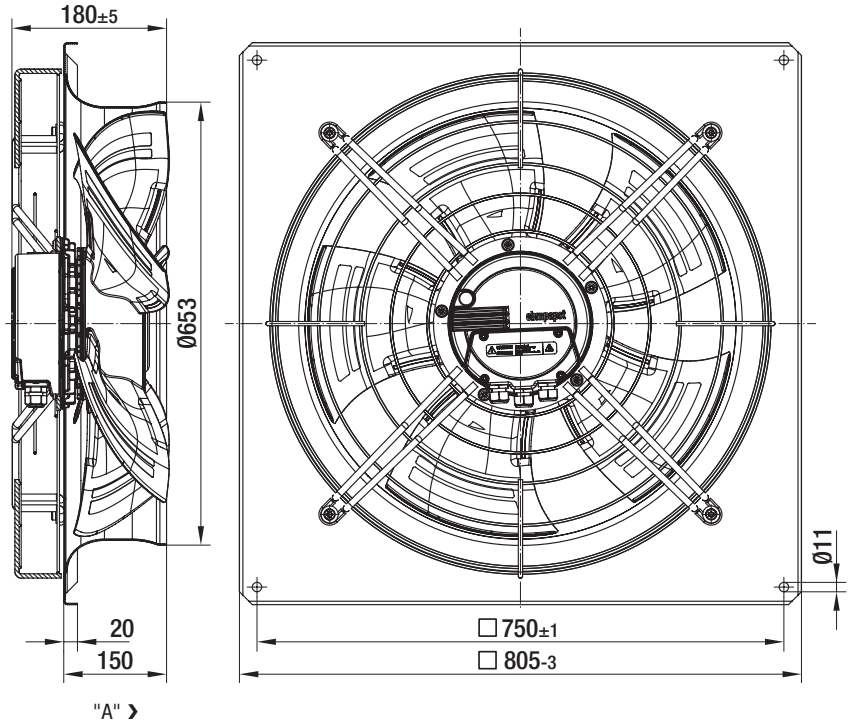
EC axial fans “low pressure”

Ø 630 with motor M3G112, drawings for direction of air flow "A"

A3G 630-AQ37-35 (Without attachments)



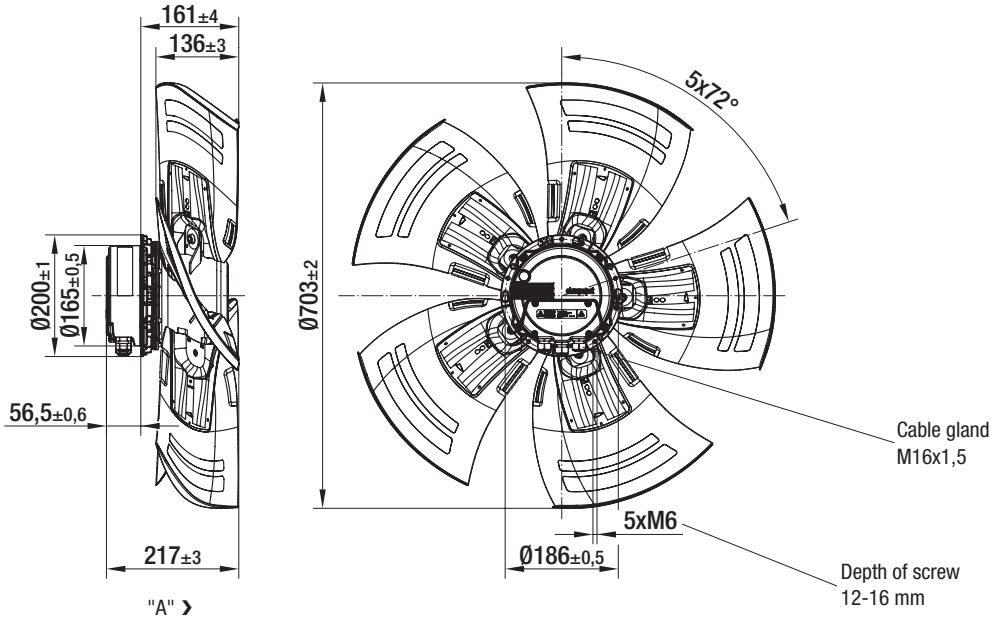
W3G 630-DQ37-35 (With full square nozzle)



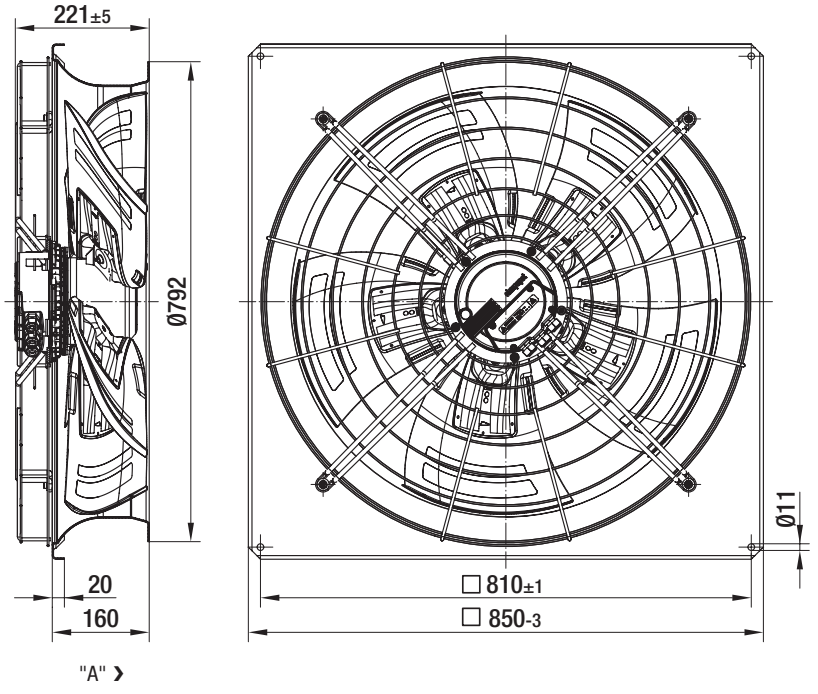
EC axial fans “low pressure”

Ø 710 with motor M3G112, drawings for direction of air flow "A"

A3G 710-A085-35 (Without attachments)



W3G 710-D085-35 (With full square nozzle)



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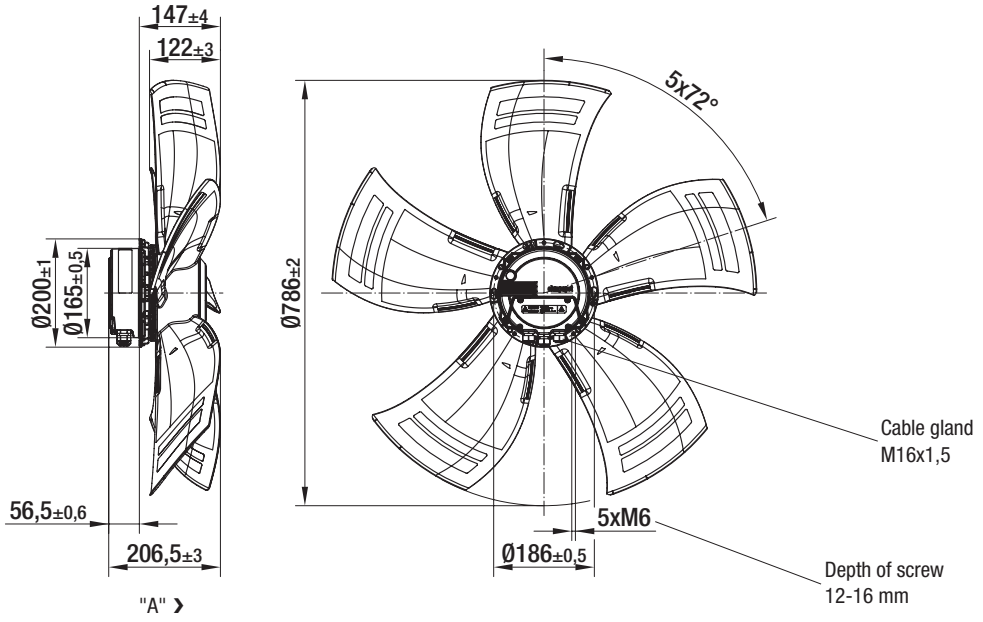
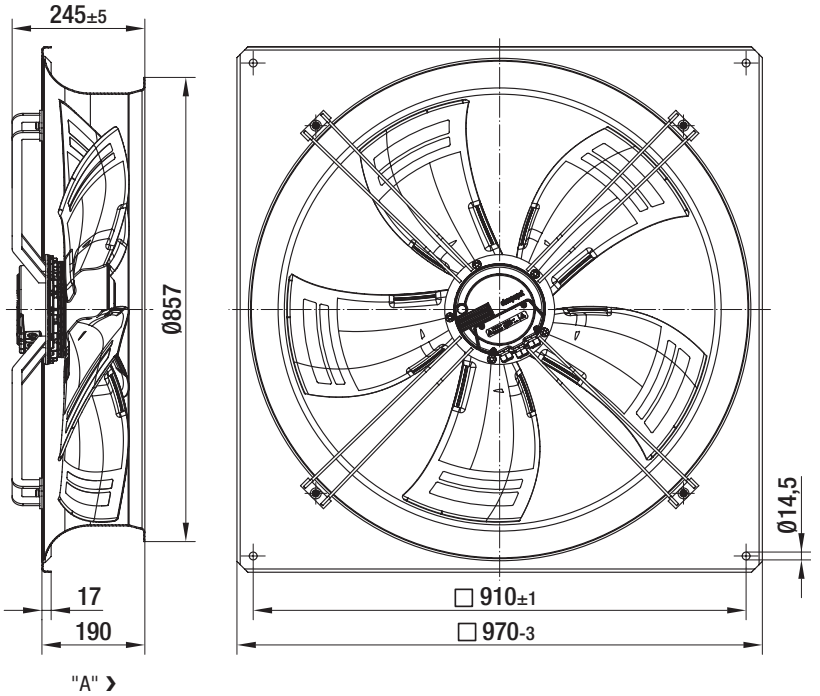
EC axial fans “low pressure”

Ø 800 with motor M3G112, drawings for direction of air flow "A"

A3G 800-A081-35 (Without attachments)



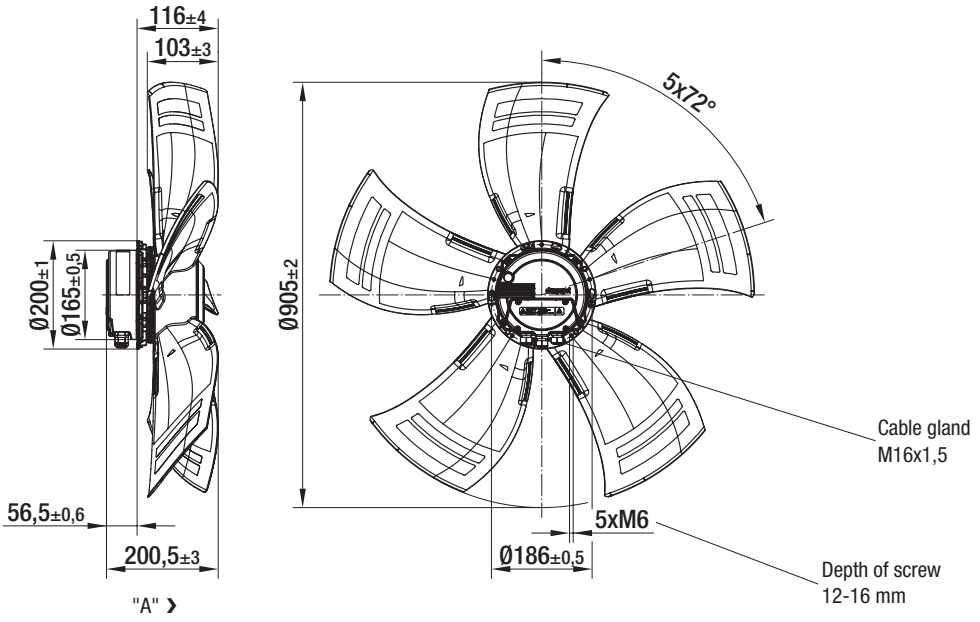
W3G 800-D081-35 (With full square nozzle)



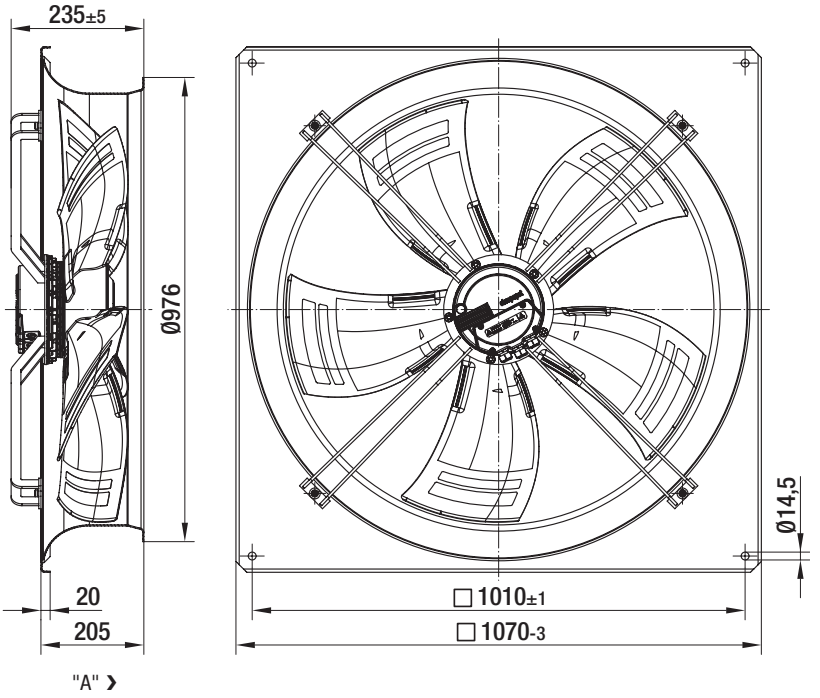
EC axial fans “low pressure”

Ø 910 with motor M3G112, drawings for direction of air flow "A"

A3G 910-A084-35 (Without attachments)



W3G 910-D084-35 (With full square nozzle)



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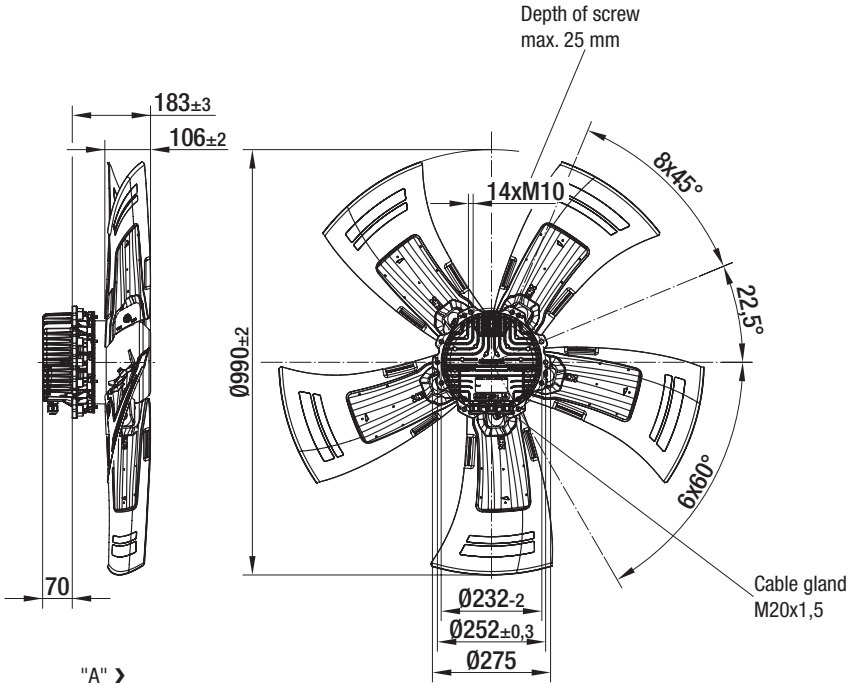
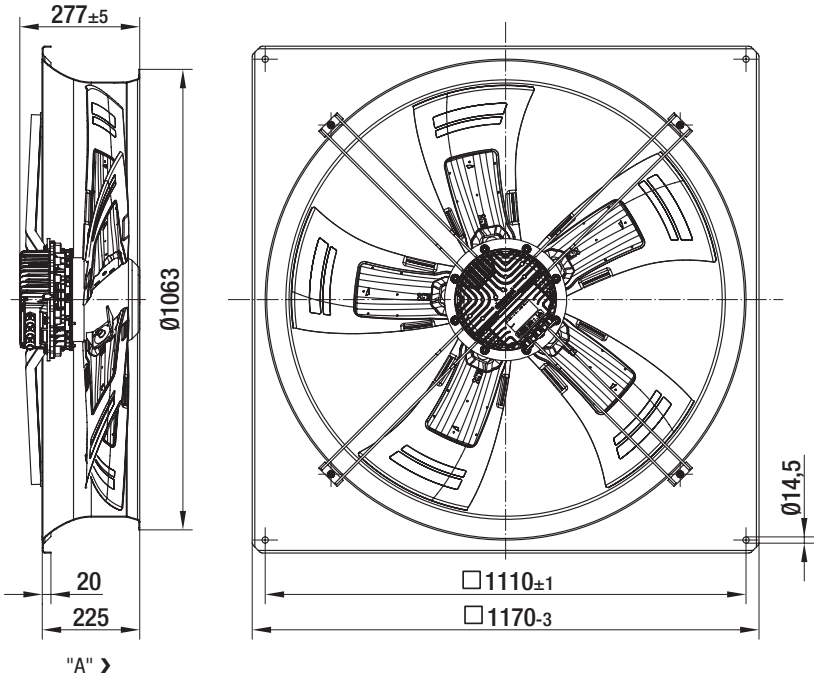
A3G 990-AW30-55 (Without attachments)



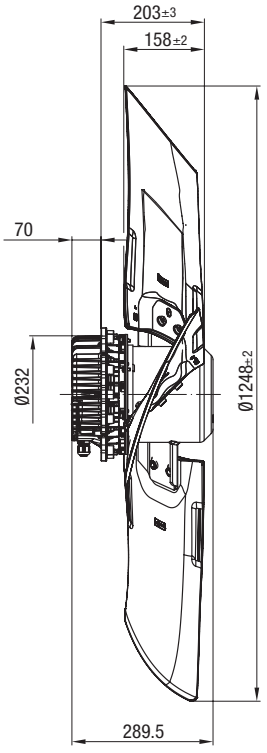
W3G 990-DW30-55 (With full square nozzle)

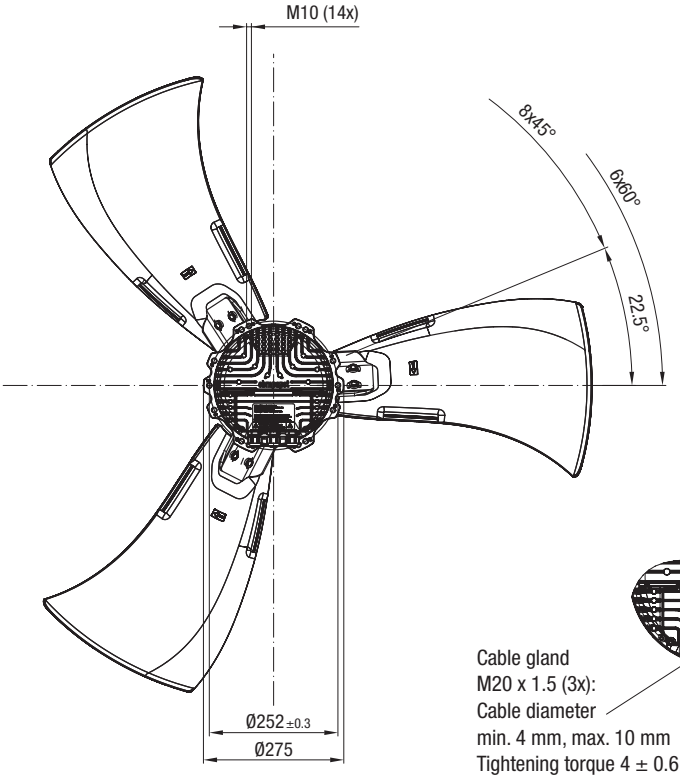


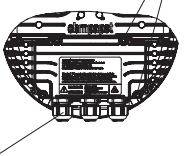
EC axial fans “low pressure”

Ø 1250 with motor M3G150, drawings for direction of air flow "A"

A3G Z50-AK07-55 (Without attachments)



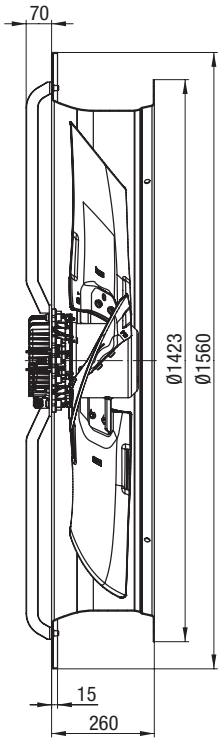


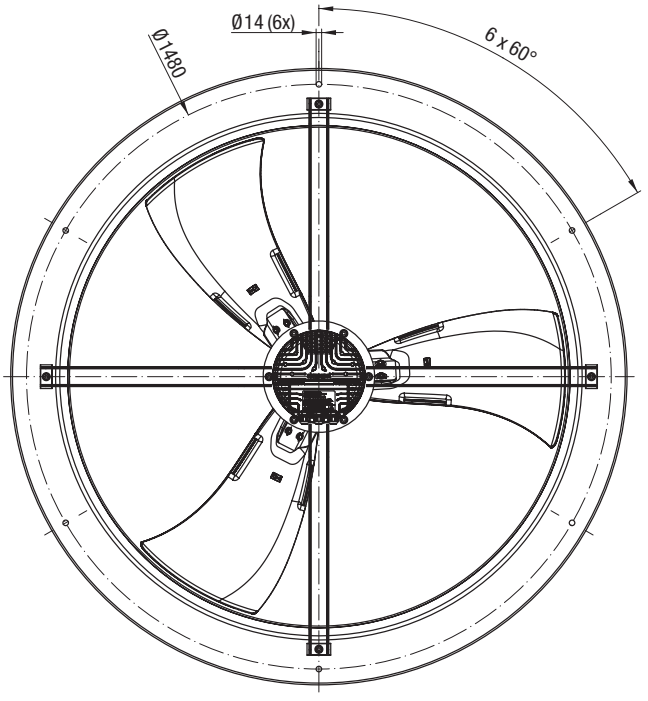


Tightening torque
3.5 ± 0.5 Nm

Cable gland
M20 x 1.5 (3x):
Cable diameter
min. 4 mm, max. 10 mm
Tightening torque 4 ± 0.6 Nm

W3G Z50-CK07-55 (With full round nozzle)





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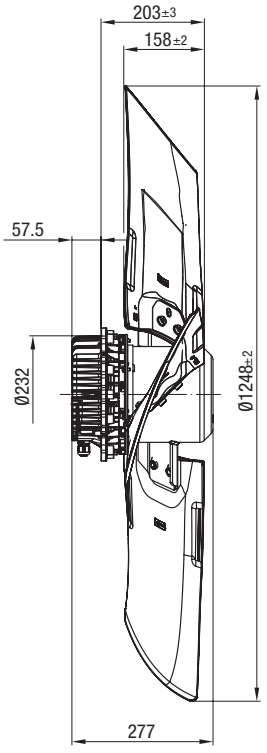
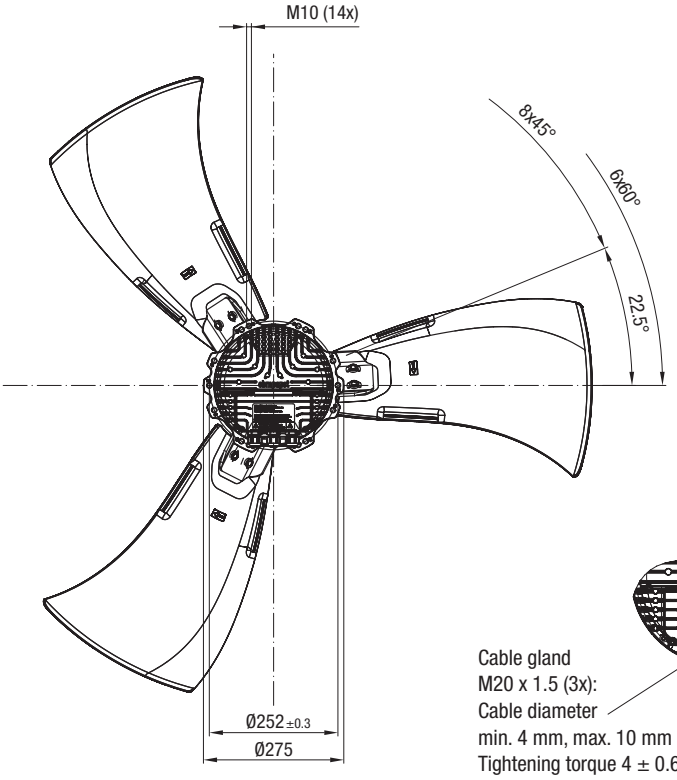
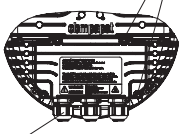
EC axial fans “low pressure”

Ø 1250 with motor M3G150, drawings for direction of air flow "A"

A3G Z50-AK15-35 (Without attachments)



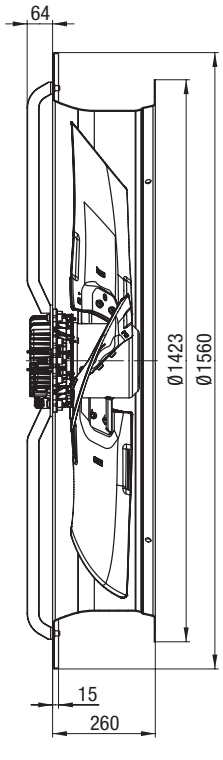


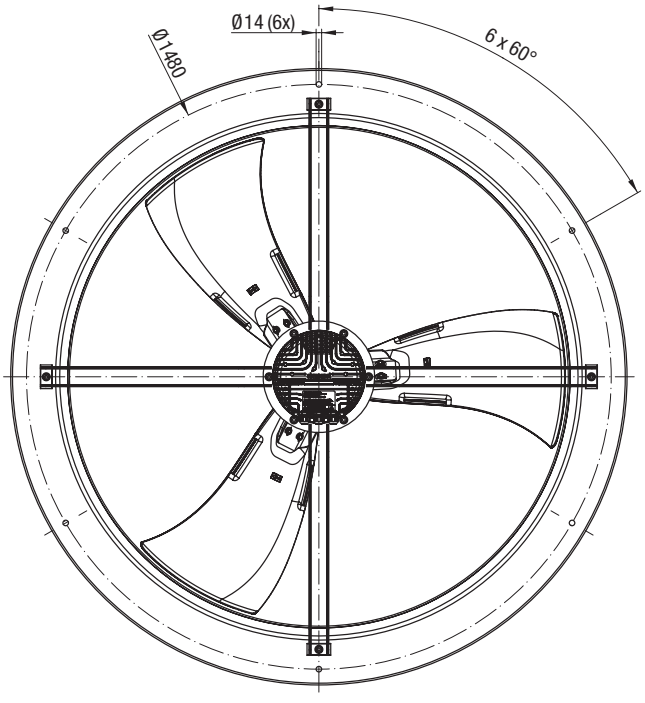


Tightening torque
3.5 ± 0.5 Nm

Cable gland
M20 x 1.5 (3x):
Cable diameter
min. 4 mm, max. 10 mm
Tightening torque 4 ± 0.6 Nm

W3G Z50-CK15-35 (With full round nozzle)





EC axial fans “high pressure”

EC axial fans “high pressure”

Ø 500 - Ø 1250

- **Material:**
  Carrying ring: Steel, galvanized and coated in black plastic (RAL 9005)
  Wall ring: Sheet steel, galvanized and coated in black plastic (RAL 9005)
  Blades: Ⓐ (5) Painted press-fitted sheet steel blank, over-molded with PP plastic
  ⒷⒸⒹⒺⒻⒼ (5) Painted aluminium insert, over-molded with PP plastic
  Rotor: Painted black
  Electronics housing: Die-cast aluminium, painted black
- **Direction of rotation:** Ⓐ clockwise, ⒷⒸⒹⒺⒻⒼ counter-clockwise viewed toward rotor
- **Degree of protection:** ⒶⒼ IP 54, ⒷⒸⒹⒺⒻ IP 55
- **Insulation class:** Ⓐ "B" ("F" applying to the main components as per EN)
  ⒷⒸⒹⒺⒻⒼ "F"
- **Installation position:** Shaft horizontal or rotor on top; rotor on bottom on request

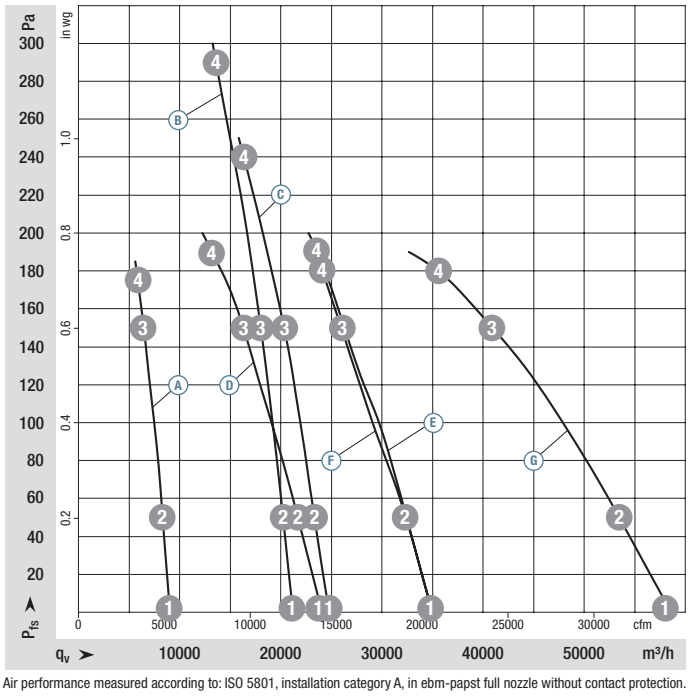
Nominal data

Type	Motor	Blade pitch	Curve	Nominal voltage range	Frequency	Speed[1]	Max. input power[1]	Max. input current[1]	Max. back pressure	Perm. ambient temp.	Weight without attachments	Techn. features and connection diagram
				VAC	Hz	rpm	kW	A	Pa	°C	kg	
*3G 500	M3G 112-EA	-0°	Ⓐ	1~200-277	50/60	1420	0,75	3,40	170	-25..+60	7,2	S. 35 / P2)
*3G 630	M3G 150-IF	-0°	Ⓑ	3~380-480	50/60	1510	3,20	5,00	290	-25..+65	24,4	S. 34 / L5)
*3G 710	M3G 150-IF	0°	Ⓒ	3~380-480	50/60	1250	2,83	4,30	240	-25..+60	25,3	S. 34 / L5)
*3G 800	M3G 150-GF	0°	Ⓓ	3~380-480	50/60	925	1,85	2,85	190	-25..+60	23,0	S. 34 / L5)
*3G 910	M3G 150-NA	0°	Ⓔ	3~380-480	50/60	1000	2,88	4,40	190	-25..+65	30,9	S. 34 / L5)
*3G 990	M3G 150-NA	-5°	Ⓕ	3~380-480	50/60	960	2,58	4,00	180	-25..+70	31,2	S. 34 / L5)
*3G Z50	M3G 200-LA	0°	Ⓖ	3~380-480	50/60	645	4,10	6,70	180	-25..+60	66,0	S. 34 / L5)

Subject to change

(1) Nominal data at operating point with maximum load and 230 or 400 VAC.

Curves:



	n rpm	P_{ed} kW	I A	L_{WA} dB(A)	SFP W/(1000m³/h)
Ⓐ 1	1420	0,55	2,52	79	60,6
Ⓐ 2	1420	0,60	2,74	77	72,1
Ⓐ 3	1420	0,71	3,20	73	109,5
Ⓐ 4	1420	0,75	3,40	74	126,6
Ⓑ 1	1510	2,48	3,77	81	117,2
Ⓑ 2	1510	2,63	4,00	81	129,7
Ⓑ 3	1510	2,86	4,40	81	158,7
Ⓑ 4	1510	3,20	5,00	85	234,4
Ⓒ 1	1250	2,23	3,40	79	89,8
Ⓒ 2	1250	2,33	3,54	79	99,8
Ⓒ 3	1250	2,62	4,00	79	128,9
Ⓒ 4	1250	2,83	4,30	83	173,2
Ⓓ 1	925	1,22	1,85	72	50,7
Ⓓ 2	925	1,37	2,07	72	63,2
Ⓓ 3	925	1,66	2,50	76	101,7
Ⓓ 4	925	1,85	2,85	80	140,2

Air performance measured according to: ISO 5801, installation category A, in ebm-papst full nozzle without contact protection. Intake-side sound level: L_{WA} according to ISO 13347, L_{pA} measured at 1 m distance from fan axis. The values given are only applicable under the specified measuring conditions and may differ depending on the installation conditions. In the event of deviation from the standard configuration, the parameters must be checked in installed condition. See Page 38 ff for detailed information.

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- **Technical features:** See connection diagram P. 34 ff.
- **Touch current:** <= 3,5 mA according to IEC 60990 (measuring circuit Fig. 4)
- **Terminal box:** Electrical connection via terminal strip
- **Protection class:** I (with customer connection of protective earth)
- **Conformity with standards:** CE
- **Approvals:**
  Ⓐ CCC; EAC is planned; UL, CSA, VDE on request
  Ⓑ Ⓒ Ⓓ Ⓔ Ⓕ Ⓖ EAC, cURus
- **Condensation drainage holes:** Stator side
- **Mode:** Continuous operation (S1)
- **Mounting:** Maintenance-free ball bearings
- **Efficiency:** Ecodesign EU regulation EU 327/2011

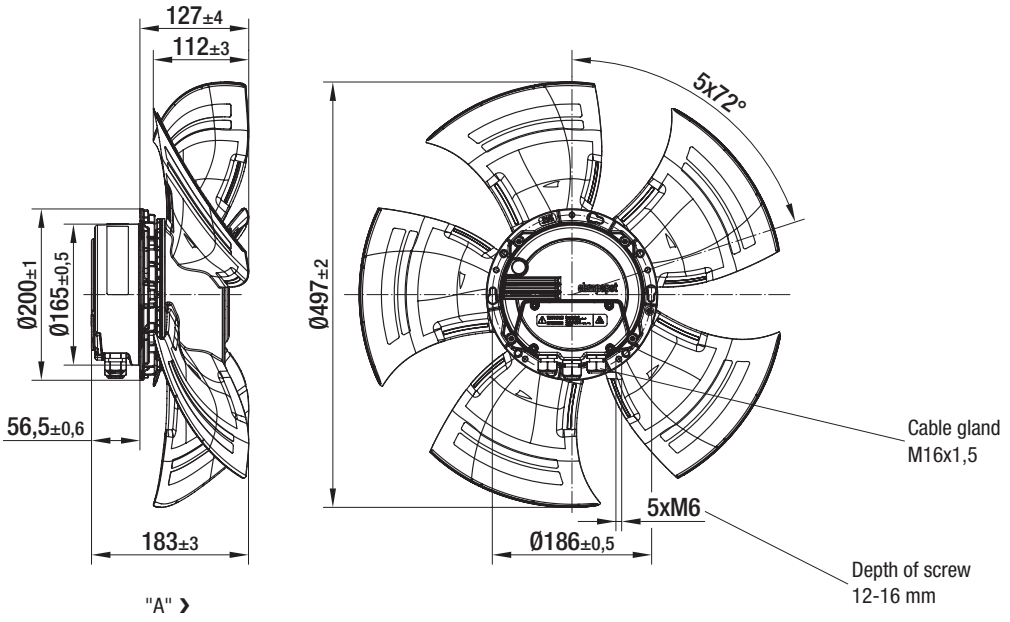
Air flow direction	 "A" › without attachments	Weight without attachments kg	 "A" › with square [2] /round [3] full nozzle	Weight with square / round full nozzle kg
"A"	A3G 500-AM56 -35	7,2	W3G 500-DM56 -35 [2]	17,2
"A"	A3G 630-AU23 -35	24,4	W3G 630-DU23 -35 [2]	39,5
"A"	A3G 710-AU21 -35	25,3	W3G 710-DU21 -35 [2]	42,4
"A"	A3G 800-AT21 -35	23,0	W3G 800-DT21 -35 [2]	42,8
"A"	A3G 910-AV02 -35	30,9	W3G 910-DV02 -35 [2]	56,1
"A"	A3G 990-AZ02 -35	31,2	W3G 990-DZ02 -35 [2]	61,4
"A"	A3G Z50-AB02 -35	66,0	W3G Z50-CB02 -35 [3]	137,0

	n rpm	P_{ed} kW	I A	L_{WA} dB(A)	SFP W/(1000m³/h)
Ⓔ ❶	1000	1,92	2,91	79	55,0
Ⓔ ❷	1000	2,19	3,35	78	67,6
Ⓔ ❸	1000	2,67	4,53	83	101,8
Ⓔ ❹	1000	2,88	4,40	82	122,1
Ⓕ ❶	960	1,49	2,27	85	42,6
Ⓕ ❷	960	1,83	2,78	83	56,6
Ⓕ ❸	960	2,43	3,70	84	93,4
Ⓕ ❹	960	2,58	4,00	85	107,3
Ⓖ ❶	645	2,69	4,64	79	46,0
Ⓖ ❷	645	3,08	5,20	78	57,6
Ⓖ ❸	645	3,83	6,33	80	93,3
Ⓖ ❹	645	4,10	6,70	83	115,3

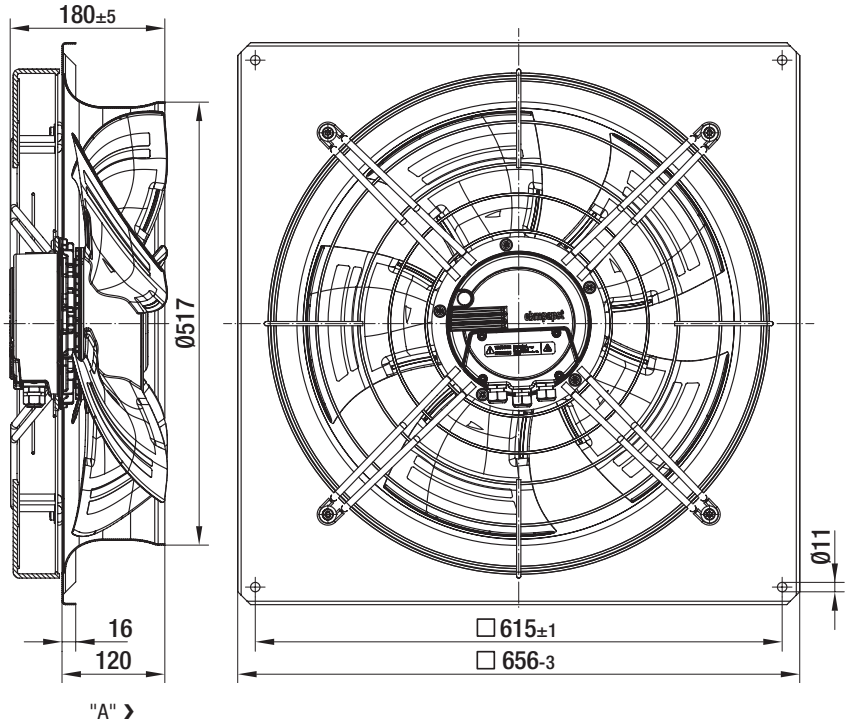
EC axial fans “high pressure”

Ø 500 with motor M3G112, drawings for direction of air flow "A"

A3G 500-AM56-35 (Without attachments)



W3G 500-DM56-35 (With full square nozzle)



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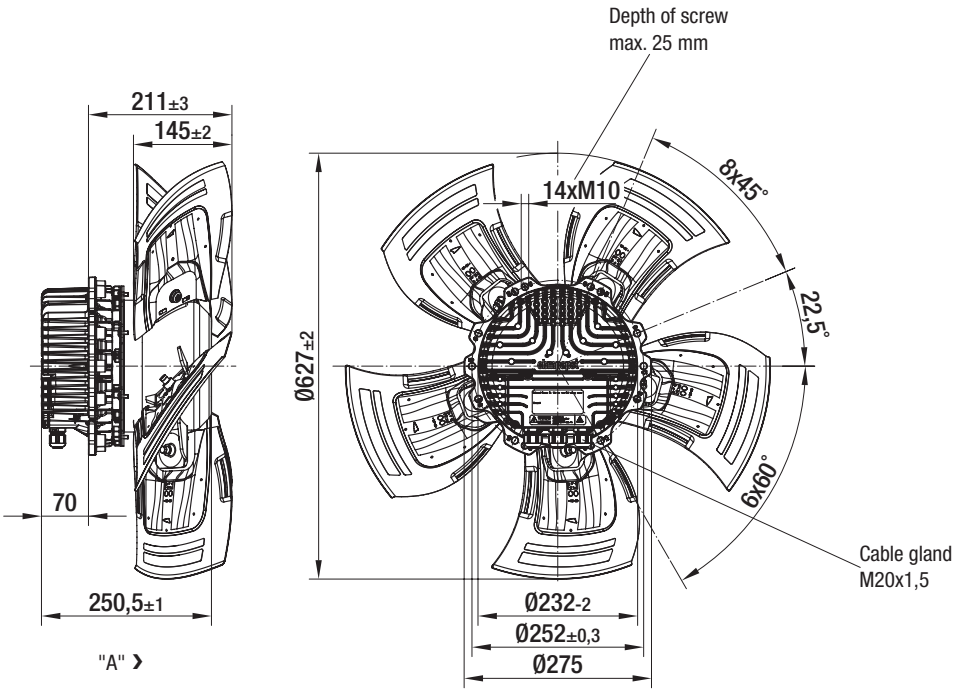
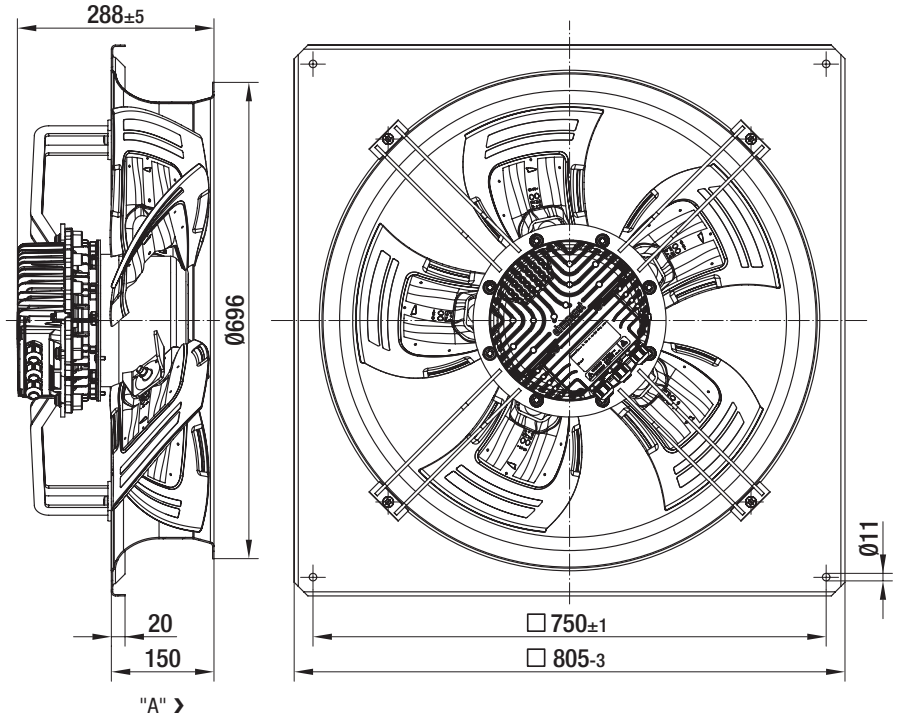
EC axial fans “high pressure”

Ø 630 with motor M3G150, drawings for direction of air flow "A"

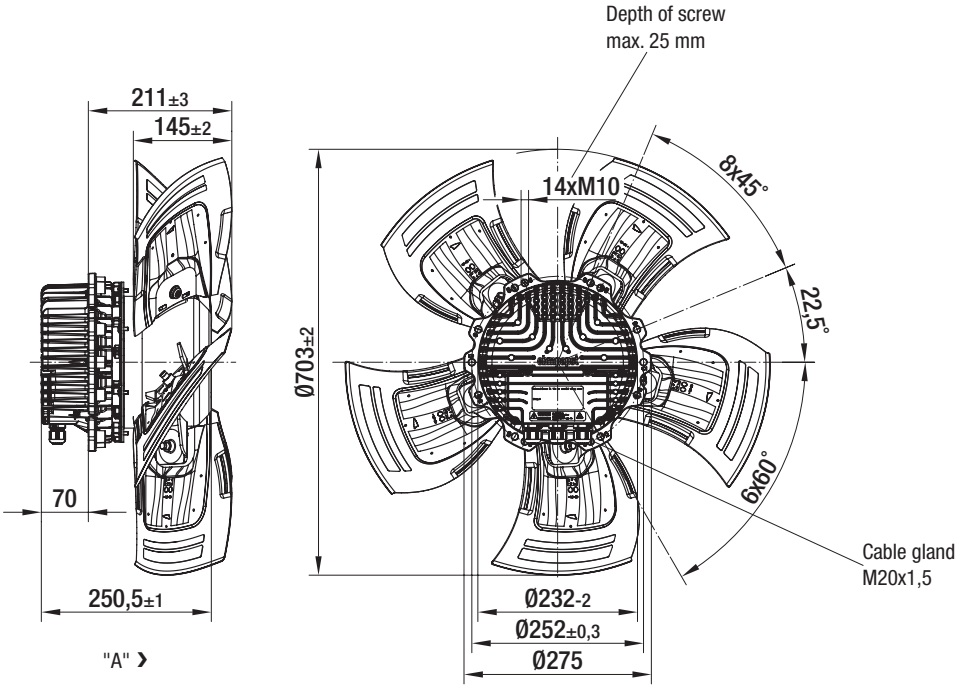
A3G 630-AU23-35 (Without attachments)



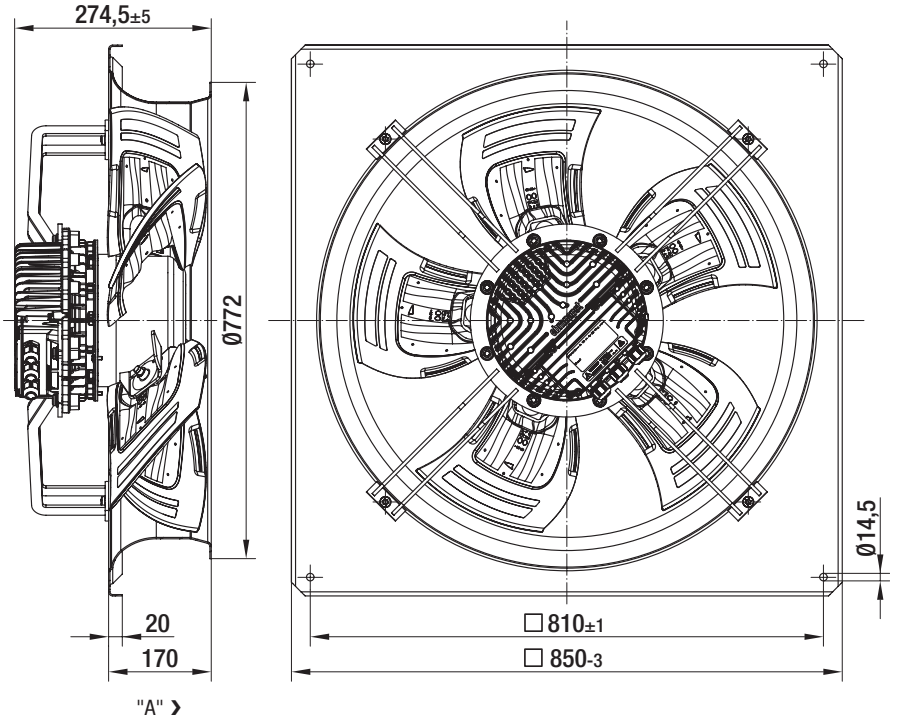
W3G 630-DU23-35 (With full square nozzle)



A3G 710-AU21-35 (Without attachments)



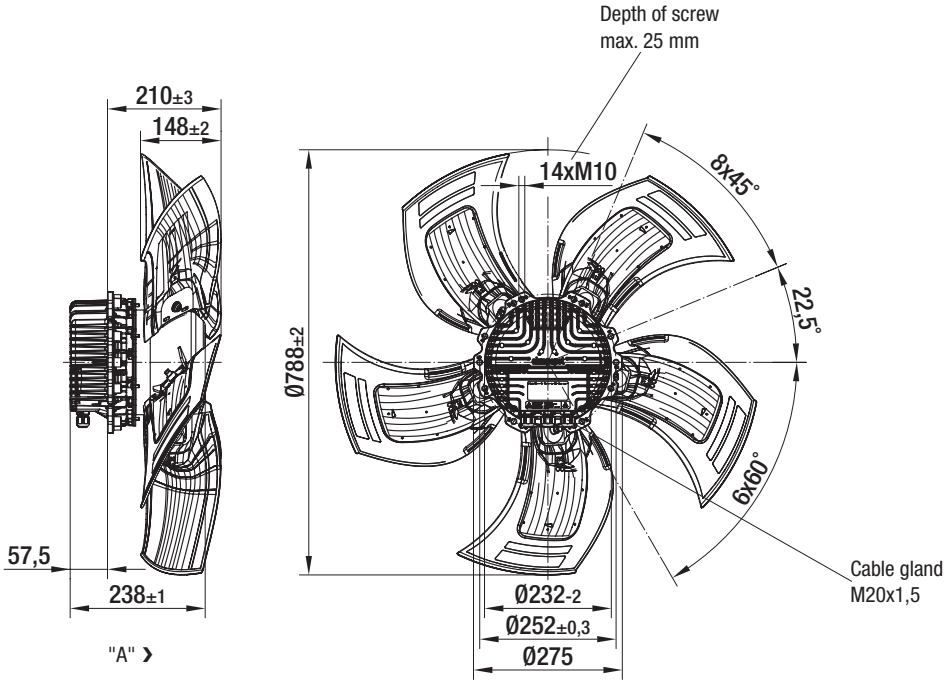
W3G 710-DU21-35 (With full square nozzle)



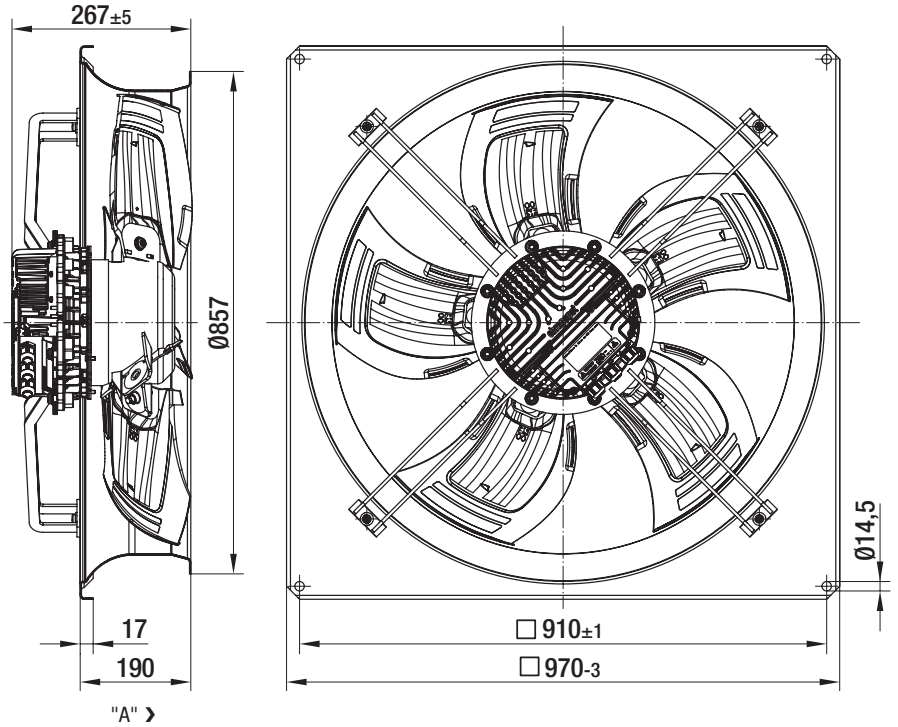
EC axial fans “high pressure”

Ø 800 with motor M3G150, drawings for direction of air flow "A"

A3G 800-AT21-35 (Without attachments)



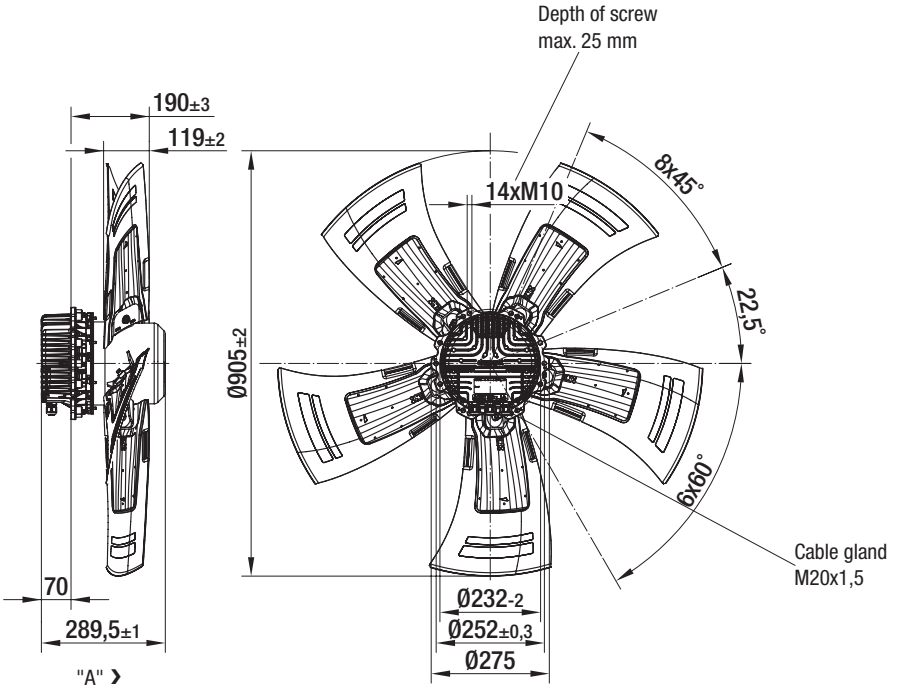
W3G 800-DT21-35 (With full square nozzle)



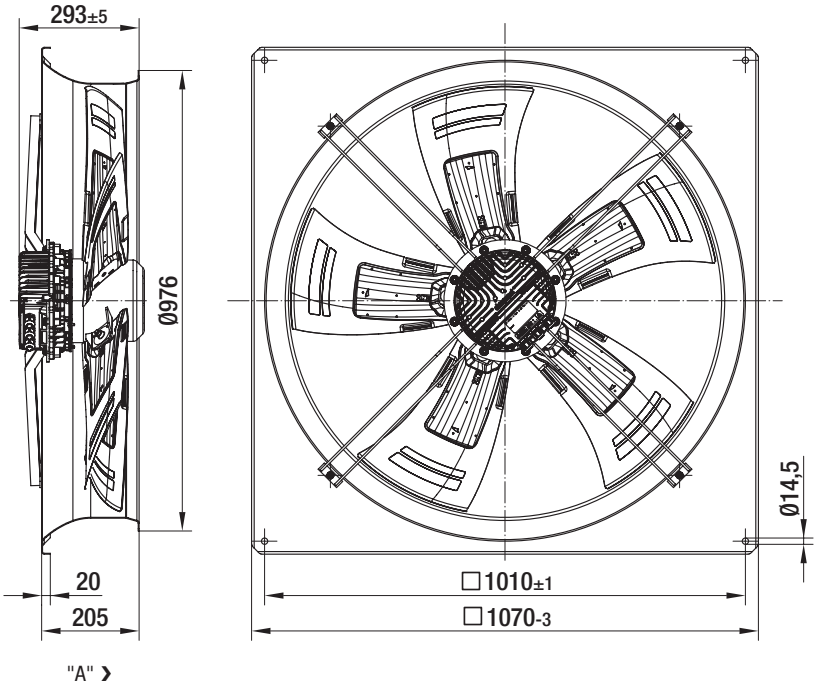
EC axial fans “high pressure”

Ø 910 with motor M3G150, drawings for direction of air flow "A"

A3G 910-AV02-35 (Without attachments)



W3G 910-DV02-35 (With full square nozzle)



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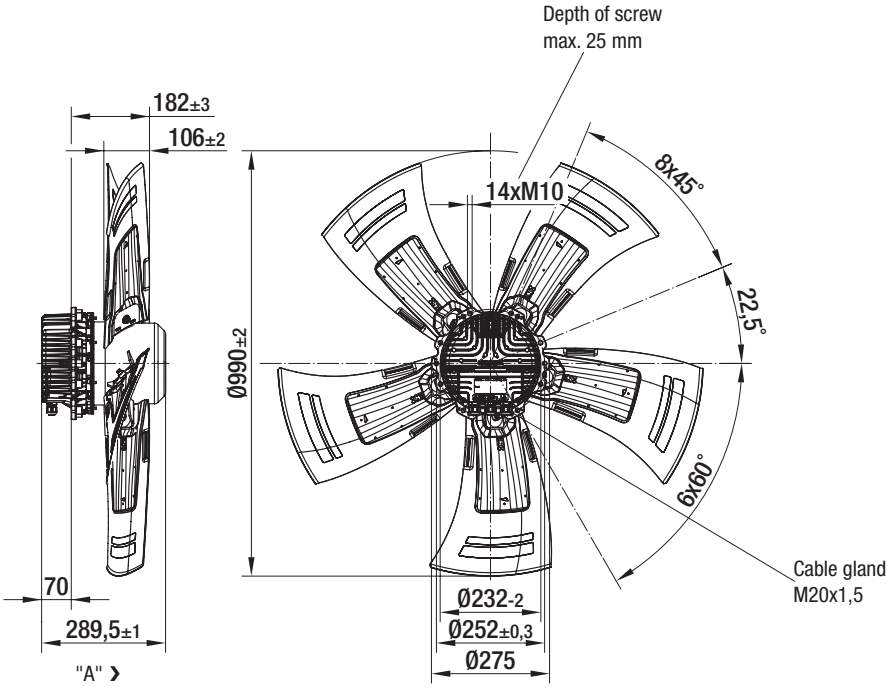
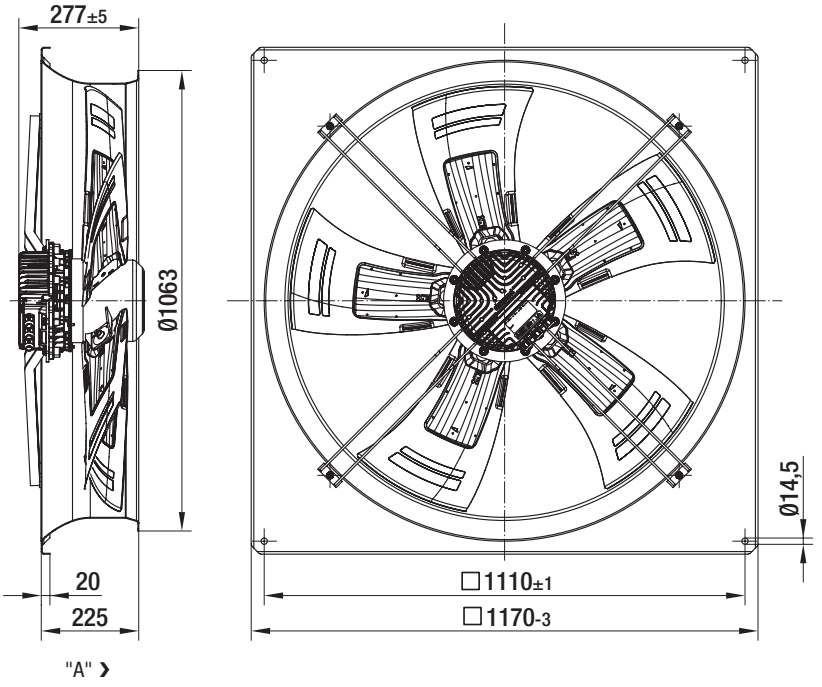
EC axial fans “high pressure”

Ø 990 with motor M3G150, drawings for direction of air flow "A"

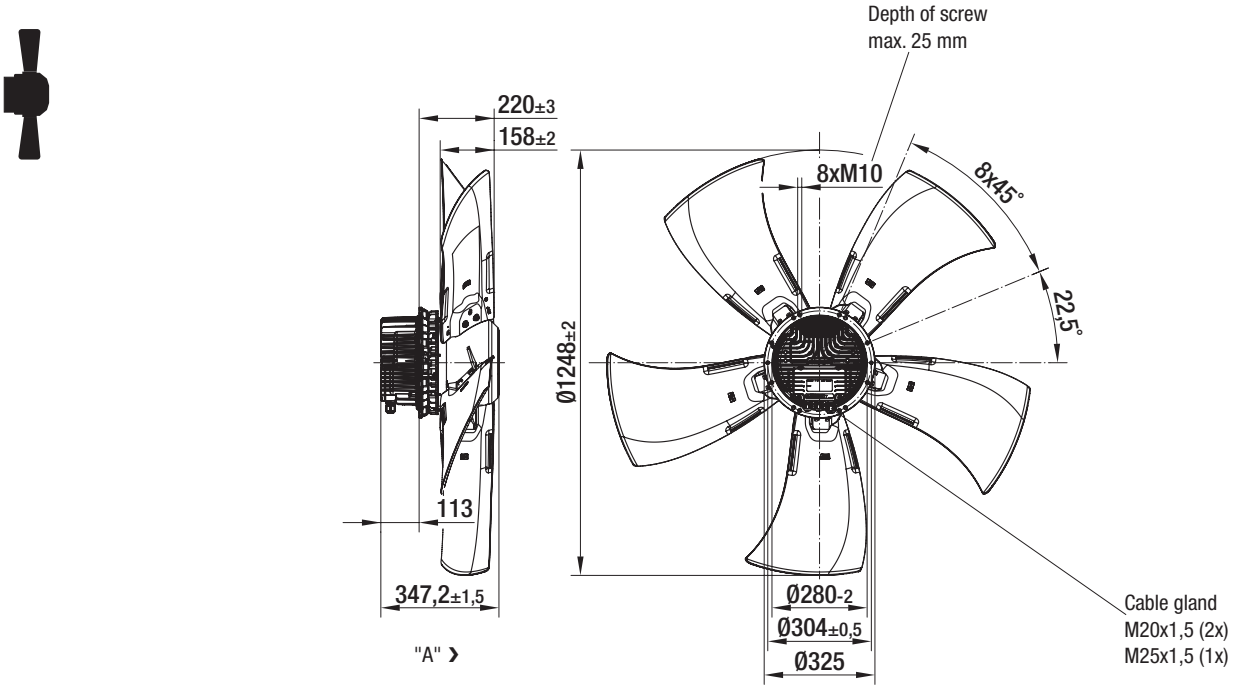
A3G 990-AZ02-35 (Without attachments)



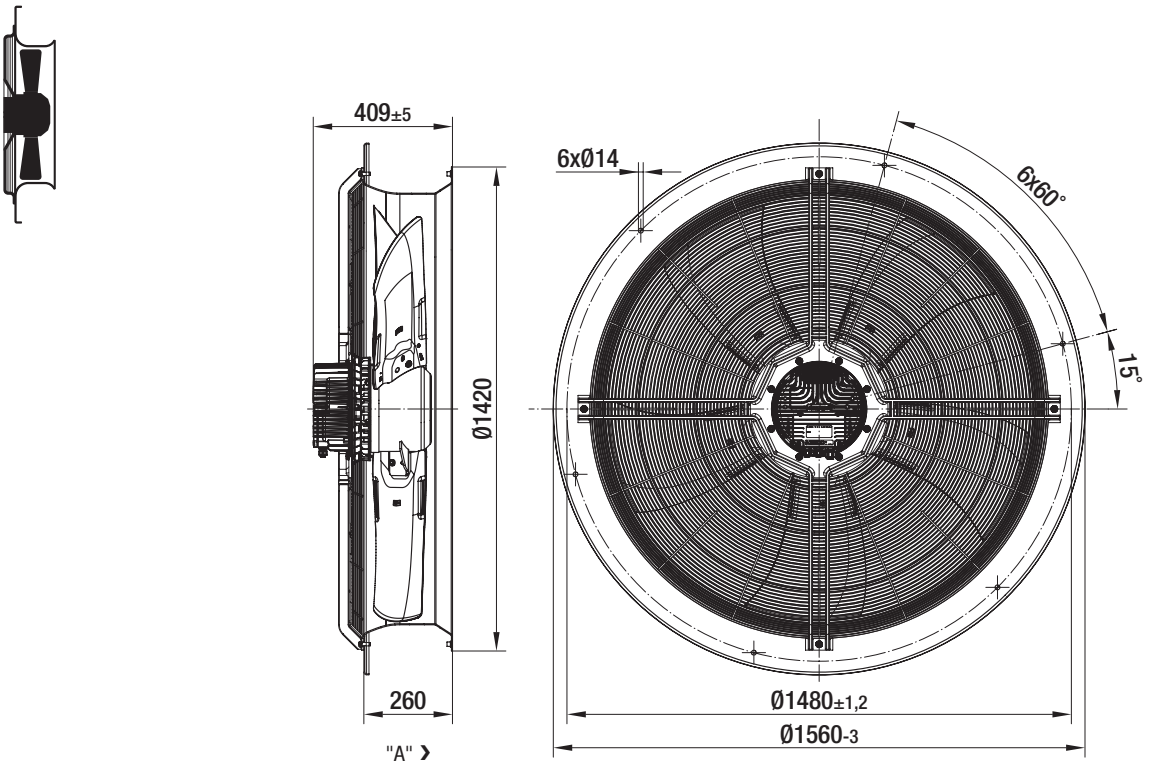
W3G 990-DZ02-35 (With full square nozzle)



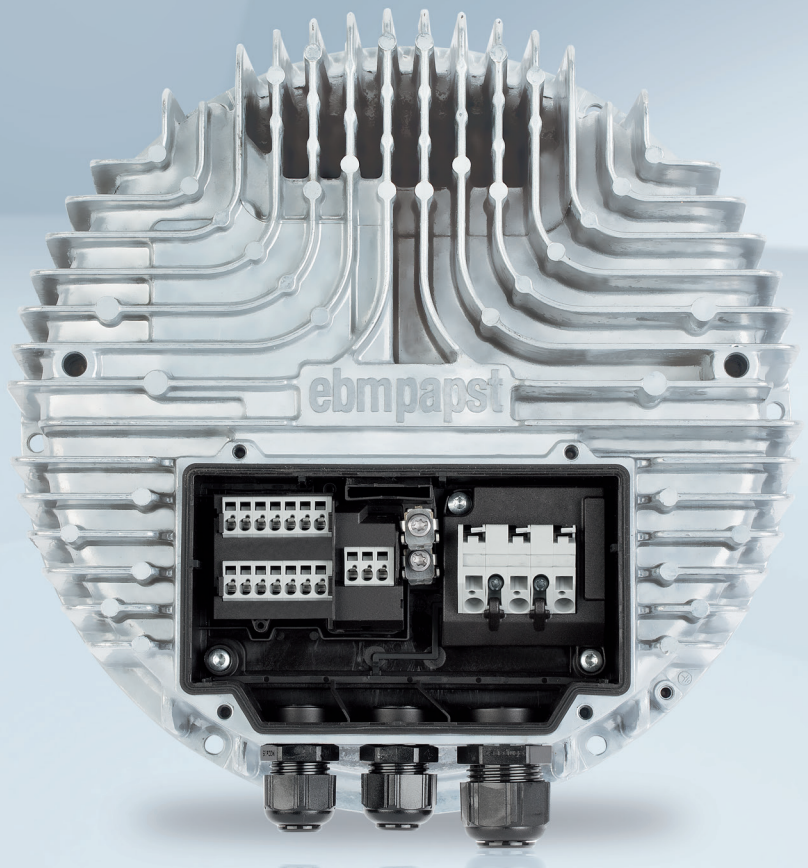
A3G Z50-AB02-35 (Without attachments)



W3G Z50-CB02-35 (With full round nozzle)



Connection diagrams

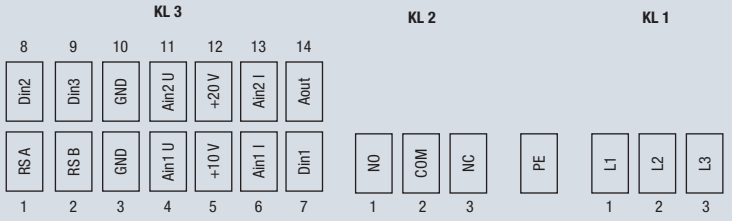


Connection diagram: L5)

M3G150 / M3G200, 3~380-480 VAC

Technical features

- PFC, passive
- Integrated PI controller
- Control input 0-10 VDC or 4-20 mA
- Input for sensor 0-10 V or 4-20 mA
- Output for slave 0-10 V max. 5 mA
- Output 20 VDC (+/-25 % / -10 %) max. 50 mA
- Output 10 VDC (+/-3 %) max. 10 mA
- RS 485 MODBUS-RTU
- Motor current limitation / Alarm relay
- Undervoltage/phase failure detection
- Thermal overload protection for electronics/motor
- Locked-rotor protection, Soft start
- Digital inputs for day / night switch, enabling, cooling / heating
- External 24 V input (parameterization)
- Control interface with SELV potential safely disconnected from supply



Terminal	Pin	Connection	Assignment/function
KL1	1	L1	Supply connection, power supply 3-phase 380-480 VAC, 50/60 Hz
	2	L2	Supply connection, power supply 3-phase 380-480 VAC, 50/60 Hz
	3	L3	Supply connection, power supply 3-phase 380-480 VAC, 50/60 Hz
PE		PE	Ground connection, PE connection
KL2	1	NO	Status relay, floating status contact, make for failure
	2	COM	Status relay, floating status contact, changeover contact, common connection (2 A, 250 V, min. 10 mA, AC1)
	3	NC	Status relay, floating status contact, break for failure
KL3	1	RSA	Bus connection RS485; RSA; MODBUS RTU; SELV
	2	RSB	Bus connection RS485; RSB; MODBUS RTU; SELV
	3/10	GND	Reference ground for control interface; SELV
	4	Ain1 U /PWM	Analog input 1 (set value); 0-10 V; Ri= 100 kΩ; adjustable curve; only for use as alternative to input Ain1 I; SELV
	5	+10 V	Fixed voltage output 10 VDC; +10 V ±3 %; max. 10 mA; short-circuit-proof; power supply for external devices (e.g. pot.meter); SELV
	6	Ain1 I	Analog input 1 (set value); 4-20 mA; Ri= 100 Ω; adjustable curve, only for use as alternative to input Ain1 U; SELV
	7	Din1	Digital input 1: Enable electronics; Enable: Pin open or applied voltage 5...50 VDC; Disable: Bridge to GND or applied voltage < 1 VDC; Reset function: Triggering of software reset after level change to < 1VDC; SELV
	8	Din2	Digital input 2: Switching parameter sets 1/2, according to EEPROM setting, the valid/used parameter set can be selected via bus or via digital input Din2. Parameter set 1: Pin open or applied voltage 5-50 VDC; Parameter set 2: Bridge to GND or applied voltage < 1 VDC; SELV
	9	Din3	Digital input 3: Direction of action of integrated controller; According to EEPROM setting, the direction of action of the integrated controller can be selected as normal/inverse via bus or digital input; Normal: Pin open or applied voltage 5...50 VDC; Inverse: Bridge or applied voltage < 1 VDC; SELV
	11	Ain2 U	Analog input 2; Measured value 0-10 V; Ri= 100 kΩ; adjustable curve; only for use as alternative to input Ain2 I; SELV
	12	+20 V	Fixed voltage output 20 VDC; +20 V +25/-10 %; max. 50 mA; short-circuit-proof; power supply for external devices (e.g. sensor); SELV
	13	Ain2 I	Analog input 2; Measured value 4-20 mA; Ri= 100 Ω; adjustable curve, only for use as alternative to input Ain2 U; SELV
	14	Aout	Analog output 0-10 V; max. 5 mA; output of current motor modulation level/current motor speed. Adjustable curve; SELV

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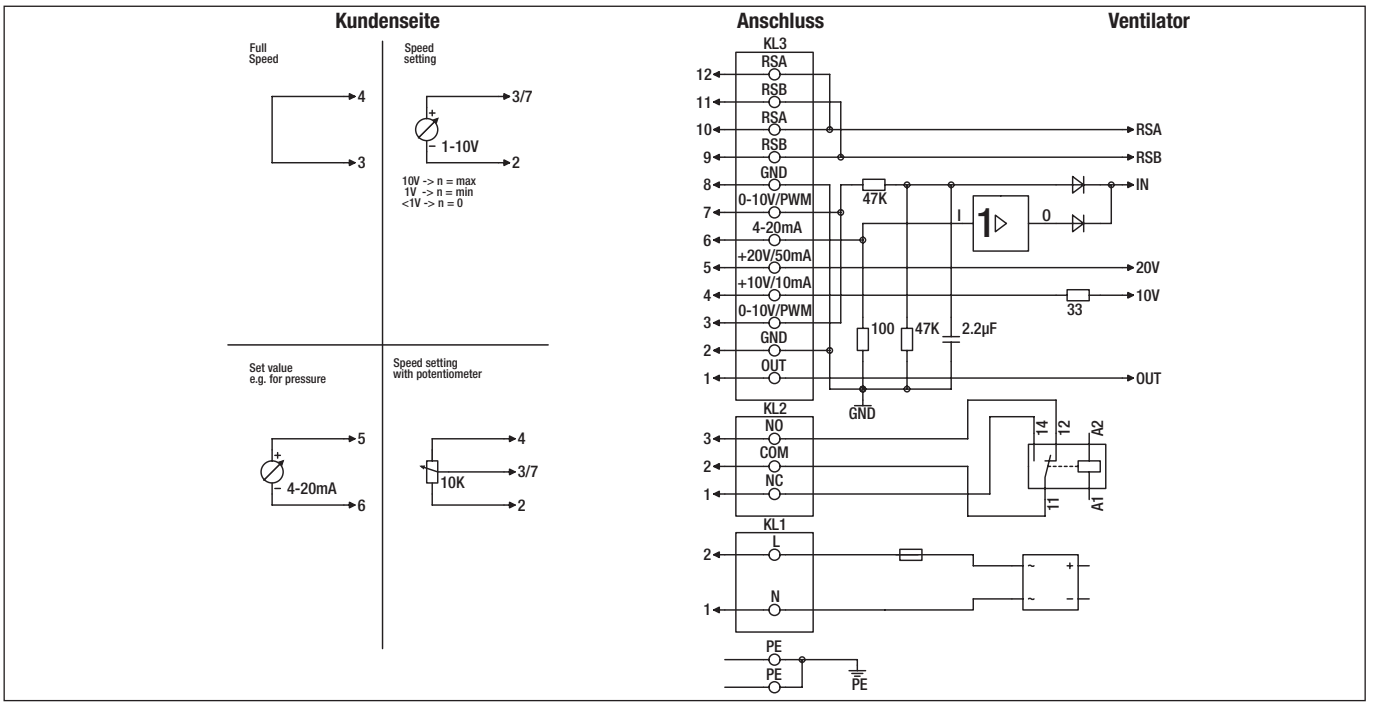
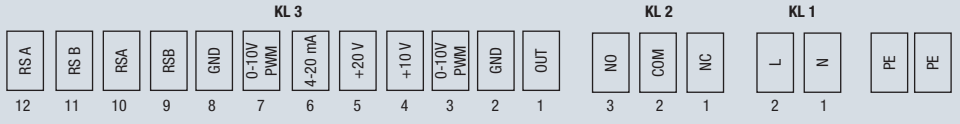
Connection diagram: P2)

M3G112, 1~200-277 VAC

Technical features

- PFC, active
- Integrated PI controller
- Control input 0-10 VDC / PWM
- Input for sensor 0-10 V or 4-20 mA
- Output for slave 0-10 V
- Output 20 VDC max. 50 mA
- Output 10 VDC max. 10 mA
- RS 485 MODBUS-RTU
- Alarm relay
- Undervoltage/phase failure detection
- Motor current limitation
- Thermal overload protection for electronics/motor
- Selection of direction of rotation left/right
- Soft start
- External 24 V input (parameterization)
- Control interface with SELV potential safely disconnected from supply
- Operation and fault indicator
- Power limiter





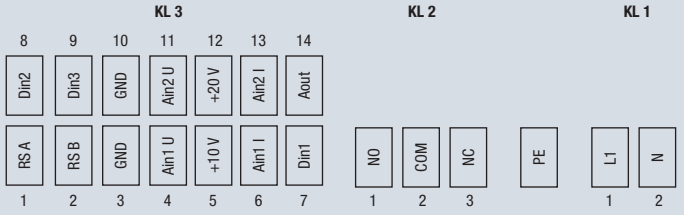
Terminal	Pin	Connection	Assignment/function
PE		PE	Ground connection, PE connection
KL1	1	N	Supply connection, power supply 1-phase 200-277 VAC; 50/60 Hz, neutral
	2	L	Supply connection, power supply 1-phase 200-277 VAC; 50/60 Hz, phase
KL2	1	NC	Status relay, floating status contact, break for failure
	2	COM	Status relay, floating status contact, changeover contact, common connection; contact rating 250 VAC / max. 2 A (AC1) / min. 10 mA
	3	NO	Status relay, floating status contact, make for failure
KL3	1	OUT	Analogue output 0-10 V; max. 3 mA, SELV Output of the actual motor duty cycle: 1 V corresponds to 10 % PWM. 10 V correspond to 100 % PWM.
	2/8	GND	Reference ground for control interface, SELV
	3/7	0-10 V PWM	Control input / current sensor value input 0-10 VDC, impedance 100 kΩ, only for use as alternative to input 4-20 mA, SELV
	4	+10 V	Fixed voltage output 10 VDC; +10 V ±3 %; max. 10 mA; power supply for external devices (e.g. potentiometer), SELV
	5	+20 V	Fixed voltage output 20 VDC; +20 V +25/-10 %; max. 50 mA; power supply for external devices (e.g. sensor), SELV
	6	4-20 mA	Control input / current sensor value input 4-20 mA, impedance 100 Ω, only for use as alternative to input 0-10 V, SELV
	9/11	RSB	Bus connection RS485; RSB; MODBUS RTU, SELV
	10/12	RSA	Bus connection RS485; RSA; MODBUS RTU, SELV

Connection diagram: L9)

M3G150, 1~200-277 VAC

Technical features

- PFC, active
- Integrated PI controller
- Control input 0-10 VDC / PWM
- Input for sensor 0-10 V or 4-20 mA
- Output for slave 0-10 V
- Output 20 VDC max. 50 mA
- Output 10 VDC max. 10 mA
- RS 485 MODBUS-RTU
- Alarm relay
- Undervoltage/phase failure detection
- Motor current limitation
- Thermal overload protection for electronics/motor
- External enable input
- Soft start
- External 24 V input (parameterization)
- Control interface with SELV potential safely disconnected from supply
- Power limiter
- Tach output



Terminal	Pin	Connection	Assignment/function
KL1	1	L1	Supply connection, power supply 1-phase 200-277 VAC, 50/60 Hz, phase
	2	N	Supply connection, power supply 1-phase 200-277 VAC, 50/60 Hz, neutral
PE		PE	Ground connection, PE connection
KL2	1	NO	Status relay, floating status contact, make for failure
	2	COM	Status relay, floating status contact, changeover contact, common connection (2 A, 250 V, min. 10 mA, AC1)
	3	NC	Status relay, floating status contact, break for failure
KL3	1	RSA	Bus connection RS485; RSA; MODBUS RTU; SELV
	2	RSB	Bus connection RS485; RSB; MODBUS RTU; SELV
	3/10	GND	Reference ground for control interface; SELV
	4	Ain1 U /PWM	Analog input 1 (set value); 0-10 V; Ri= 100 kΩ; adjustable curve; only for use as alternative to input Ain1 I; SELV
	5	+10 V	Fixed voltage output 10 VDC; +10 V ±3 %; max. 10 mA; short-circuit-proof; power supply for external devices (e.g. pot.meter); SELV
	6	Ain1 I	Analog input 1 (set value); 4-20 mA; Ri= 100 Ω; adjustable curve, only for use as alternative to input Ain1 U; SELV
	7	Din1	Digital input 1: Enable electronics; Enable: Pin open or applied voltage 5...50 VDC; Disable: Bridge to GND or applied voltage < 1 VDC; Reset function: Triggering of software reset after level change to < 1VDC; SELV
	8	Din2	Digital input 2: Switching parameter sets 1/2, according to EEPROM setting, the valid/used parameter set can be selected via bus or via digital input Din2. Parameter set 1: Pin open or applied voltage 5-50 VDC; Parameter set 2: Bridge to GND or applied voltage < 1 VDC; SELV
	9	Din3	Digital input 3: Direction of action of integrated controller; According to EEPROM setting, the direction of action of the integrated controller can be selected as normal/inverse via bus or digital input; Normal: Pin open or applied voltage 5...50 VDC; Inverse: Bridge or applied voltage < 1 VDC; SELV
	11	Ain2 U	Analog input 2; Measured value 0-10 V; Ri= 100 kΩ; adjustable curve; only for use as alternative to input Ain2 I; SELV
	12	+20 V	Fixed voltage output 20 VDC; +20 V +25/-10 %; max. 50 mA; short-circuit-proof; power supply for external devices (e.g. sensor); SELV
	13	Ain2 I	Analog input 2; Measured value 4-20 mA; Ri= 100 Ω; adjustable curve, only for use as alternative to input Ain2 U; SELV
	14	Aout	Analog output 0-10 V; max. 5 mA; output of current motor modulation level/current motor speed. Adjustable curve; SELV

ebmpapst

Technical parameters and scope

High standards for all ebm-papst products
At ebm-papst we are always looking to improve our products to be able to offer customers just what they need for their particular requirements. Careful monitoring of the market enables us to constantly incorporate enhancements into our products. As shown by the technical parameters listed below, you can always be sure of finding the right solution from ebm-papst for whatever application you may have in mind.

General performance parameters
Any deviations from the technical data and technical parameters described here are given in the product-specific data sheet.

Degree of protection
The degree of protection is specified in the product-specific data sheets.

Insulation class
The insulation class is specified in the product-specific data sheets.

Installation position
The installation position is specified in the product-specific data sheets.

Condensation drainage holes
Information on condensation drainage holes is provided in the product-specific data sheets.

Mode of operation
The mode of operation is specified in the product-specific data sheets.

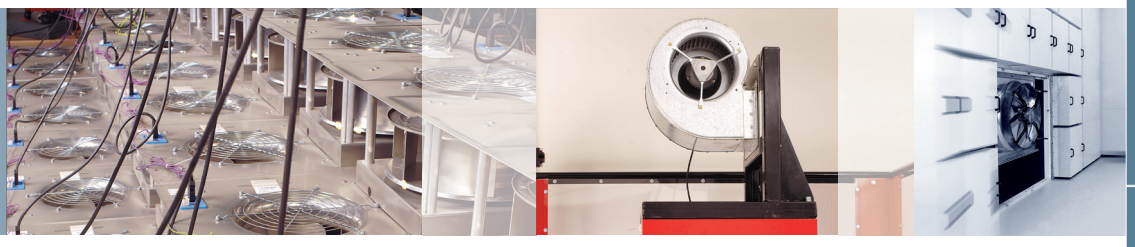
Protection class
The protection class is specified in the product-specific data sheets.

Service life
The service life of ebm-papst products depends on two main factors:
– The service life of the insulation system
– The service life of the bearing system
The service life of the insulation system is essentially governed by the voltage level, the temperature and the ambient conditions such as humidity and condensation.

The service life of the bearing system is primarily governed by the thermal load on the bearings. For the majority of our products we use maintenance-free ball bearings which can be fitted in any installation position. Sleeve bearings can alternatively be employed, as described in the product-specific data sheets.
As a rough guide (depending on the general conditions), the ball bearings have a life expectancy L10 of approx. 40,000 hours of operation at an ambient temperature of 40 °C.
We will gladly provide you with a life expectancy calculation based on your specific usage conditions.

Motor protection/thermal protection
Information on motor protection and thermal protection is provided in the product-specific data sheets.
The following protection methods are provided depending on the type of motor and area of application:
– Thermal overload protector, in-circuit or external
– PTC with electronic diagnostics
– Impedance protection
– Thermal overload protector with electronic diagnostics
– Current limitation via electronics
If use is made of an external thermal overload protector, a commercially available tripping unit must be connected by the customer for shut-off.
Motor protection conforming to the applicable standard must be fitted for products not provided with a built-in thermal overload protector and not protected against improper use.

Mechanical strain/performance parameters
All ebm-papst products are subjected to comprehensive testing in conformity with the normative specifications and also incorporating the extensive experience of ebm-papst.



Vibration testing

Vibration testing is performed as follows:

– Vibration test in operation according to DIN IEC 68 Part 2-6
– Vibration test at standstill according to DIN IEC 68 Part 2-6

Shock load

Shock load testing is performed as follows:

– Shock load according to DIN IEC 68 Part 2-27

Balancing grade

Balancing grade testing is performed as follows:

– Residual imbalance according to DIN ISO 1940
– Standard balancing quality level G 6.3

Should your particular application require a higher level of balancing, please contact us and specify the details in your order.

Important

When operating fans in a dusty environment, it must be ensured that excessive imbalance loading is avoided at all times. Vibration in the fan and the surrounding area is an indication of imbalance and remedial action must be taken immediately. Operation in this condition will inevitably result in failure of the fan. Information on fan cleaning can be found in the assembly and operating instructions.

Chemical and physical strain/performance parameters

Please consult your ebm-papst contact for any questions regarding chemical and physical strain.

Areas of use, industries & applications

Our products are used in a variety of industries and for numerous applications:

Ventilation, air conditioning and refrigeration technology, clean room technology, automotive and railway engineering, medical and laboratory technology, electronics, computer and office systems, telecommunications, household appliances, heating systems, machinery and installations, drive engineering.

Our products are not intended for use in the aerospace industry!

Legal and normative specifications

The products described in this catalog are developed and manufactured in accordance with the standards applying to the particular product and, if known, in accordance with the conditions of the particular area of application.

Standards

Information on standards is provided in the product-specific data sheets.

EMC

Information on EMC standards is provided in the product-specific data sheets.

Compliance with EMC standards has to be assessed on the final product, as EMC properties may change under different installation conditions.

Touch current

Information on touch current is provided in the product-specific data sheets.

Measurement is performed according to IEC 60990.

Approvals

Please contact us if you require a specific type of approval (VDE, UL, GOST, CCC, CSA, etc.) for your ebm-papst product.

Most of our products can be supplied with the applicable approval.

Information on existing approvals is provided in the product-specific data sheets.

Air performance measurements

All air performance measurements are conducted on intake-side chamber test rigs conforming to the requirements of ISO 5801 and DIN 24163. The fans under test are attached to the measuring chamber with free air intake and exhaust (installation category A) and operated at nominal voltage, with alternating current also at nominal frequency, without any additional attachments such as a guard grill.

As required by the standards, the air performance curves shown are referenced to an air density of 1.15 kg/m^3.

Technical parameters and scope

Air and sound measurement conditions

Measurements on ebm-papst products are taken under the following conditions:

– Axial and diagonal fans in airflow direction “V” in full nozzle without guard grille
– Backward-curved centrifugal fans, free-running with inlet ring
– Forward-curved single and dual-inlet centrifugal fans with housing
– Backward-curved dual-inlet centrifugal fans with housing

Sound measurements

All sound measurements are taken in anechoic rooms with reverberant floor. ebm-papst acoustic test chambers meet the requirements of accuracy class 1 as per DIN EN ISO 3745. For sound measurement, the fans being tested are positioned in a reverberant wall and operated at nominal voltage, with alternating current also at nominal frequency, without any additional attachments such as a guard grill.

Sound pressure and sound power level

All acoustic values are determined in accordance with ISO 13347, DIN 45635 and ISO 3744/3745 as per accuracy class 2 and given in A-rated form.

For measurement of the sound pressure level L_p the microphone is located on the intake side of the fan being tested, generally at a distance of 1 m on the fan axis.

For measurement of the sound power level L_W 10 microphones are distributed over an enveloping surface on the intake side of the fan being tested (see graphic). The measured sound power level can be roughly calculated from the sound pressure level by adding 7 dB.

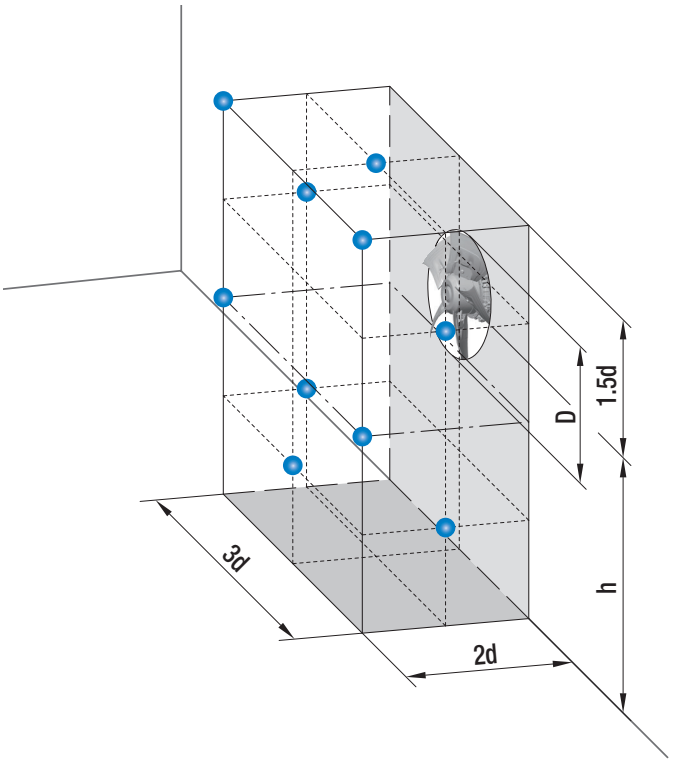
Measurement set-up according to ISO 13347-3 and DIN 45635-38:

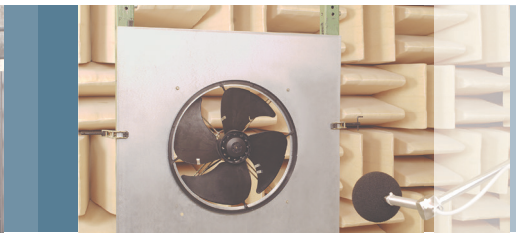
● 10 measuring points

$d \geq D$

$h = 1.5d \ldots 4.5d$

Measurement area $S = 6d^2 + 7d\,(h + 1.5d)$

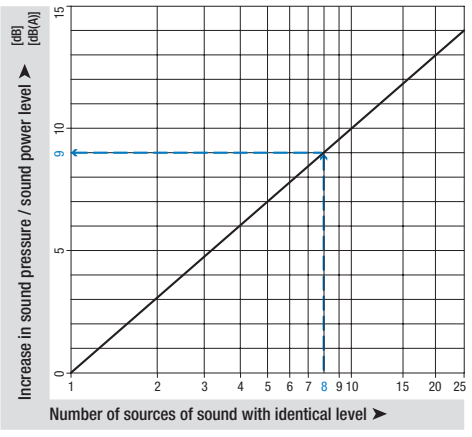




Cumulative level of several sound sources with the same level

The addition of 2 sound sources with the same level produces a level increase of approx. 3 dB. The noise characteristics of several identical fans can be predicted on the basis of the sound values specified in the data sheet. This is shown in the adjacent graph.

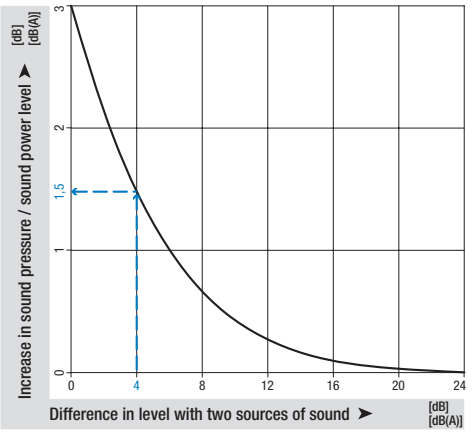
Example: There are 8 axial fans A3G800 on a condenser. According to the data sheet, the sound pressure level of one fan is 75 dB(A). The level increase determined from the graph is 9 dB. This means that a total level of 84 dB(A) is to be expected for the installation.



Cumulative level of two sound sources with different levels

The noise characteristics of two different fans can be predicted on the basis of the sound values specified in the data sheet. This is shown in the adjacent graph.

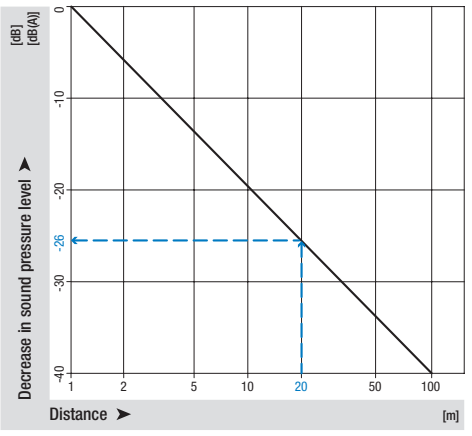
Example: In a ventilation unit, there is one axial fan A3G800 with a sound pressure level of 75 dB(A) at the point of operation and one axial fan A3G710 with 71 dB(A). The difference in level is 4 dB. The level increase of approx. 1.5 dB can now be read off the graph. This means that a total level of 76.5 dB(A) is to be expected for the unit.



Distance laws

The sound power level is not governed by the distance from the noise source. By contrast, the sound pressure level decreases with increasing distance from the sound source. The adjacent graph shows the decrease in level under far field conditions. Far field conditions apply if there is a considerable distance between the microphone and the fan in relation to the fan diameter and the wavelength under consideration. On account of the complexity of the topic, literature should be consulted for more detailed information on far fields. The level in the far field decreases by 6 dB each time the distance is doubled. Different relationships apply in the near field of the fan and the level may decrease to a far lesser extent. The following example only applies to far field conditions and may vary considerably as a result of installation effects:

For an axial fan A3G300, a sound pressure level of 65 dB(A) was measured at a distance of 1 m. From the adjacent graph, this would yield a reduction of 26 dB at a distance of 20 m, i.e. a sound pressure level of 39 dB(A).



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