

# EC/AC centrifugal fans for air-conditioning technology

version 09/2011



The engineer's choice

**ebmpapst**

# The new centrifugal fans for air-conditioning technology



A good indoor climate is becoming increasingly important – even in moderate latitudes. In offices, for example, it can increase productivity significantly, as people perform best at temperatures around 20 °C. In upscale hotels, climate control systems have now become the standard. In private homes, it will soon no longer be considered a luxury to select the temperature that is most comfortable for you.

At the same time, however, the requirements for fan technology have increased. On the one hand, value is placed on demand-oriented air flow and individual control options. At the same time, awareness of the latent potential for energy savings in building air-conditioning has increased. Another factor is more stringent expectations for the noise level. Especially in a hotel, a pleasant room temperature is of little use if you are kept awake by unwanted noise.

All of these requirements are met by the new series of ebm-papst climate control fans with GreenTech EC technology. The powerful EC centrifugal fans come standard with continuous speed control via a 0-10 V input and feature whisper-quiet operation thanks to the optimised control technique. This fulfils the more stringent requirements for comfort and convenience. In terms of energy efficiency, GreenTech EC technology is the very first choice, and features a power reduction of up to 70% compared to the previously used fans with split-pole or capacitor motors.

















The blower housing is made of durable plastic. The motor and attached impeller are decoupled from the housing by rubber elements. The fan can be easily installed in the fan at the blower exhaust flange. The control and supply lines are connected via prefabricated patch cords (optional). This enables easy and cost-saving installation and helps you avoid wiring errors.

All in all, this concept helps everyone feel good all around.



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Sustainability is at the centre of our thoughts and actions. Out of conviction!

*Eco-friendliness and sustainability have always been at the core of our thoughts and actions. For decades, we have worked according to the simple but strict creed of our co-founder Gerhard Sturm: "Each new product we develop has to be better than the last one in terms of economy and ecology." GreenTech is the ultimate expression of our corporate philosophy.*





**GreenTech is pro-active development.**

Even in the design phase, the materials and processes we use are optimised for the greatest possible eco-friendliness, energy balance and – wherever possible – recyclability. We continually improve the material and performance of our products, as well as the flow and noise characteristics. At the same time, we significantly reduce energy consumption. Close co-operation with universities and scientific institutes and the professorship we endow in the area of power engineering and regenerative energies allows us to profit from the latest research findings in these fields – and at the same time ensure highly qualified young academics.

**GreenTech is eco-friendly production.**

GreenTech also stands for maximum energy efficiency in our production processes. There, the intelligent use of industrial waste heat and ground-water cooling, photovoltaics and, of course, our own cooling and ventilation technology are of the utmost importance. Our most modern plant, for instance, consumes 91% less energy than currently specified and required. In this way, our products contribute to protecting the environment, from their origin to their recyclable packaging.

**GreenTech is acknowledged and certified.**

Every step in our chain of production meets the stringent standards of environmental specialists and the public. The 2008 Environmental Prize of Baden-Wuerttemberg, the Green Award 2009, the Energy Efficiency Award 2009 of the dena – to give just a few examples – testify to this. The environmental advantage gained in the performance of the products developed from our GreenTech philosophy can also be measured in the fulfilment of the most stringent energy and environmental standards. In many instances, our products are already well below the thresholds energy legislation will impose a few years from now – several times over.

**Our customers profit from this every day.**

The heart of GreenTech is future-oriented EC technology from ebmpapst. The EC technology at the core of our most efficient motors and fans allows efficiency of up to 90%, saves energy at a very high level, significantly extends service life and makes our products maintenance-free. These values pay off not only for the environment, but every cent also pays off for the user! All ebmpapst products – even those for which GreenTech EC technology does not (yet) make sense from an application viewpoint – feature the greatest possible connection of economy and ecology.

# EC centrifugal fans

forward curved, dual inlet, with housing, Ø 133



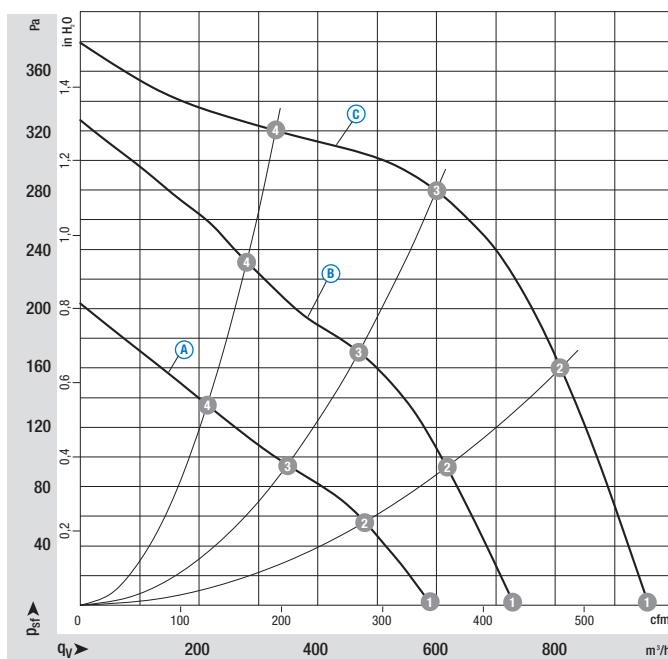
- **Material:** Housing: Plastic PP, black  
Impeller: Plastic PA 6, fibreglass-reinforced; ⓐ Hot-dip galvanised sheet steel  
Rotor: Galvanised  
Electronics housing: Plastic PP, black
- **Direction of rotation:** Counter-clockwise, seen on rotor
- **Type of protection:** IP 44
- **Insulation class:** "F"
- **Mounting position:** Any
- **Condensate discharges:** None, open rotor
- **Mode of operation:** Continuous operation (S1)
- **Design:** Motor anti-vibration mounted on both sides
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage range	Frequency	Speed/rpm <sup>(1)</sup>	Max. input power <sup>(1)</sup>	Max. current draw <sup>(1)</sup>	Min. back pressure	Perm. amb. temp.	Electr. connection
Type	Motor	VAC	Hz	rpm	W	A	Pa	°C	p. 32/34	
<b>D3G 133</b>	M3G 055-BI	Ⓐ	1~ 200-240	50/60	1330	56	0,50	0	-25..+55	H4)
<b>D3G 133</b>	M3G 055-CF	Ⓑ	1~ 200-240	50/60	1620	82	0,70	0	-25..+40	H4)
<b>D3G 133</b>	M3G 055-DF	Ⓒ	1~ 200-240	50/60	2170	185	1,45	0	-25..+60	H6)

subject to alterations

(1) Nominal data in operating point with maximum load and 230 VAC

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst scroll housing and without protection against accidental contact

Suction-side noise levels: L<sub>wA</sub> as per ISO 13347, L<sub>pA</sub> measured at 1 m distance to fan axis

The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

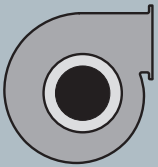
With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

For detailed information see page 36 ff.

	n rpm	P <sub>e</sub> W	I A	L <sub>wA</sub> dB(A)
Ⓐ 1	1330	56	0,50	64
Ⓐ 2	1480	47	0,45	61
Ⓐ 3	1595	41	0,41	60
Ⓐ 4	1825	30	0,32	60
Ⓑ 1	1620	82	0,70	68
Ⓑ 2	1840	81	0,68	67
Ⓑ 3	2150	78	0,67	66
Ⓑ 4	2350	60	0,54	67
Ⓒ 1	2170	185	1,45	76
Ⓒ 2	2450	183	1,43	75
Ⓒ 3	2695	159	1,25	74
Ⓒ 4	2710	99	0,81	72

- **Technical features:**
  - Control input 0-10 VDC / PWM
  - Output 10 VDC max. 1,1 mA
- **Motor protection:** TOP wired internally
- **EMC:**
  - Ⓐ Ⓑ Interference emission acc. to EN 61000-6-3
  - Ⓒ Interference emission acc. to EN 61000-6-4
  - Ⓐ Ⓑ Ⓒ Interference immunity acc. to EN 61000-6-2
  - Ⓐ Ⓑ Harmonics acc. to EN 61000-3-2
- **Leakage current:** <= 3,5 mA acc. to EN 60335-1
- **Ⓐ Ⓑ Cable exit:** variable
- **Ⓒ Connection leads:** Via plug
- **Protection class:** I
- **Product conforming to standards:** EN 60335-1

- Tach output
- Motor current limitation
- Soft start

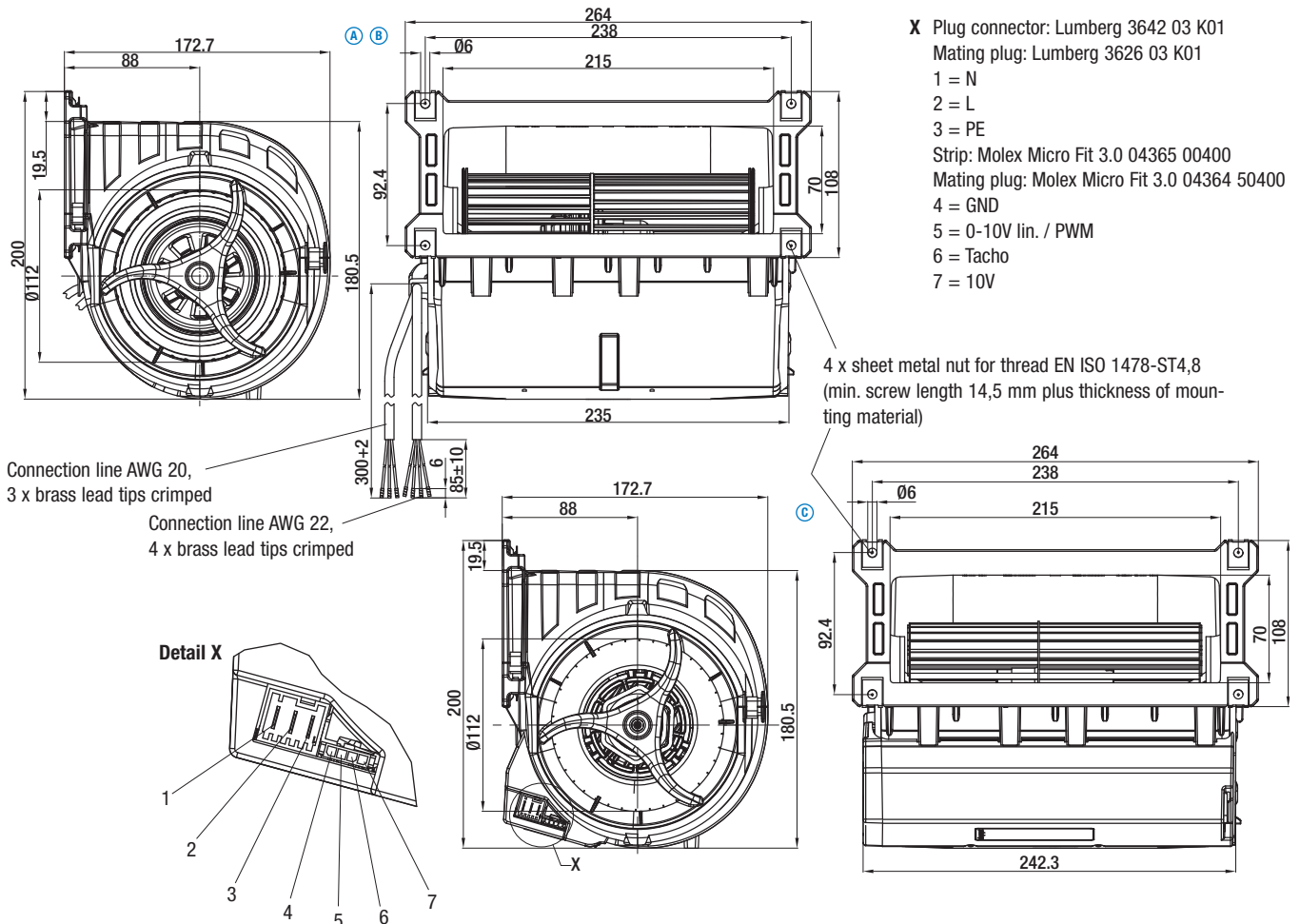


Mass

Centrifugal fan with housing & flange

kg

D3G 133-LT13 -01	2,3
D3G 133-LU01 -01	2,5
D3G 133-LV13 -01	2,7



# EC centrifugal fan combination

forward curved, dual inlet, with housing, Ø 133



- **Material:** Housing: Plastic PP, black  
Impeller: Plastic PA 6, fibreglass-reinforced  
Rotor: Galvanised  
Electronics housing: Plastic PP, black
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 44
- **Insulation class:** "F"
- **Mounting position:** Any
- **Condensate discharges:** None, open rotor
- **Mode of operation:** Continuous operation (S1)
- **Design:** Motor anti-vibration mounted on both sides
- **Bearings:** Maintenance-free ball bearings

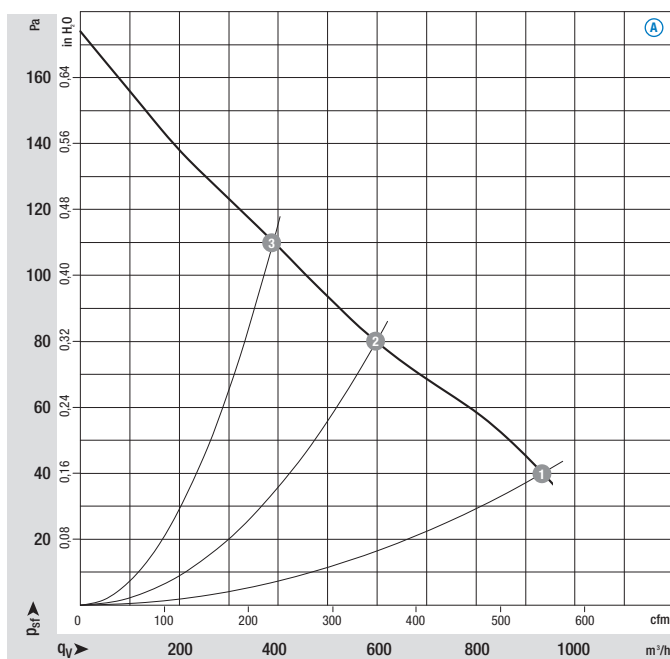
## Nominal data

Type	Motor	Curve	Nominal voltage range VAC	Frequency Hz	Speed/rpm <sup>(1)</sup> rpm	Max. input power <sup>(1)</sup> W	Max. current draw <sup>(1)</sup> A	Min. back pressure Pa	Perm. amb. temp. °C	Electr. connection p. 34
<b>K3G 133</b>	M3G 055-DF	Ⓐ	1~ 200-240	50/60	1280	69	0,56	40	-25..+50	H6)

subject to alterations

(1) Nominal data in operating point with maximum load and 230 VAC

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst scroll housing and without protection against accidental contact

Suction-side noise levels: L<sub>WA</sub> as per ISO 13347, L<sub>pA</sub> measured at 1 m distance to fan axis

The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

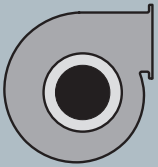
For detailed information see page 36 ff.

	n rpm	P <sub>e</sub> W	I A	L <sub>WA</sub> dB(A)
Ⓐ 1	1280	69	0,56	60
Ⓐ 2	1460	54	0,45	61
Ⓐ 3	1595	44	0,37	61



- **Technical features:**
  - Control input 0-10 VDC / PWM
  - Output 10 VDC max. 1,1 mA
- **Motor protection:** TOP wired internally
- **EMC:** Interference emission acc. to EN 61000-6-3  
Interference immunity acc. to EN 61000-6-2  
Harmonics acc. to EN 61000-3-2
- **Leakage current:**  $\leq 3,5$  mA acc. to EN 60335-1
- **Connection leads:** Via plug
- **Protection class:** I
- **Product conforming to standards:** EN 60335-1

- Tach output
- Motor current limitation
- Soft start



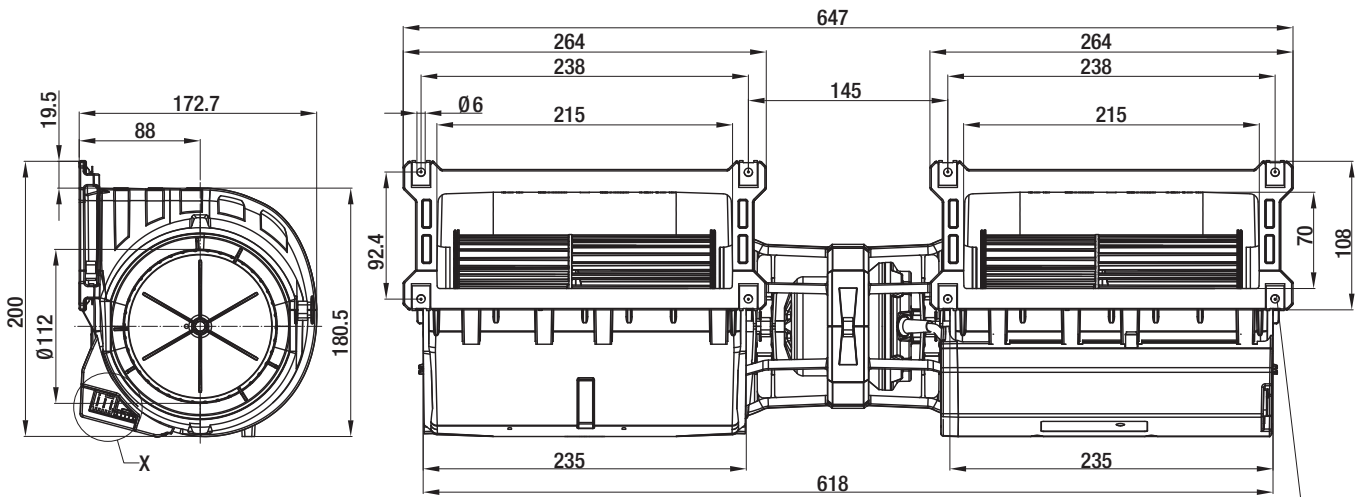
Mass

Centrifugal fan with housing & flange

kg

K3G 133-LR15 -01

3,6



X

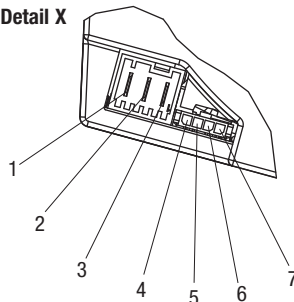
Plug connector: Lumberg 3642 03 K01  
Mating plug: Lumberg 3626 03 K01

- 1 = N
- 2 = L
- 3 = PE

Strip: Molex Micro Fit 3.0 04365 00400  
Mating plug: Molex Micro Fit 3.0 04364 50400

- 4 = GND
- 5 = 0-10V lin. / PWM
- 6 = Tacho
- 7 = 10V

Detail X



4 x sheet metal nut for thread EN ISO 1478-ST4,8  
(min. screw length 14,5 mm plus thickness of mounting material)

# EC centrifugal fans

forward curved, dual inlet, with housing, Ø 146



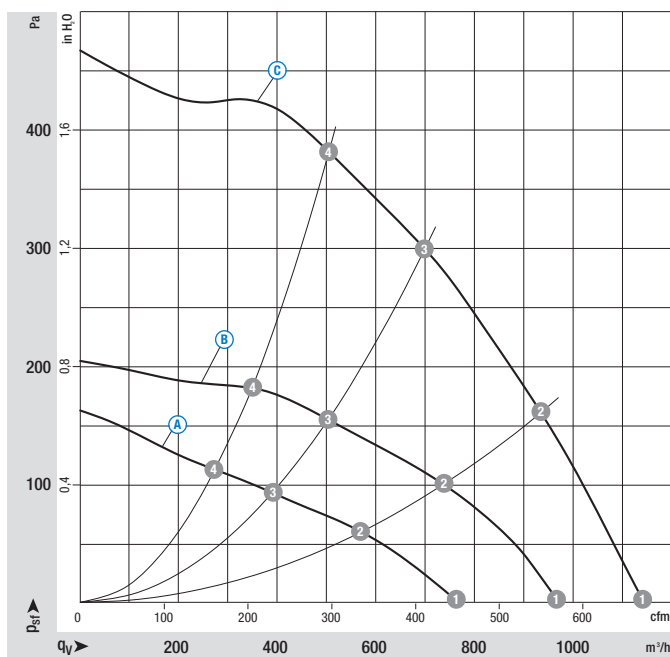
- **Material:** Housing: Plastic PP, black  
Impeller: Plastic PA 6, fibreglass-reinforced; Ⓢ Hot-dip galvanised sheet steel  
Rotor: Galvanised  
Electronics housing: Plastic PP, black
- **Direction of rotation:** Counter-clockwise, seen on rotor
- **Type of protection:** IP 44
- **Insulation class:** "F"
- **Mounting position:** Any
- **Condensate discharges:** None, open rotor
- **Mode of operation:** Continuous operation (S1)
- **Design:** Motor anti-vibration mounted on both sides
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage range	Frequency	Speed/rpm <sup>(1)</sup>	Max. input power <sup>(1)</sup>	Max. current draw <sup>(1)</sup>	Min. back pressure	Perm. amb. temp.	Electr. connection
Type	Motor	VAC	Hz	rpm	W	A	Pa	°C	p. 34	
D3G 146	M3G 055-BI	Ⓐ	1~ 200-240	50/60	1050	55	0,50	0	-25..+50	H6)
D3G 146	M3G 055-CF	Ⓑ	1~ 200-240	50/60	1330	100	0,80	0	-25..+50	H6)
D3G 146	M3G 055-DF	Ⓒ	1~ 200-240	50/60	1550	182	1,40	0	-25..+50	H6)

subject to alterations

(1) Nominal data in operating point with maximum load and 230 VAC

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst scroll housing and without protection against accidental contact

Suction-side noise levels: L<sub>wA</sub> as per ISO 13347, L<sub>pA</sub> measured at 1 m distance to fan axis

The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

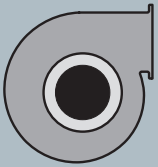
With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

For detailed information see page 36 ff.

	n rpm	P <sub>e</sub> W	I A	L <sub>wA</sub> dB(A)
Ⓐ 1	1050	55	0,50	63
Ⓐ 2	1220	45	0,40	59
Ⓐ 3	1350	35	0,31	58
Ⓐ 4	1435	29	0,26	58
Ⓑ 1	1330	100	0,80	68
Ⓑ 2	1575	87	0,72	65
Ⓑ 3	1730	66	0,57	64
Ⓑ 4	1810	54	0,48	64
Ⓒ 1	1550	182	1,40	75
Ⓒ 2	1940	179	1,40	73
Ⓒ 3	2335	177	1,39	73
Ⓒ 4	2600	174	1,37	75

- **Technical features:**
  - Control input 0-10 VDC / PWM
  - Output 10 VDC max. 1,1 mA
- **Motor protection:** TOP wired internally
- **EMC:**
  - (A) (B) Interference emission acc. to EN 61000-6-3
  - (C) Interference emission acc. to EN 61000-6-4
  - (A) (B) (C) Interference immunity acc. to EN 61000-6-2
  - (A) (B) Harmonics acc. to EN 61000-3-2
- **Leakage current:** <= 3,5 mA acc. to EN 60335-1
- **Connection leads:** Via plug
- **Protection class:** I
- **Product conforming to standards:** EN 60335-1

- Tach output
- Motor current limitation
- Soft start

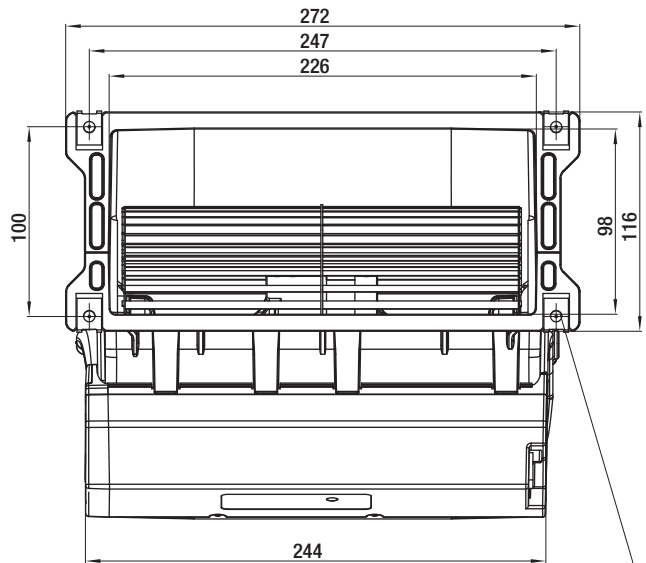
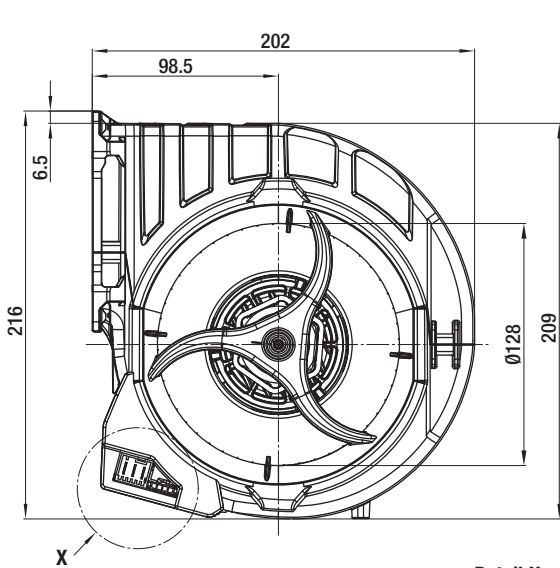


Mass

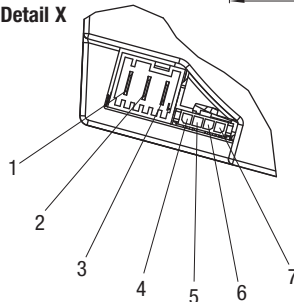
Centrifugal fan with housing & flange

kg

D3G 146-LT13 -01	2,5
D3G 146-LU03 -01	2,7
D3G 146-LV13 -01	2,9



Detail X



Plug connector: Lumberg 3642 03 K01  
 Mating plug: Lumberg 3626 03 K01  
 1 = N  
 2 = L  
 3 = PE

Strip: Molex Micro Fit 3.0 04365 00400  
 Mating plug: Molex Micro Fit 3.0 04364 50400  
 4 = GND  
 5 = 0-10V lin. / PWM  
 6 = Tacho  
 7 = 10V

4 x sheet metal nut for thread EN ISO 1478-ST4,8  
 (min. screw length 14,5 mm plus thickness of mounting material)

# EC centrifugal fans

forward curved, dual inlet, with housing, Ø 146



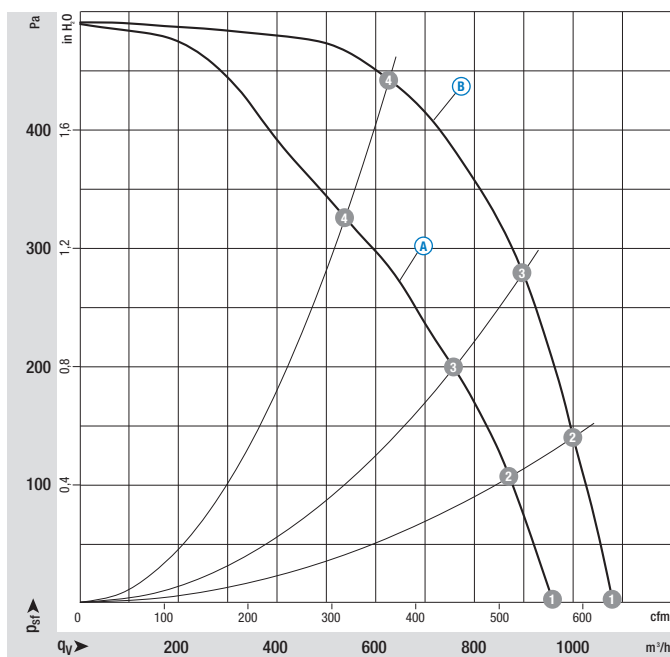
- **Material:** Housing: Plastic PP, black  
Impeller: Plastic PP, white  
Rotor: Galvanised  
Electronics housing: Plastic PP, black
- **Direction of rotation:** Counter-clockwise, seen on rotor
- **Type of protection:** IP 44
- **Insulation class:** "F"
- **Mounting position:** Any
- **Condensate discharges:** None, open rotor
- **Mode of operation:** Continuous operation (S1)
- **Design:** Motor anti-vibration mounted on both sides
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage range	Frequency	Speed/rpm <sup>(1)</sup>	Max. input power <sup>(1)</sup>	Max. current draw <sup>(1)</sup>	Min. back pressure	Perm. amb. temp.	Electr. connection
Type	Motor	VAC	Hz	rpm	W	A	Pa	°C	p. 33	
<b>D3G 146</b>	M3G 055-DF	Ⓐ	1~ 200-240	50/60	1830	165	1,30	0	-25..+50	H5)
<b>D3G 146</b>	M3G 055-DF	Ⓑ	1~ 200-240	50/60	2400	230	1,80	0	-25..+50	H5)

subject to alterations

(1) Nominal data in operating point with maximum load and 230 VAC Ⓐ at 100 Pa and Ⓑ at 270 Pa

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst scroll housing and without protection against accidental contact

Suction-side noise levels: L<sub>wA</sub> as per ISO 13347, L<sub>pA</sub> measured at 1 m distance to fan axis

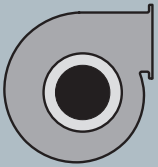
The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

For detailed information see page 36 ff.

	n rpm	P <sub>e</sub> W	I A	L <sub>wA</sub> dB(A)
Ⓐ 1	1610	165	1,30	70
Ⓐ 2	1830	165	1,30	69
Ⓐ 3	2005	152	1,20	68
Ⓐ 4	2280	124	1,00	69
Ⓑ 1	1790	189	1,47	73
Ⓑ 2	2110	216	1,65	72
Ⓑ 3	2400	230	1,80	71
Ⓑ 4	2670	182	1,42	72

- **Technical features:**
    - Control input 0-10 VDC / PWM
    - Output 10 VDC max. 1,1 mA
    - Over-temperature protected motor
  - **Motor protection:** TOP wired internally
  - **EMC:** Interference immunity acc. to EN 61000-6-2
  - **Leakage current:** <= 3,5 mA acc. to EN 60335-1
  - **Connection leads:** Via plug
  - **Protection class:** I
  - **Product conforming to standards:** EN 60335-1, CE
  - **Approvals:** VDE, UL are applied for
- Tach output
  - Motor current limitation
  - Soft start



Mass

Centrifugal fan with housing & flange

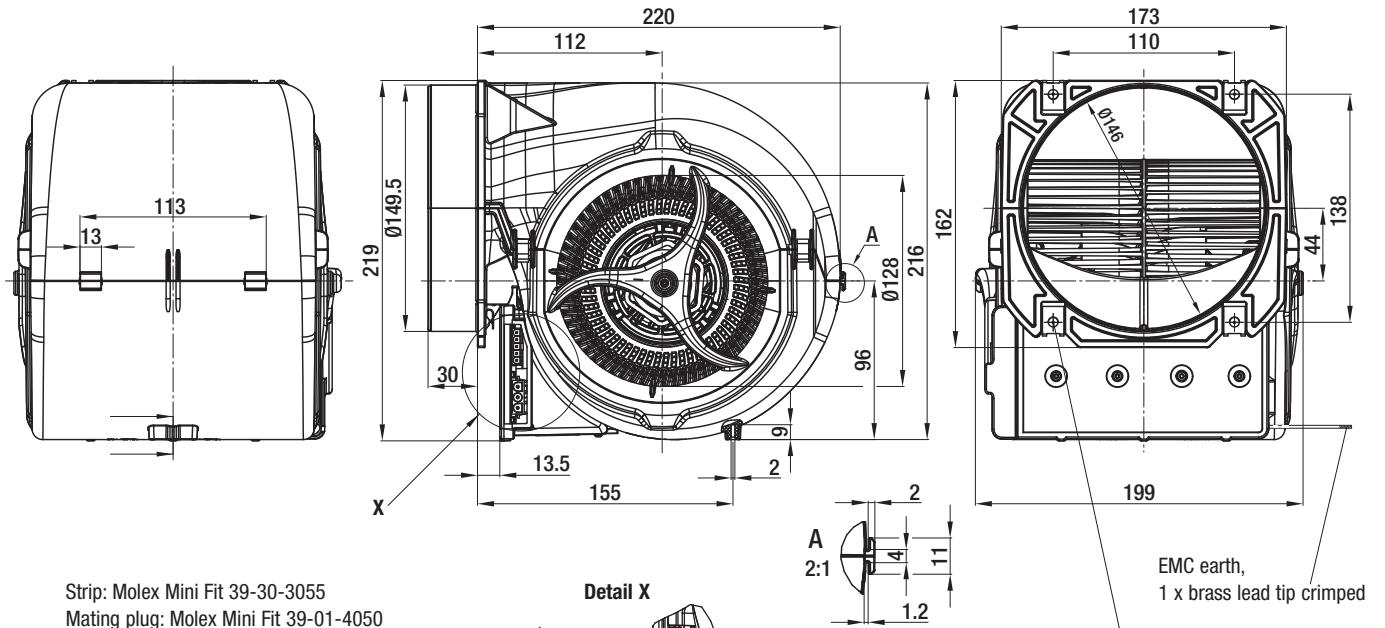
kg

D3G 146-HQ01 -01

2,4

D3G 146-HQ13 -04

2,4



Strip: Molex Mini Fit 39-30-3055

Mating plug: Molex Mini Fit 39-01-4050

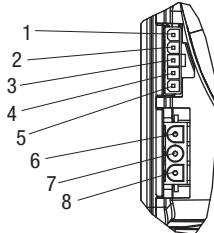
- 1 = GND
- 2 = not assigned
- 3 = 0-10V lin. / PWM
- 4 = Tacho
- 5 = 10V

Pin socket: AMP Mate-N-Lok 1-350943-0

Mating plug: AMP Mate-N-Lok 350766-4

- 6 = PE
- 7 = N
- 8 = L

Detail X



4 x sheet metal nut for thread EN ISO 1478-ST4,8  
(min. screw length 14,5 mm plus thickness of mounting material)

# EC centrifugal fan combinations

forward curved, dual inlet, with housing, Ø 146



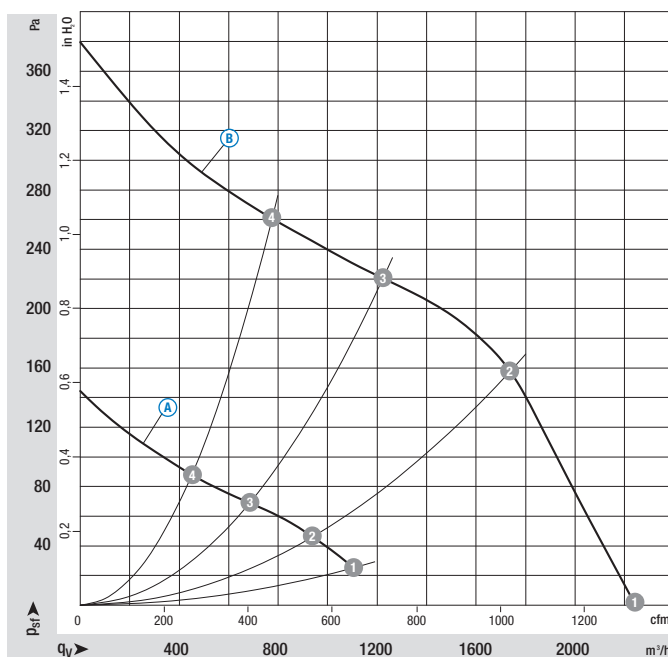
- **Material:** Housing: Plastic PP, black  
Impeller: Plastic PA 6, fibreglass-reinforced  
Rotor: Galvanised  
Electronics housing: Plastic PP, black
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 44
- **Insulation class:** "F"
- **Mounting position:** Any
- **Condensate discharges:** None, open rotor
- **Mode of operation:** Continuous operation (S1)
- **Design:** Motor anti-vibration mounted on both sides
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage range	Frequency	Speed/rpm <sup>(1)</sup>	Max. input power <sup>(1)</sup>	Max. current draw <sup>(1)</sup>	Min. back pressure	Perm. amb. temp.	Electr. connection
Type	Motor		VAC	Hz	rpm	W	A	Pa	°C	p. 34
<b>K3G 146</b>	M3G 055-DF	Ⓐ	1~ 200-240	50/60	910	60	0,50	25	-25..+50	H6)
<b>K3G 146</b>	M3G 074-DF	Ⓑ	1~ 200-240	50/60	1430	245	1,90	0	-25..+40	H6)

subject to alterations

(1) Nominal data in operating point with maximum load and 230 VAC

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst scroll housing and without protection against accidental contact

Suction-side noise levels: L<sub>wA</sub> as per ISO 13347, L<sub>pA</sub> measured at 1 m distance to fan axis

The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

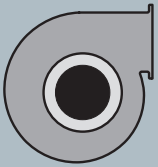
With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

For detailed information see page 36 ff.

	n rpm	P <sub>e</sub> W	I A	L <sub>wA</sub> dB(A)
Ⓐ 1	910	60	0,50	57
Ⓐ 2	1005	54	0,49	56
Ⓐ 3	1120	45	0,41	56
Ⓐ 4	1245	37	0,35	57
Ⓑ 1	1430	245	1,90	75
Ⓑ 2	1815	244	1,88	72
Ⓑ 3	1955	199	1,57	71
Ⓑ 4	2090	154	1,25	72

- **Technical features:**
  - Control input 0-10 VDC / PWM
  - Output 10 VDC max. 1,1 mA
- **Motor protection:** TOP wired internally
- **EMC:**
  - Ⓐ Interference emission acc. to EN 61000-6-3
  - Ⓐ Ⓑ Interference immunity acc. to EN 61000-6-2
  - Ⓐ Harmonics acc. to EN 61000-3-2
- **Leakage current:** <= 3,5 mA acc. to EN 60335-1
- **Connection leads:** Via plug
- **Protection class:** I
- **Product conforming to standards:** EN 60335-1

- Tach output
- Motor current limitation
- Soft start



Mass

Centrifugal fan with housing & flange

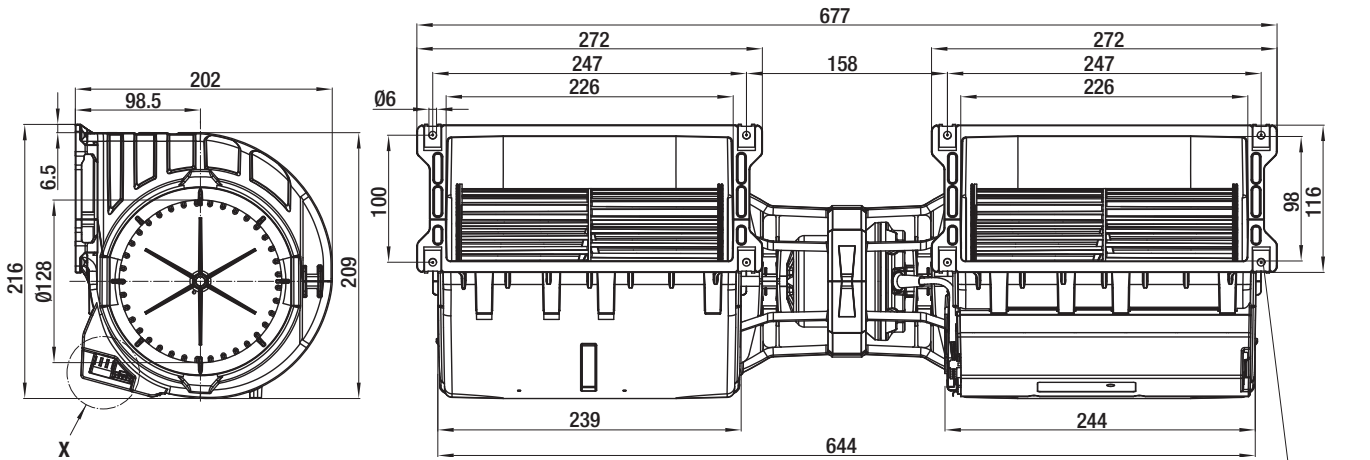
kg

K3G 146-AC15 -01

3,5

K3G 146-AD01 -01

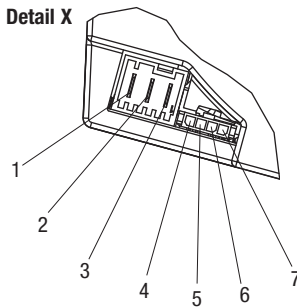
4,7



Plug connector: Lumberg 3642 03 K01  
 Mating plug: Lumberg 3626 03 K01  
 1 = N  
 2 = L  
 3 = PE

Strip: Molex Micro Fit 3.0 04365 00400  
 Mating plug: Molex Micro Fit 3.0 04364 50400  
 4 = GND  
 5 = 0-10V lin. / PWM  
 6 = Tacho  
 7 = 10V

Detail X



8 x sheet metal nut for thread EN ISO 1478-ST4,8  
 (min. screw length 14,5 mm plus thickness of mounting material)

# EC centrifugal fan

backward curved, Ø 280



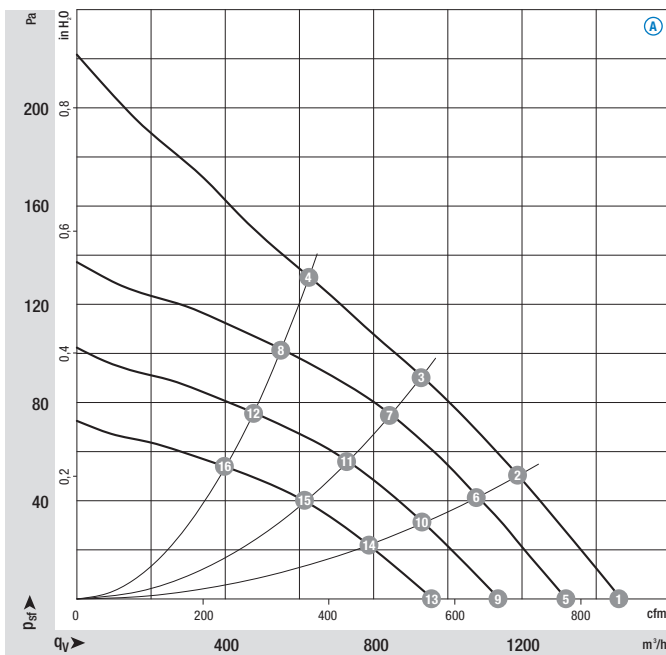
- **Material:** Impeller: Plastic PA 6, fibreglass-reinforced  
Rotor: Thick layer passivated  
Electronics housing: Die-cast aluminium
- **Number of blades:** 9
- **Direction of rotation:** Counter-clockwise, seen on rotor
- **Type of protection:** IP 54
- **Insulation class:** "B"
- **Mounting position:** Any
- **Condensate discharges:** None, open rotor
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage range	Frequency	Speed/rpm <sup>(1)</sup>	Max. input power <sup>(1)</sup>	Max. current draw <sup>(1)</sup>	Perm. amb. temp.	Electr. connection
Type	Motor	VAC	Hz	rpm	W	A	°C	p. 32	
<b>R3G 280</b>	M3G 055-DF	Ⓐ	1~ 200-240	50/60	1220	74	0,64	-25..+60	H4)

subject to alterations

(1) Nominal data in operating point with maximum load and 230 VAC

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst full nozzle and without protection against accidental contact

Suction-side noise levels: L<sub>WA</sub> as per ISO 13347, L<sub>PA</sub> measured at 1 m distance to fan axis

The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

For detailed information see page 36 ff.

	n rpm	P <sub>e</sub> W	I A	L <sub>WA</sub> dB(A)
Ⓐ 1	1225	70	0,61	63
Ⓐ 2	1220	72	0,64	60
Ⓐ 3	1220	74	0,64	60
Ⓐ 4	1250	66	0,58	62
Ⓐ 5	1100	51	0,44	61
Ⓐ 6	1100	54	0,48	58
Ⓐ 7	1100	55	0,48	57
Ⓐ 8	1100	45	0,40	59
Ⓐ 9	950	33	0,28	58
Ⓐ 10	950	35	0,31	54
Ⓐ 11	950	35	0,31	54
Ⓐ 12	950	29	0,26	56
Ⓐ 13	800	19	0,17	54
Ⓐ 14	800	21	0,18	51
Ⓐ 15	800	21	0,18	51
Ⓐ 16	800	17	0,15	52



- **Technical features:**
  - Control input 0-10 VDC / PWM
  - Output 10 VDC max. 1,1 mA
  - Over-temperature protected electronics / motor
- **Motor protection:** Locked-rotor protection
- **EMC:** Interference emission acc. to EN 61000-6-3 (household environment)  
Interference immunity acc. to EN 61000-6-2 (industrial environment)  
Harmonics acc. to EN 61000-3-2/3
- **Leakage current:**  $\leq 3,5$  mA acc. to EN 60335-1
- **Cable exit:** variable
- **Protection class:** I
- **Product conforming to standards:** EN 60335-1
- **Approvals:** VDE, CUL, GOST are applied for

- Tach output
- Line undervoltage detection
- Soft start



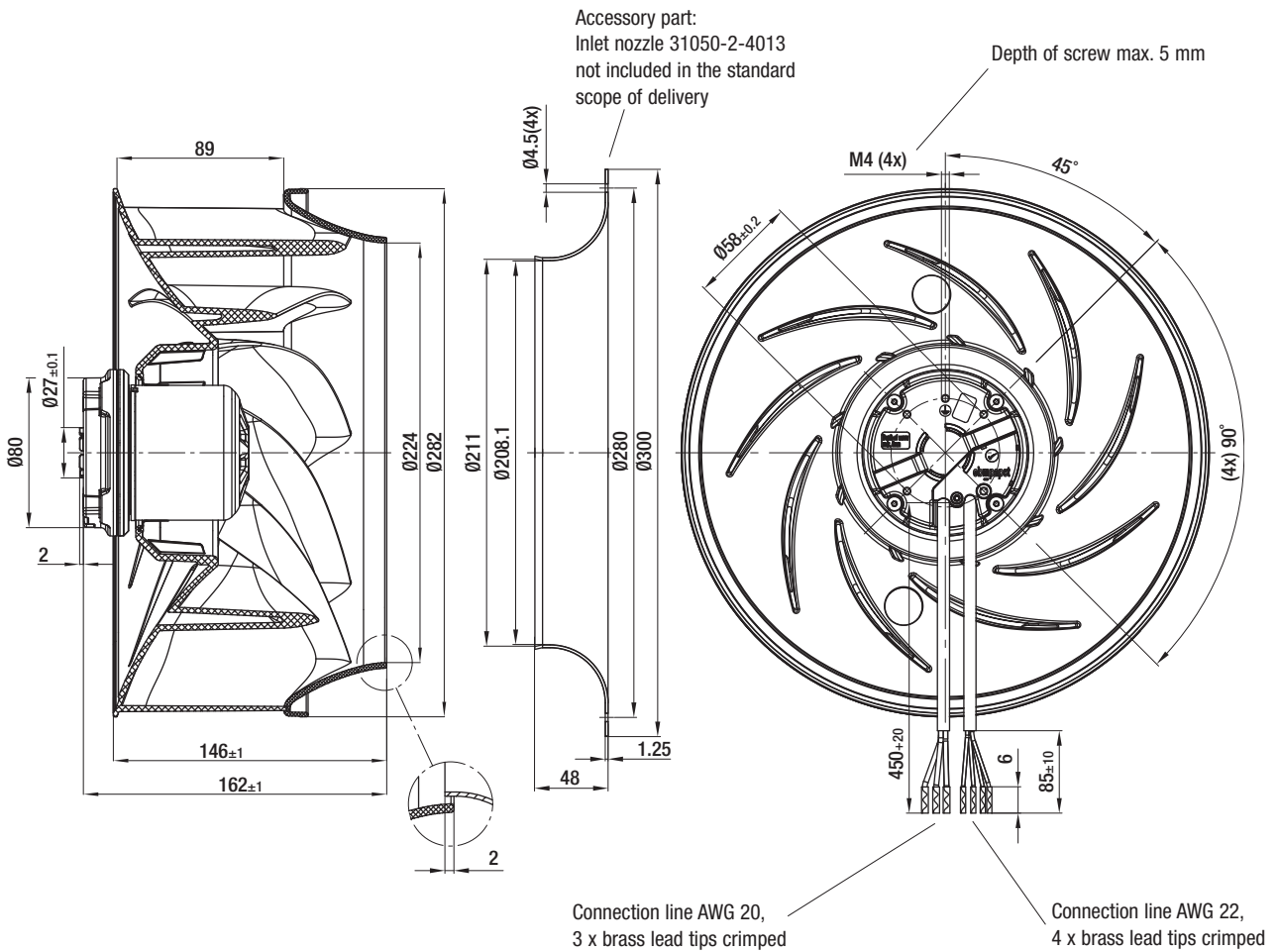
Mass

Centrifugal fan

kg

R3G 280-AP03 -03

2,5



# AC centrifugal fans

forward curved, dual inlet, with housing, Ø 133

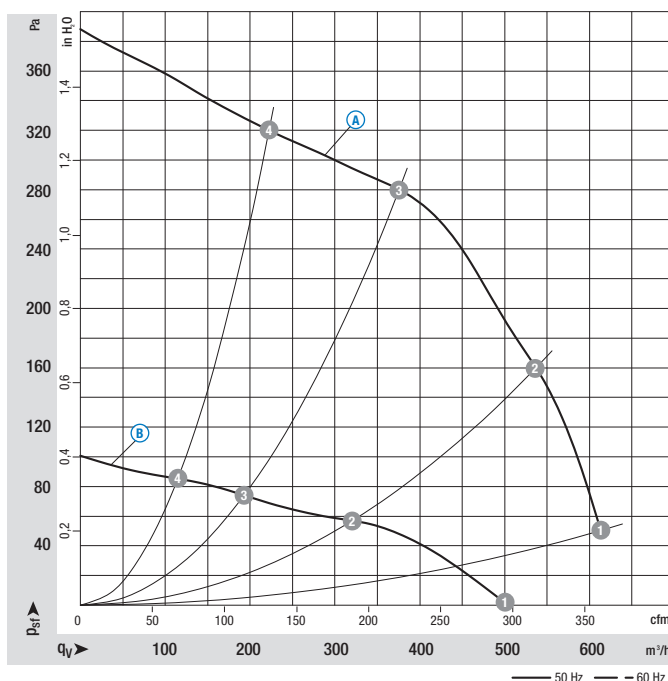


- **Material:** Housing: Plastic PP, black  
Impeller: (A) Plastic PA, black (B) Galvanised sheet steel  
Rotor: Partially cast in aluminium
- **Direction of rotation:** Counter-clockwise, seen on rotor
- **Type of protection:** IP 44
- **Insulation class:** "F"
- **Mounting position:** Any
- **Condensate discharges:** None
- **Mode of operation:** Continuous operation (S1)
- **Design:** Centrifugal fan with housing, SAL-Motor anti-vibration mounted on both sides
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage range	Frequency	Flow rate	Speed/rpm	Input power	Current draw	Capacitor capacity	Min. back pressure	Perm. amb. temp.	Electr. connection
Type	Motor		VAC	Hz	m³/h	rpm	W	A	µF/VDB	Pa	°C	
<b>D2E 133</b>	M2E 068-DF	(A)	1~ 230	50	610	1600	170	0,74	2,5/450	50	-25..+65	---
			1~ 230	60	500	1770	170	0,75	2,5/450	100	-25..+50	---
<b>D4E 133</b>	M4E 068-BF	(B)	1~ 230	50	500	1150	60	0,27	2,0/400	0	-25..+50	---
			1~ 230	60	530	1250	70	0,32	2,0/400	0	-25..+55	---

subject to alterations

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst scroll housing and without protection against accidental contact

Suction-side noise levels: L<sub>wA</sub> as per ISO 13347, L<sub>pA</sub> measured at 1 m distance to fan axis

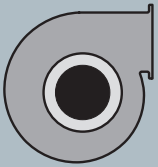
The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

For detailed information see page 36 ff.

	n rpm	P <sub>e</sub> W	I A	L <sub>wA</sub> dB(A)
(A) 1	1600	170	0,74	67
(A) 2	2090	146	0,64	69
(A) 3	2510	112	0,49	70
(A) 4	2680	91	0,40	71
(B) 1	1150	60	0,27	59
(B) 2	1290	57	0,25	55
(B) 3	1360	55	0,24	57
(B) 4	1395	55	0,24	57

- **Motor protection:** TOP wired internally
- **Cable exit:** variable
- **Protection class:** I
- **Product conforming to standards:** EN 60335-1, CE



Mass

Centrifugal fan with housing & flange

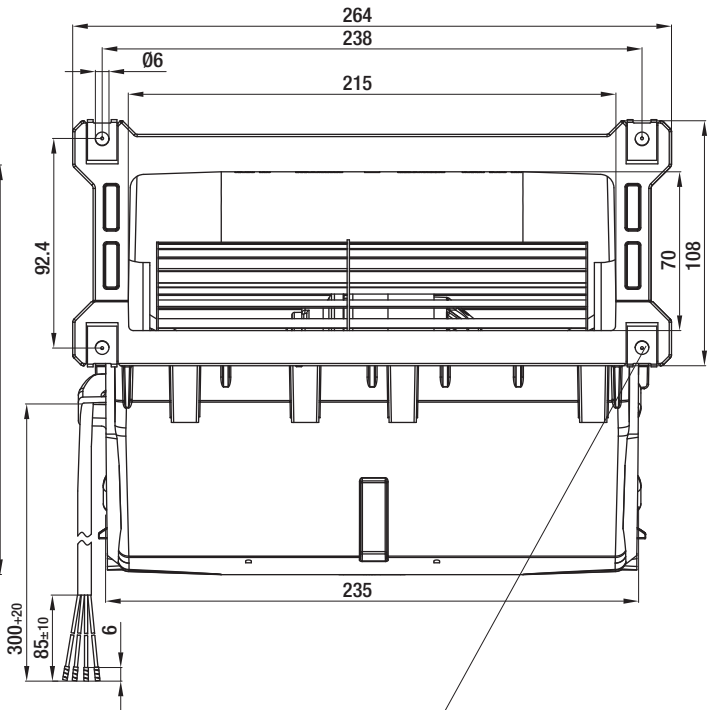
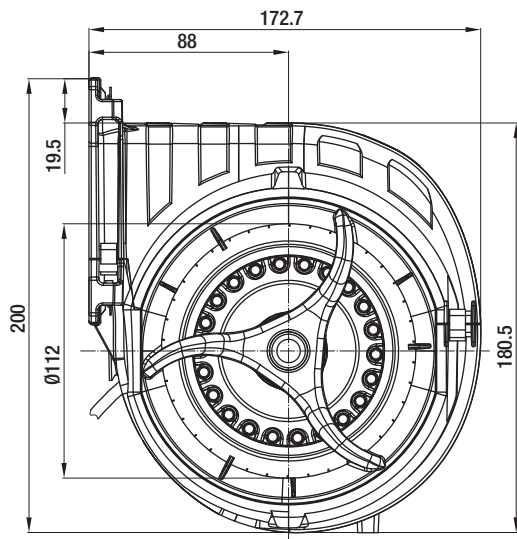
kg

D2E 133-LM34 -01

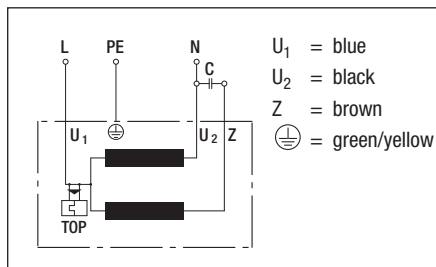
3,3

D4E 133-LH05 -01

3,0



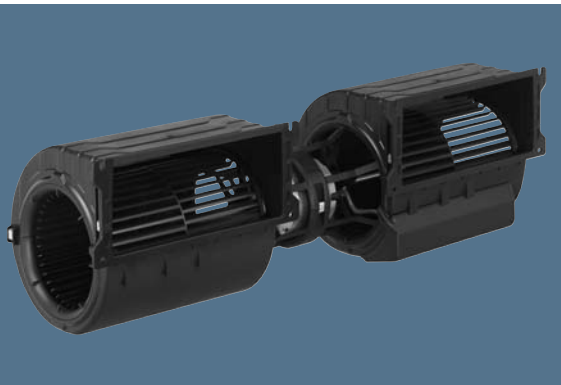
**Electr. connection**



4 x sheet metal nut for thread EN ISO 1478-ST4,8 (min. screw length 14,5 mm plus thickness of mounting material)

# AC centrifugal fan combination

forward curved, dual inlet, with housing, Ø 133

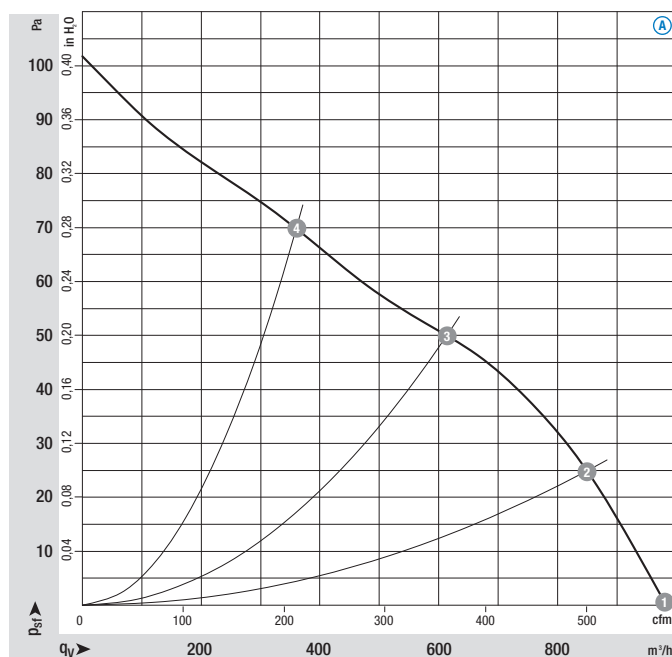


- **Material:** Housing: Plastic PP, black  
Impeller: Plastic PA, black  
Rotor: Partially cast in aluminium
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 44
- **Insulation class:** "F"
- **Mounting position:** Any
- **Condensate discharges:** None
- **Mode of operation:** Continuous operation (S1)
- **Design:** Centrifugal fan combination with housing and integrated terminal box, SAL-Motor anti-vibration mounted on both sides
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage range	Frequency	Flow rate	Speed/rpm	Input power	Current draw	Capacitor capacity	Min. back pressure	Perm. amb. temp.	Electr. connection
Type	Motor		VAC	Hz	m³/h	rpm	W	A	µF/VDB	Pa	°C	
<b>K4E 133</b>	M4E 068-DF	Ⓐ	1~ 230	50	980	1000	78	0,35	2,5/400	0	-25..+60	---

subject to alterations

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst scroll housing and without protection against accidental contact

	n rpm	P <sub>e</sub> W	I A	L <sub>wA</sub> dB(A)
Ⓐ 1	1000	78	0,35	59
Ⓐ 2	1100	74	0,32	57
Ⓐ 3	1215	68	0,30	55
Ⓐ 4	1305	62	0,27	54

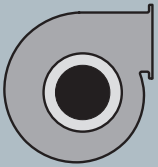
Suction-side noise levels: L<sub>wA</sub> as per ISO 13347, L<sub>pA</sub> measured at 1 m distance to fan axis

The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

For detailed information see page 36 ff.

- **Motor protection:** TOP wired internally
- **Cable exit:** variable
- **Protection class:** I
- **Product conforming to standards:** EN 60335-1, CE



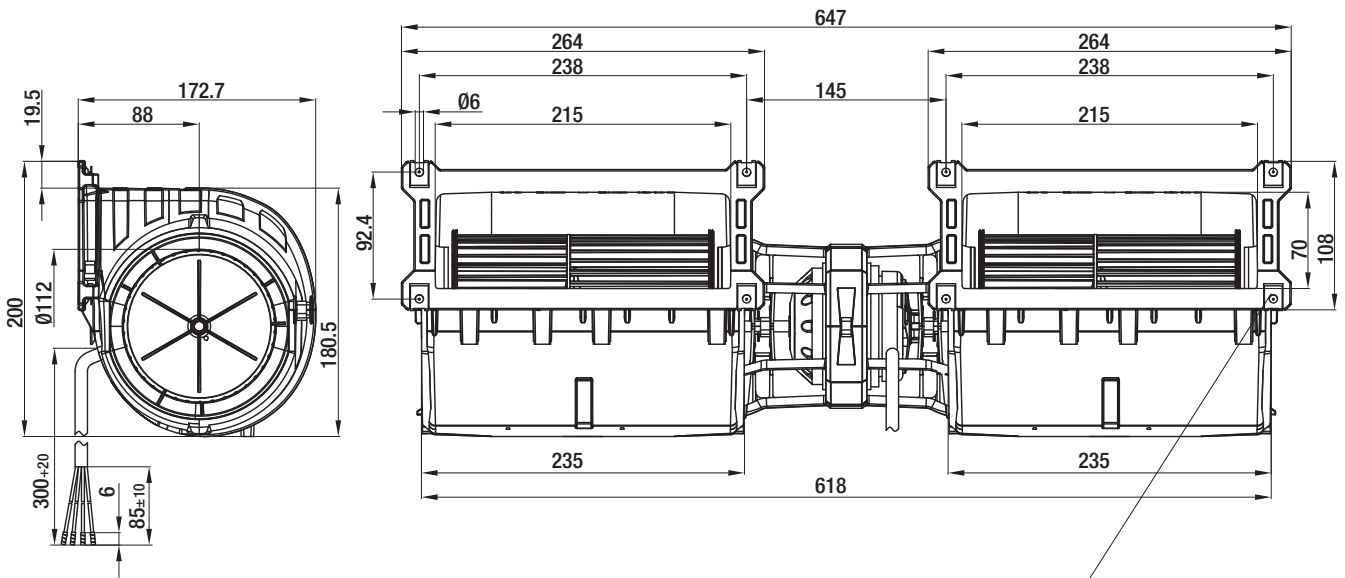
Mass

Centrifugal fan with housing & flange

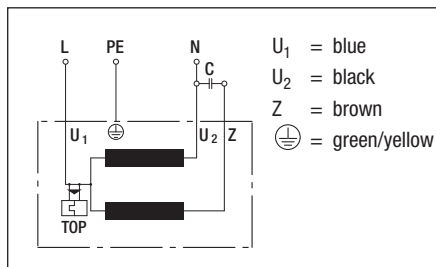
kg

K4E 133-LA69 -02

3,5



**Electr. connection**



4 x sheet metal nut for thread EN ISO 1478-ST4,8 (min. screw length 14,5 mm plus thickness of mounting material)

# AC centrifugal fans

forward curved, dual inlet, with housing, Ø 146

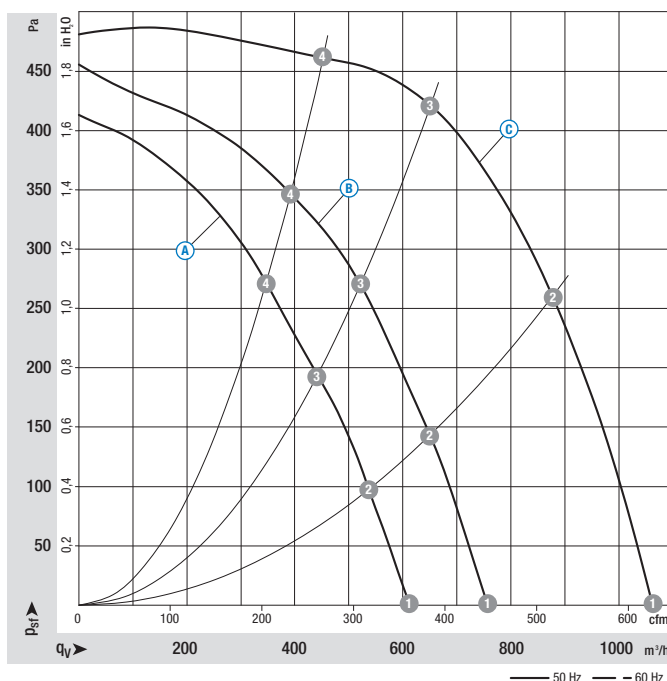


- **Material:** Housing: Plastic PP, black  
Impeller: (A) (B) Plastic PP, white (C) Galvanised sheet steel  
Rotor: Partially cast in aluminium  
Terminal box: Plastic PP, black
- **Direction of rotation:** Counter-clockwise, seen on rotor
- **Type of protection:** IP 20
- **Insulation class:** "F"
- **Mounting position:** Any
- **Condensate discharges:** None
- **Mode of operation:** Continuous operation (S1)
- **Design:** 4-step centrifugal fan with housing and integrated terminal box, EW-Motor anti-vibration mounted on both sides
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage range	Frequency	Flow rate	Speed/rpm	Input power	Current draw	Capacitor capacity	Min. back pressure	Perm. amb. temp.	Electr. connection
Type	Motor		VAC	Hz	m³/h	rpm	W	A	µF/VDB	Pa	°C	
D2E 146	M2E 068-CF	(A)	1~ 230	50	615	1030	140	0,62	3,5/400	0	-25..+50	---
			1~ 230	60	430	1630	145	0,65	3,5/400	150	-25..+45	
D2E 146	M2E 068-DF	(B)	1~ 230	50	755	1350	195	0,86	5,0/400	0	-25..+45	---
			1~ 230	60	580	1750	215	0,94	5,0/400	150	-25..+40	
D2E 146	M2E 068-EC	(C)	1~ 230	50	1060	1850	355	1,55	8,0/450	0	-25..+55	---
			1~ 230	60	875	2100	400	1,75	8,0/450	200	-25..+50	

subject to alterations

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst scroll housing and without protection against accidental contact



Suction-side noise levels: L<sub>wA</sub> as per ISO 13347, L<sub>pA</sub> measured at 1 m distance to fan axis

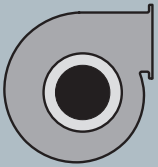
The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

For detailed information see page 36 ff.

	n rpm	P <sub>e</sub> W	I A	L <sub>wA</sub> dB(A)
(A) 1	1030	140	0,62	60
(A) 2	1420	134	0,58	60
(A) 3	1820	126	0,55	62
(A) 4	2105	117	0,52	65
(B) 1	1350	195	0,86	66
(B) 2	1775	186	0,81	65
(B) 3	2110	173	0,76	66
(B) 4	2350	160	0,71	68
(C) 1	1850	355	1,55	77
(C) 2	2225	305	1,32	73
(C) 3	2470	259	1,13	74
(C) 4	2610	227	0,99	74

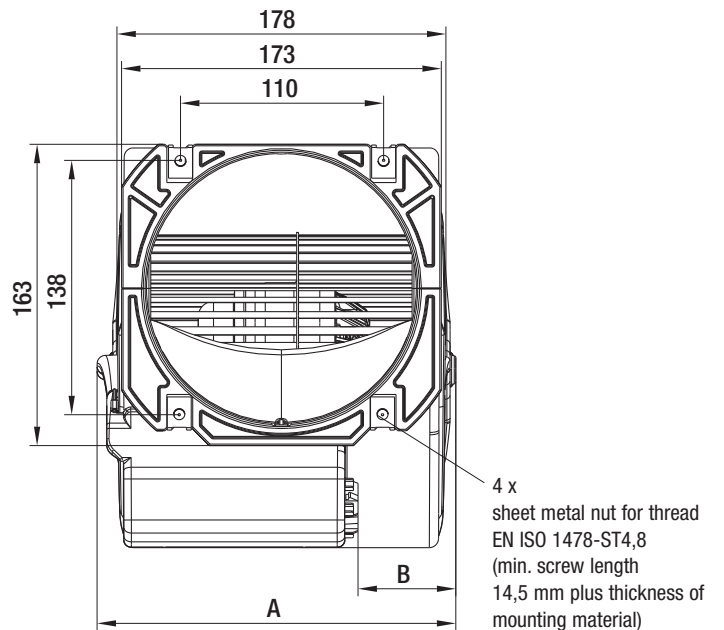
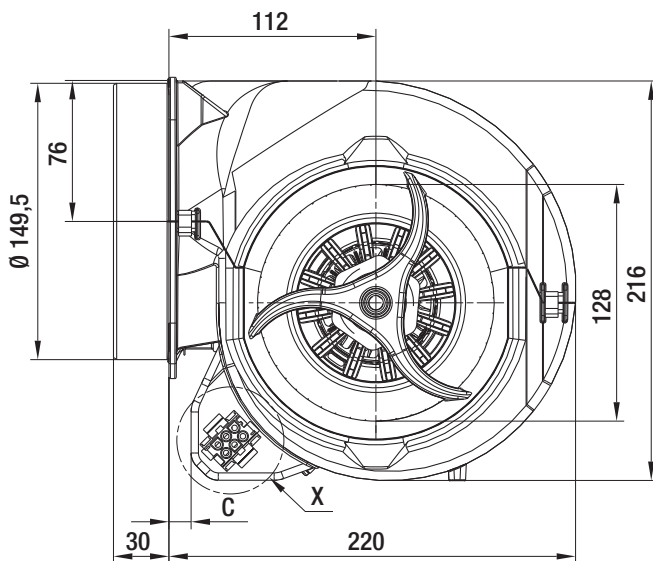
- **Motor protection:** TOP wired internally
- **Connection leads:** Via plug
- **Protection class:** I
- **Capacitor:** FPU (P2) integrated in terminal box completely wired up and ready for plug-in
- **Product conforming to standards:** EN 60335-2-31, CE
- **Approvals:** VDE,   GOST



Mass  
Dimensions

Centrifugal fan with housing & flange

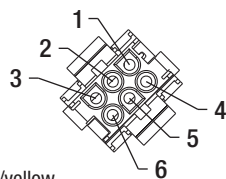
	kg	A	B	C
<b>D2E 146-HR93 -A1</b>	3,0	195	53	12
<b>D2E 146-HS97 -03</b>	3,5	195	53	12
<b>D2E 146-HT67 -02</b>	3,6	199	35	7



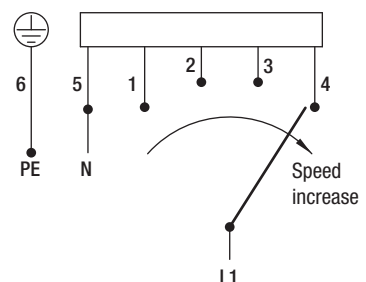
**Detail X**

AMP Universal Mate-N-Lok coded plug system  
Connector shell: AMP 926 682-3  
6 x plug pin: AMP 926 886-1

- 1 = Step 1 (min.) white
- 2 = Step 2 red
- 3 = Step 3 grey
- 4 = Step 4 (max.) black
- 5 = N blue
- 6 = Protective earth green/yellow



**Electrical connection**  
When changing speeds, switch must break the circuit.



# AC centrifugal fans

forward curved, dual inlet, with housing, Ø 146

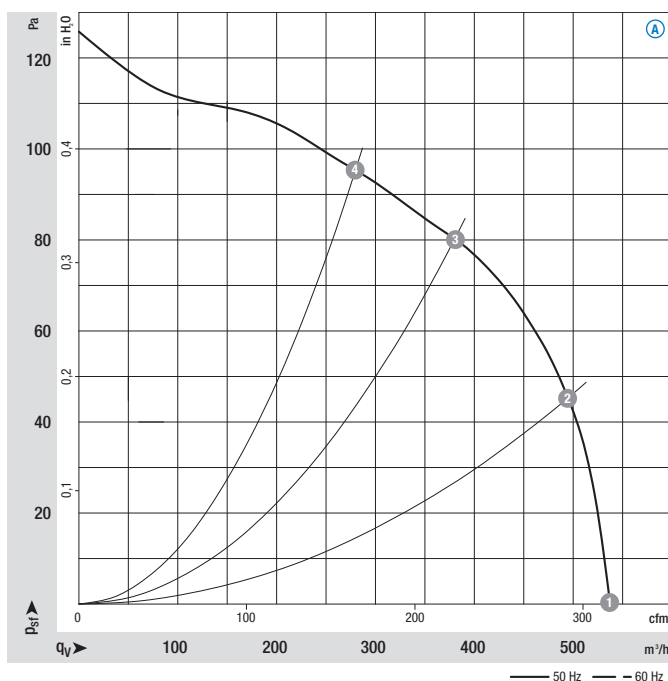


- **Material:** Housing: Plastic PP, black  
Impeller: Plastic PA, black  
Rotor: Partially cast in aluminium  
Terminal box: Plastic PP, black
- **Direction of rotation:** Counter-clockwise, seen on rotor
- **Type of protection:** IP 44
- **Insulation class:** "F"
- **Mounting position:** Any
- **Condensate discharges:** None
- **Mode of operation:** Continuous operation (S1)
- **Design:** 5-step centrifugal fan with housing and integrated terminal box, EW-Motor anti-vibration mounted on both sides
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage range	Frequenz	Flow rate	Speed/rpm	Input power	Current draw	Capacitor capacity	Min. back pressure	Perm. amb. temp.	Electr. connection
Type	Motor		VAC	Hz	m³/h	rpm	W	A	µF/VDB	Pa	°C	
D4E 146	M4E 068-CF	Ⓐ	1~ 230	50	565	780	65	0,29	2,0/400	0	-25..+50	---
			1~ 230	60	510	710	68	0,30	2,0/400	0	-25..+40	

subject to alterations

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst scroll housing and without protection against accidental contact

	n rpm	P <sub>e</sub> W	I A	L <sub>WA</sub> dB(A)
Ⓐ 1	780	65	0,29	54
Ⓐ 2	1075	58	0,26	56
Ⓐ 3	1270	48	0,21	56
Ⓐ 4	1335	44	0,20	56

Suction-side noise levels: L<sub>WA</sub> as per ISO 13347, L<sub>pA</sub> measured at 1 m distance to fan axis

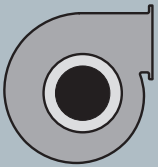
The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

For detailed information see page 36 ff.



- **Motor protection:** TOP wired internally
- **Connection leads:** Via plug
- **Protection class:** I
- **Capacitor:** FPU (P2) integrated in terminal box completely wired up and ready for plug-in
- **Product conforming to standards:** EN 60335-1, CE
- **Approvals:** VDE



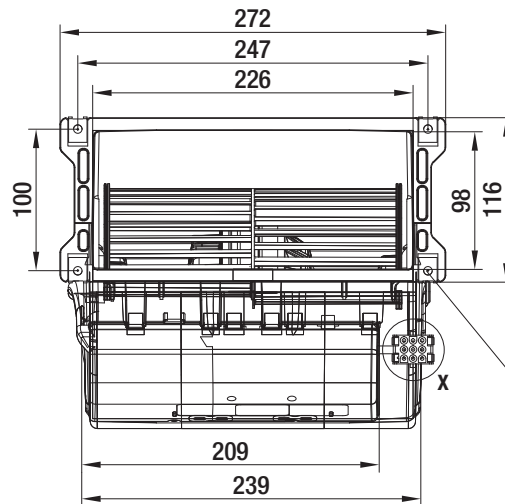
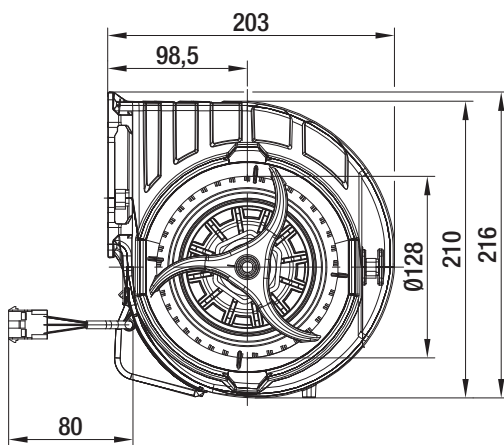
Mass

Centrifugal fan with housing & flange

kg

D4E 146-LV19 -14

2,5

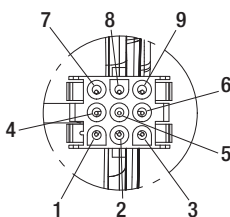


4 x sheet metal nut for thread EN ISO 1478-ST4,8  
(min. screw length 14,5 mm plus thickness of mounting material)

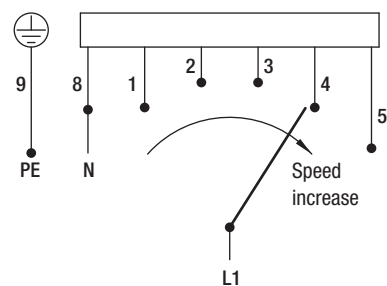
**Detail X**

AMP Universal Mate-N-Lok coded plug system  
Connector shell: AMP 927 231-3  
7 x plug pin: AMP 926 886-1

- 1 = Step 1 (min.)
- 2 = Step 2
- 3 = Step 3
- 4 = Step 4
- 5 = Step 5 (max.)
- 8 = N
- 9 = Protective earth

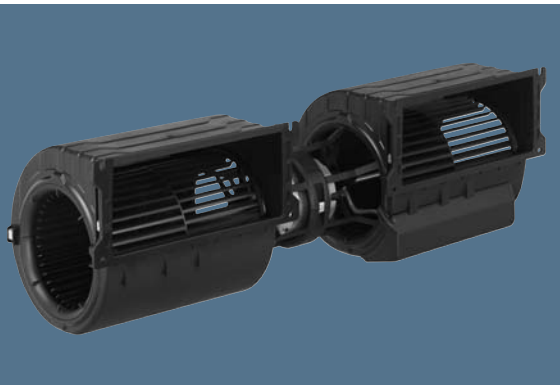


**Electrical connection**  
When changing speeds, switch must break the circuit.



# AC centrifugal fan combination

forward curved, dual inlet, with housing, Ø 146

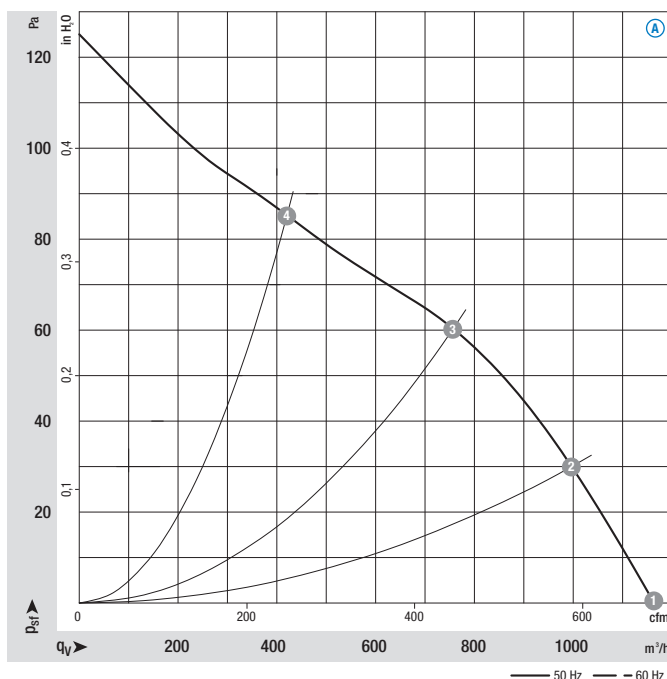


- **Material:** Housing: Plastic PP, black  
Impeller: Plastic PA, black  
Rotor: Partially cast in aluminium  
Terminal box: Plastic PP, black
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 44
- **Insulation class:** "F"
- **Mounting position:** Any
- **Condensate discharges:** None
- **Mode of operation:** Continuous operation (S1)
- **Design:** 5-step centrifugal fan combination with housing and integrated terminal box, SAL-Motor anti-vibration mounted on both sides
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage range	Frequency	Flow rate	Speed/rpm	Input power	Current draw	Capacitor capacity	Min. back pressure	Perm. amb. temp.	Electr. connection
Type	Motor		VAC	Hz	m³/h	rpm	W	A	µF/VDB	Pa	°C	
<b>K4E 146</b>	M4E 068-DF	Ⓐ	1~ 230	50	1180	750	85	0,38	2,5/450	0	-25..+50	---

subject to alterations

## Curves



Air performance measured as per: ISO 5801, Installation category A, in ebm-papst scroll housing and without protection against accidental contact

	n rpm	P <sub>e</sub> W	I A	L <sub>wA</sub> dB(A)
Ⓐ 1	750	85	0,38	57
Ⓐ 2	900	82	0,36	55
Ⓐ 3	1070	75	0,33	55
Ⓐ 4	1235	66	0,29	56

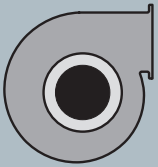
Suction-side noise levels: L<sub>wA</sub> as per ISO 13347, L<sub>pA</sub> measured at 1 m distance to fan axis

The acoustic values given are only valid under the measurement conditions listed and may vary depending on the installation situation.

With any deviation to the standard setup, the specific values have to be checked and reviewed once installed or fitted!

For detailed information see page 36 ff.

- **Motor protection:** TOP wired internally
- **Connection leads:** Via plug
- **Protection class:** I
- **Capacitor:** FPU (P2) integrated in terminal box completely wired up and ready for plug-in
- **Product conforming to standards:** EN 60335-1, CE
- **Approvals:** VDE



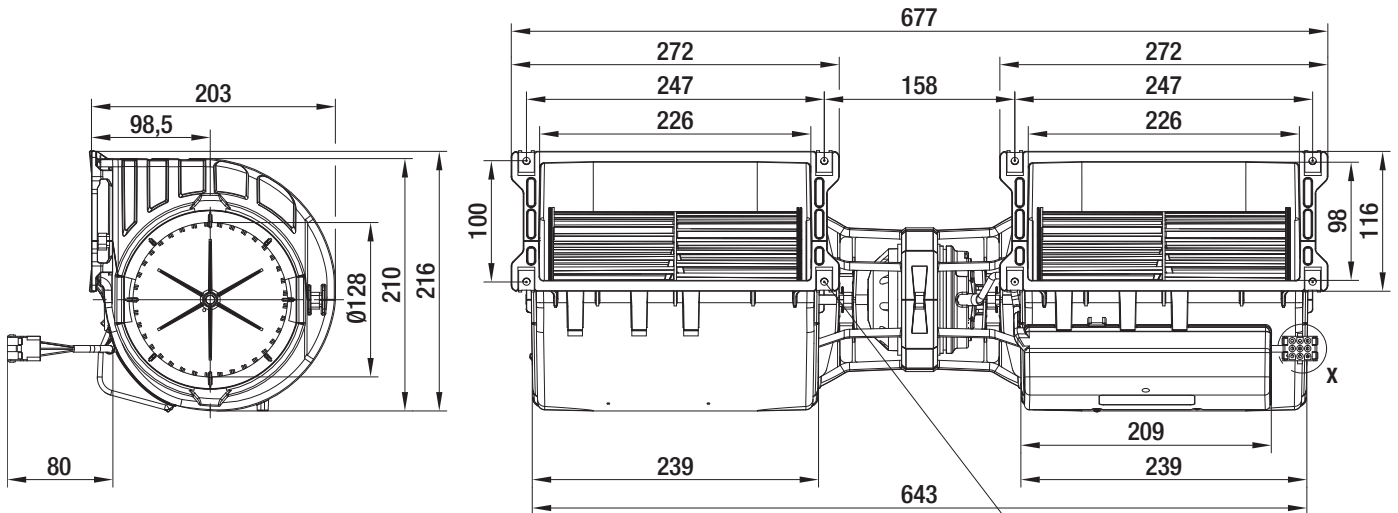
Mass

Centrifugal fan with housing & flange

kg

K4E 146-AB73 -21

4,0

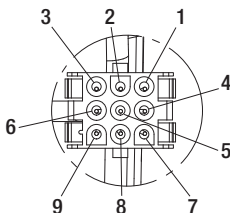


8 x sheet metal nut for thread EN ISO 1478-ST4,8 (min. screw length 14,5 mm plus thickness of mounting material)

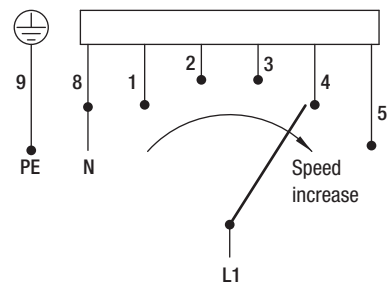
**Detail X**

AMP Universal Mate-N-Lok coded plug system  
 Connector shell: AMP 927 231-3  
 7 x plug pin: AMP 926 886-1

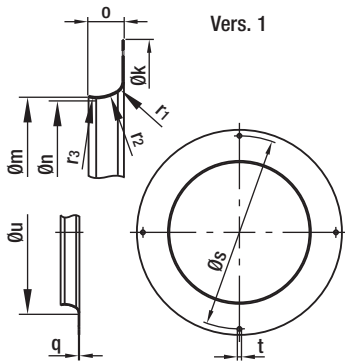
- 1 = Step 1 (min.)
- 2 = Step 2
- 3 = Step 3
- 4 = Step 4
- 5 = Step 5 (max.)
- 8 = N
- 9 = Protective earth



**Electrical connection**  
 When changing speeds, switch must break the circuit.



# Inlet nozzles, guard grilles

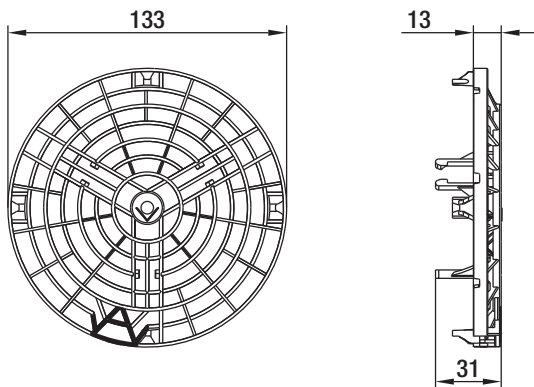


– **Material:** Galvanised sheet steel

## Inlet nozzles for backward curved centrifugal fans

Part no.	Size	Vers.	k	m	n	o	q	r <sub>1</sub>	r <sub>2</sub>	r <sub>3</sub>	s	t	u
31050-2-4013	310 (A)	1	300.0	211.0	208.1	48.0	1.25	18.0	55.5	35.0	280.0	4x4.5	256.0

subject to alterations



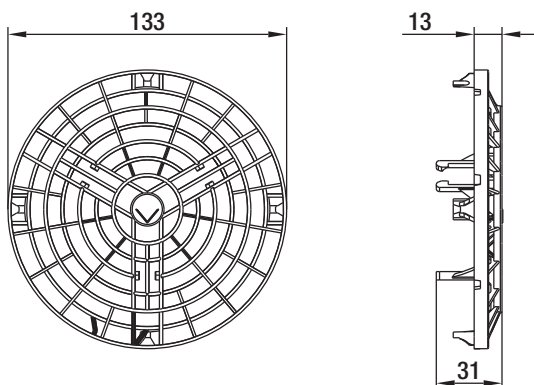
- **Material:** PA plastic 6.6 GV25 V0, black
- **Special feature:** Triangular, raised contour
- **Suitable for:** D2E146; D4E146; D3G146

## Guard grilles for centrifugal fans with dual inlet with plastic housing (cable exit side)

Part no.

34265-2-2929

subject to alterations



- **Material:** PA plastic 6.6 GV25 V0, black
- **Special feature:** Outer two rings are closed
- **Suitable for:** D2E146; D4E146; D3G146; K4E146; K3G146

## Guard grilles for centrifugal fans with dual inlet with plastic housing (side opposite cable exit)

Part no.

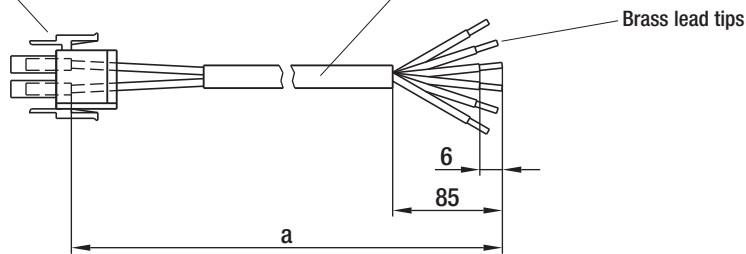
38182-2-2929

subject to alterations

# Connection leads AC

AMP Universal Mate-N-Lok suitable for:  
Connector shell AMP 926 682-3  
Plug pin 926 886-1

Jacketed cable, internal leads  
H03VV-F6G0,5 black



- **Suitable for:**  
D2E146-HR; D2E146-HS; D2E146-HT
- **Plug assignment:**
  - 1 = Step 1 (white)
  - 2 = Step 2 (red)
  - 3 = Step 3 (grey)
  - 4 = Step 4 (black)
  - 5 = N (blue)
  - 6 = PE (green/yellow)

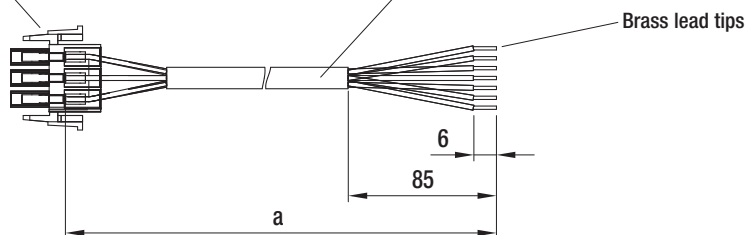
## Lead connections for AC centrifugal fans with plastic housing

Part no.	a
21956-4-1040	300,0
21957-4-1040	450,0
21958-4-1040	650,0
21959-4-1040	1000,0

subject to alterations

AMP Universal Mate-N-Lok suitable for:  
Connector shell AMP 927 231-3  
Plug pin 926 886-1

Jacketed cable, internal leads  
H03VV-F6G0,5 black



- **Suitable for:**  
D4E146-LV; K4E146-AB
- **Plug assignment:**
  - 1 = Step 1 (white)
  - 2 = Step 2 (red)
  - 3 = Step 3 (grey)
  - 4 = Step 4 (orange)
  - 5 = Step 5 (black)
  - 8 = N (blue)
  - 9 = PE (green/yellow)

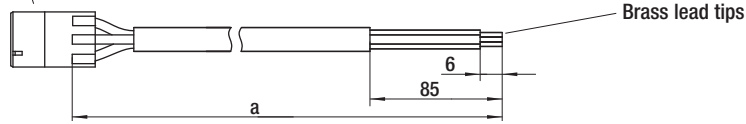
## Lead connections for AC centrifugal fans with plastic housing

Part no.	a
21810-4-1012	450,0
21811-4-1012	1050,0
21812-4-1012	1300,0
21813-4-1012	1600,0
21814-4-1012	2300,0

subject to alterations

# Connection leads EC

Lumberg female connector



- **Suitable for:**  
D3G146-LT; D3G146-LU; D3G146-LV;  
K3G146-A.....

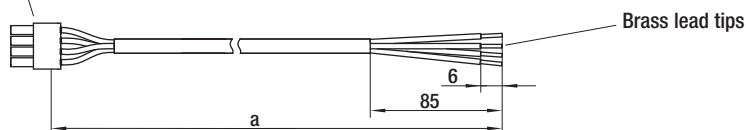
- **Plug assignment:**  
1 = N (blue)  
2 = L (black)  
3 = PE (green/yellow)

## Line leads for EC centrifugal fans with plastic housing

Part no.	a
65030-4-1040	450,0
65031-4-1040	650,0
65032-4-1040	1000,0
65033-4-1040	1500,0

subject to alterations

Molex Micro Fit female connector



- **Suitable for:**  
D3G146-LT; D3G146-LU; D3G146-LV;  
K3G146-A.....

- **Plug assignment:**  
1 = GND (blue)  
2 = 0-10V lin. / PWM (yellow)  
3 = Tacho (white)  
4 = 10V (red)

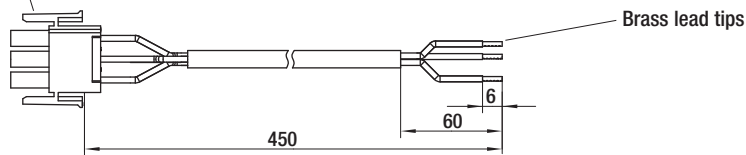
## Control lines for EC centrifugal fans with plastic housing

Part no.	a
65006-4-1040	450,0
65007-4-1040	650,0
65008-4-1040	1000,0
65009-4-1040	1500,0

subject to alterations

# Connection leads EC

AMP Mate-N-Lok female connector



- Suitable for:  
D3G146-HQ

- Plug assignment:

- 1 = PE (green/yellow)
- 2 = N (blue)
- 3 = L (black)

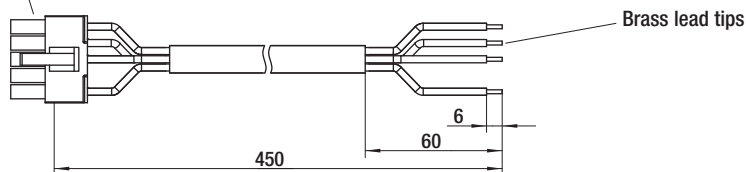
## Line lead for EC centrifugal fans with plastic housing

Part no.

**62964-4-1040**

subject to alterations

Molex Mini Fit female connector



- Suitable for:  
D3G146-HQ

- Plug assignment:

- 1 = GND (blue)
- 2 = 0-10V lin. / PWM (yellow)
- 3 = Tacho (white)
- 4 = 10V (red)

## Control line for EC centrifugal fans with plastic housing

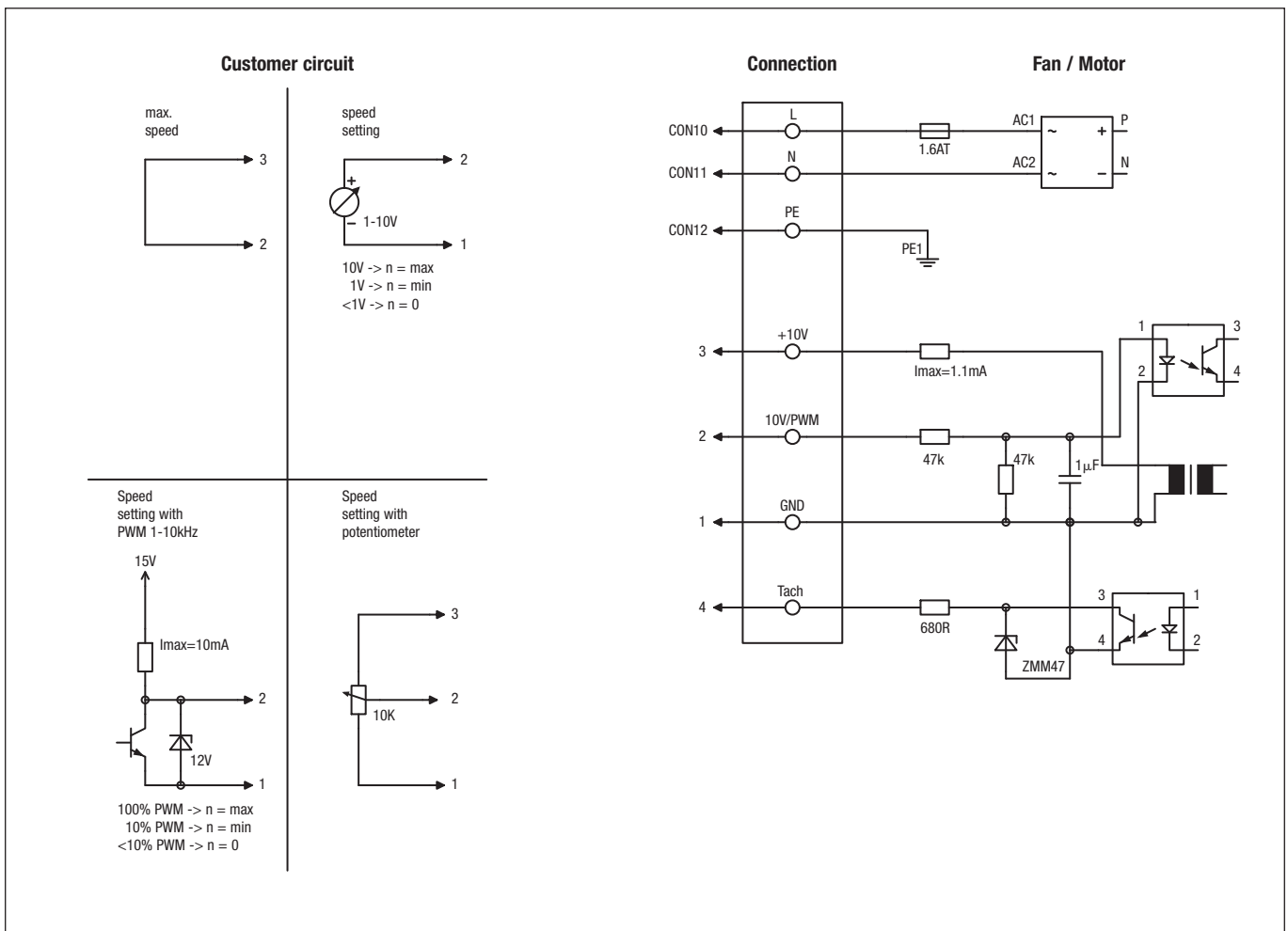
Part no.

**59601-4-1040**

subject to alterations

## Electrical connections EC

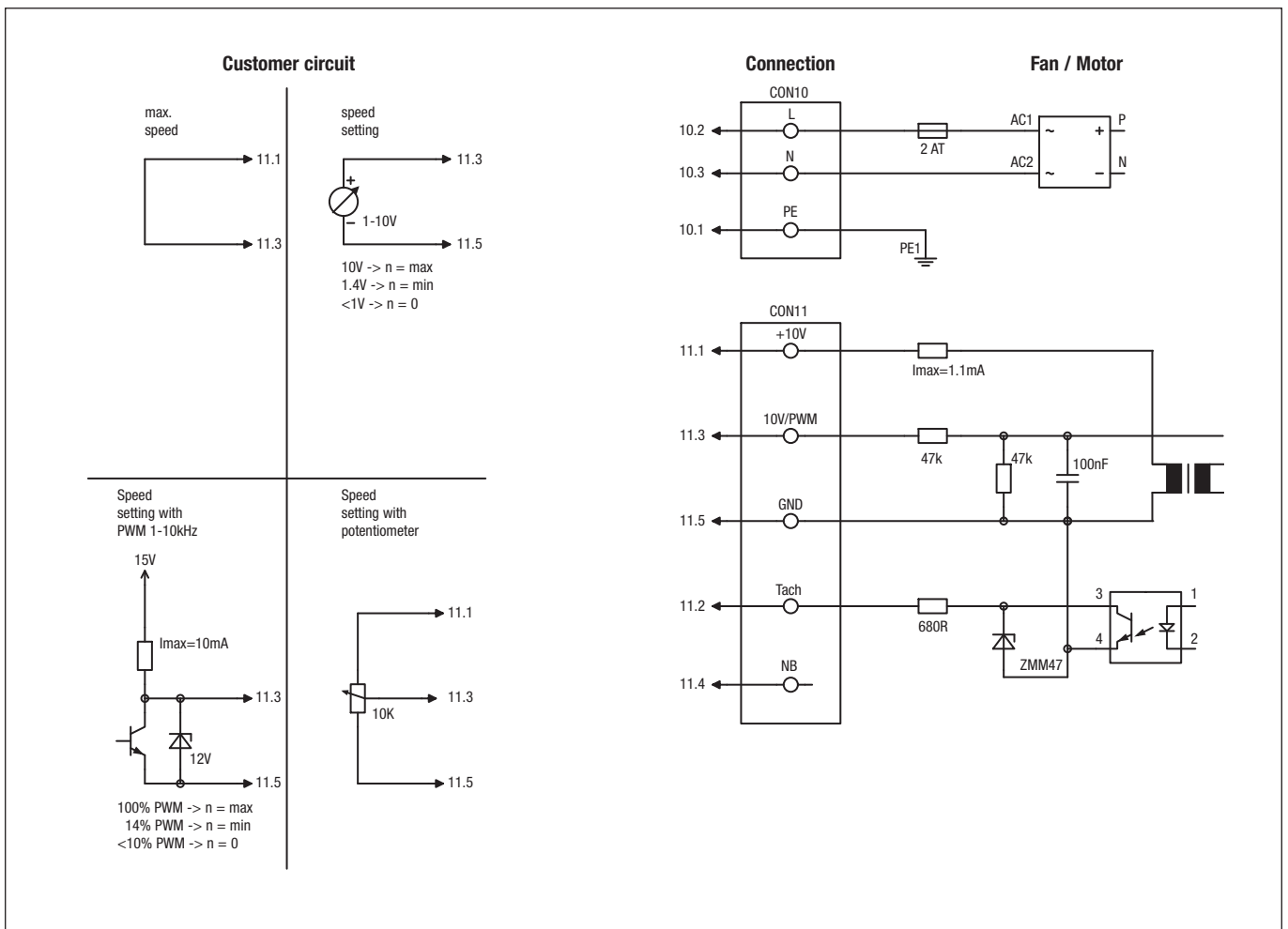
H4)



Line	Connection	Colour	Assignment / function
CON10	L	black	Power supply 230 VAC, 50 - 60 Hz, see type plate for voltage range
CON11	N	blue	Neutral conductor
CON12	PE	green/yellow	Protective earth
1	GND	blue	GND - Connection for control interface
2	0-10V PWM	yellow	Control input 0 - 10 V or PWM, electrically isolated
3	10V/max.1.1mA	red	Voltage output 10V / 1.1mA, electrically isolated, not short-circuit-proof
4	Tach	white	Tach output: Open Collector, 1 pulse per revolution, electrically isolated



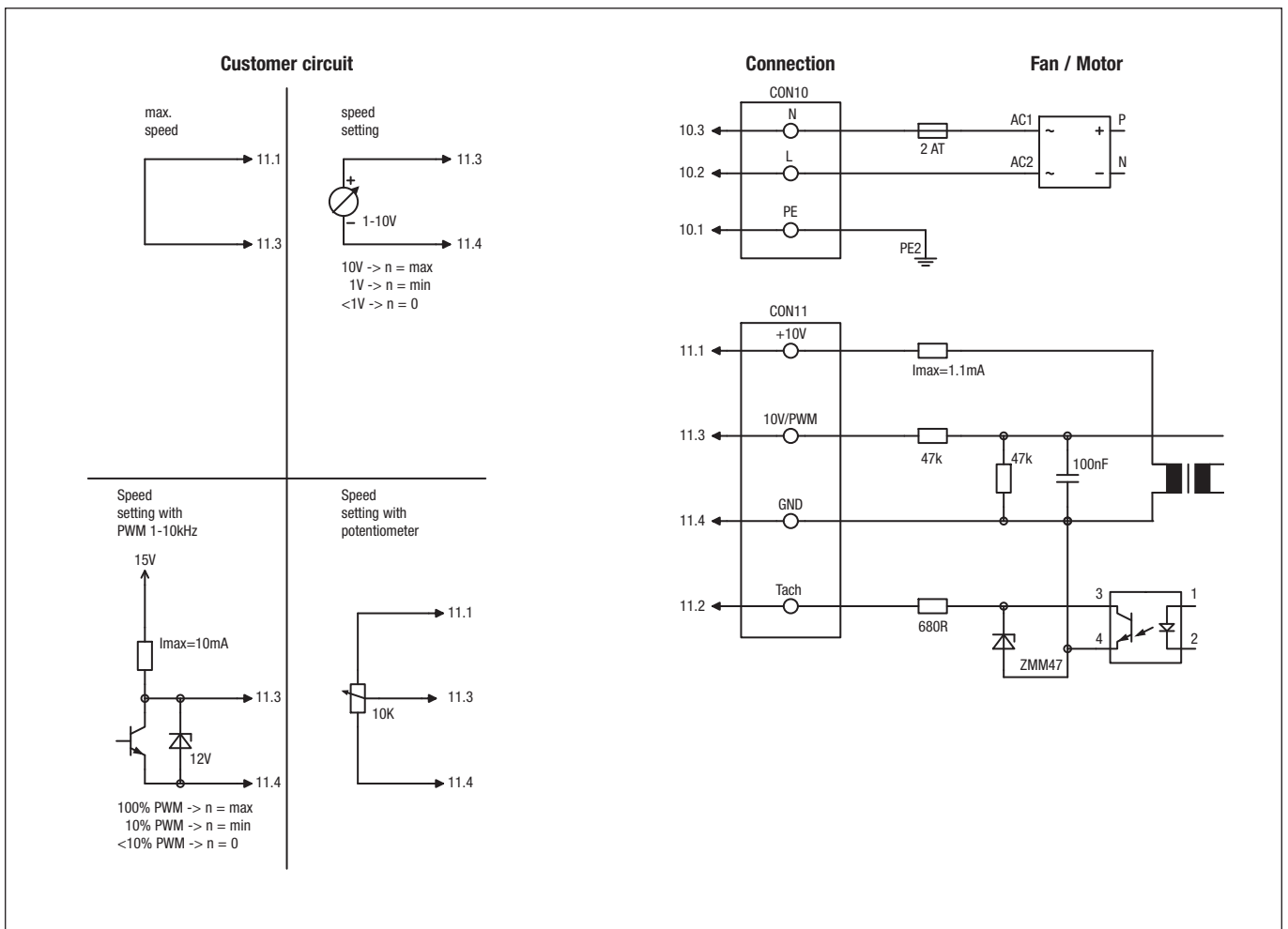
H5)



Line	No.	Connection	Colour	Assignment / function
CON10	10.1	PE	green/yellow	Protective earth
CON10	10.2	L	black	Power supply 230 VAC, 50 - 60 Hz, see type plate for voltage range
CON10	10.3	N	blue	Neutral conductor
CON11	11.1	10V/max. 1.1mA	red	Voltage output 10V / 1mA, electrically isolated
CON11	11.2	Tach	white	Tach output: Open Collector, 1 pulse per revolution, electrically isolated
CON11	11.3	0-10V PWM	yellow	Control input 0 - 10V or PWM, electrically isolated
CON11	11.4	NB		not assigned
CON11	11.5	GND	blue	GND - Connection for control interface

## Electrical connections EC

H6)



Line	No.	Connection	Colour	Assignment / function
CON10	10.1	PE	green/yellow	Protective earth
CON10	10.2	L	black	Power supply 230 VAC, 50 - 60 Hz, see type plate for voltage range
CON10	10.3	N	blue	Neutral conductor
CON11	11.1	10V/max. 1.1mA	red	Voltage output 10V / 1mA, electrically isolated
CON11	11.2	Tach	white	Tach output: Open Collector, 1 pulse per revolution, electrically isolated
CON11	11.3	0-10V PWM	yellow	Control input 0 - 10V or PWM, electrically isolated
CON11	11.4	GND	blue	GND - Connection for control interface



# Technical parameters & scope



## High standards for all ebm-papst products

*Here at ebm-papst, we constantly strive to further improve our products in order to be able to offer you the best possible product for your application. Careful monitoring of the market ensures that technical innovations are reflected in the improvements of our products.*

*Based on the technical parameters listed below and the ambience you want our product to operate in, we here at ebm-papst can always work out the best solution for your specific application.*

## ■ General performance parameters

Any deviations from the technical data and parameters described here are listed on the product-specific data sheet.

### Type of protection

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

### Insulation class

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

### Mounting position

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

### Condensate discharge holes

Information on the condensate discharge 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 major factors:

- The service life of the insulation system
- The service life of the bearing system

The service life of the insulation system mainly depends on voltage level, temperature and ambient conditions, such as humidity and condensation.

The service life of the bearing system depends mainly on the thermal load on the bearing.

The majority of our products use maintenance-free ball bearings for any mounting position possible. As an option, sleeve bearings can be used, which is indicated on the product-specific data sheet wherever applicable.

The service life L10 of the ball bearings can be taken as approx. 40,000 operating hours at an ambient temperature of 40 °C, yet this estimate can vary according to the actual ambient conditions.

We will gladly provide you with a lifetime calculation taking into account your specific operating conditions.

## Motor protection / thermal protection

Information on motor protection and thermal protection is provided in the product-specific data sheets.

Depending on motor type and field of application, the following protective features are realised:

- Thermal overload protection (TOP), either in-circuit or external
- PTC with electronic diagnostics
- Impedance protection
- Thermal overload protection (TOP) with electronic diagnostics
- Current limitation via electronics

If an external TOP is connected, the customer has to make sure to connect a conventional trigger device for switching it off.

Products without fitted TOP and without protection against improper use, a motor protection complying with the valid standards has to be installed.

*Left: Endurance test room  
Middle: Shock test  
Right: Chamber test rig*



### ■ Mechanical strain / performance parameters

All ebm-papst products are subjected to comprehensive tests complying with the normative specifications. In addition to this, the tests also reflect the vast experience and expertise of ebm-papst.

#### **Vibration test**

Vibration tests are carried out in compliance with

- Vibration test in operation according to DIN IEC 68, parts 2-6
- Vibration test at standstill according to DIN IEC 68, parts 2-6

#### **Shock load**

Shock load tests are carried out in compliance with

- Shock load according to DIN IEC 68, parts 2-27

#### **Balancing quality**

Testing the balancing quality is carried out in compliance with

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

Should you require a higher balancing quality level for your specific application, please let us know and specify this when ordering your product.

### ■ Chemo-physical strain / performance parameters

Should you have questions about chemo-physical strain, please direct them to your ebm-papst contact.

### ■ Fields of application, industries and applications

Our products are used in various industries and applications:

Ventilation, air-conditioning and refrigeration technology, clean room technology, automotive and rail technology, medical and laboratory technology, electronics, computer and office technology, telecommunications, household appliances, heating, machines and plants, drive engineering.

Our products are not designed for use in the aviation and aerospace industry!

### ■ Legal and normative directives

The products described in this catalogue are designed, developed and produced in keeping with the standards in place for the relevant product and, if known, the conditions governing the relevant fields 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.

Complying with the EMC standards has to be established on the final appliance, as different mounting situations can result in changed EMC properties.

#### **Leakage current**

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

Measuring is according to IEC 60990.

#### **Approvals**

In case you require a specific approval for your ebm-papst product (VDE, UL, GOST, CCC, CSA, etc.) please let us know.

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

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

### ■ Air performance measurements

All air performance measurements are carried out on suction side and on chamber test beds conforming to the specifications as per ISO 5801 and DIN 24163. The fans under test are installed in the measuring chamber at free air intake and exhaust (installation category A) and are operated at nominal voltage, with AC also at nominal frequency, and without any additional components such as guard grilles.

As required by the standard, the air performance curves correspond to an air density of 1.2 kg/m<sup>3</sup>.

Room for precision noise measuring



### ■ Measurement conditions for air and noise measurement

ebm-papst products are measured under the following conditions:

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

### ■ Noise measurements

All noise measurements are carried out in low-reflective test rooms with reverberant floor. Thus the ebm-papst acoustic test chambers meet the requirements of precision class 1 according to DIN EN ISO 3745. For noise measurement, the fans being tested are placed in a reverberant wall and operated at nominal voltage (for AC, also at nominal frequency) without additional attachments such as the guard grille.

### Sound pressure level and sound level

All acoustic values are established according to ISO 13347, DIN 45635 and ISO 3744/3745 to accuracy class 2 and given in A-rated form.

When the sound pressure level ( $L_p$ ) is measured, the microphone is on the intake side of the fan being tested, usually at a distance of 1 m on the fan axis.

To measure 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 sound power level measured can be roughly calculated from the sound pressure level by adding 7 dB.

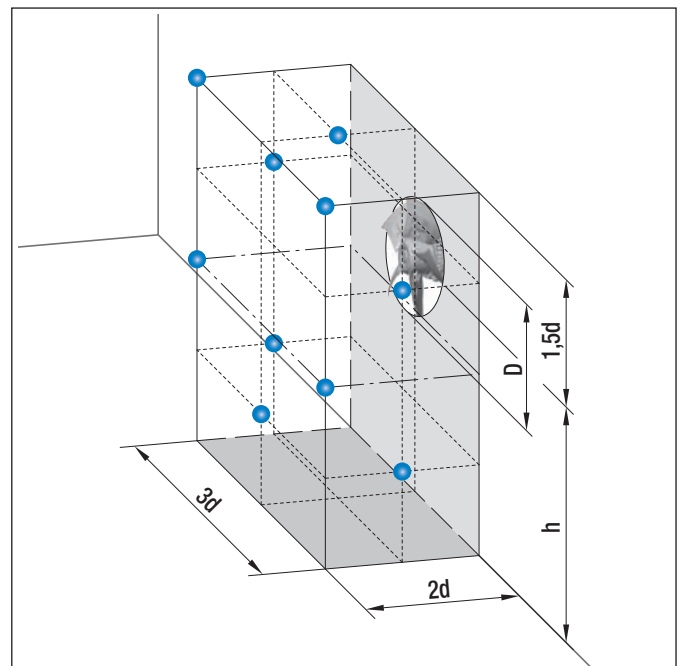
Measuring configuration as per ISO 13347-3 respectively DIN 45635-38:

- 10 measuring points

$$d \geq D$$

$$h = 1,5d \dots 4,5d$$

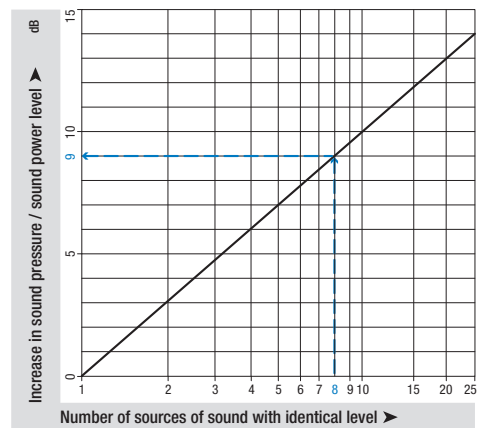
$$\text{Measurement area } S = 6d^2 + 7d(h + 1,5d)$$



### Adding multiple noise sources with the same level

Adding 2 noise sources with the same volume results in a level increase of approx. 3 dB. The noise characteristics of multiple identical fans can be determined in advance based on the noise values specified in the data sheet. This is shown in the diagram opposite.

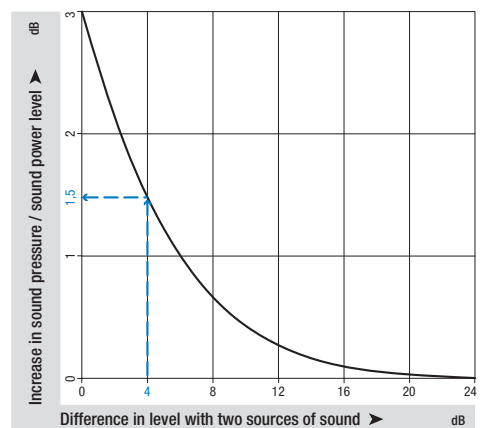
**Example:** 8 A3G800 axial fans are on a condenser. According to the data sheet, the sound pressure level of a fan is approximately 75 dB(A). The level increase measured from the diagram is 9 dB. Thus the overall sound level of the installation can be expected to be 84 dB(A).



### Adding two noise sources with different levels

The acoustic performance of two different fans can be predetermined based on the sound levels given in the data sheet. This is shown in the diagram opposite.

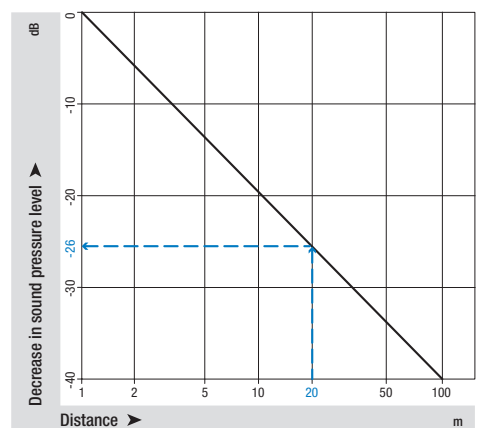
**Example:** There is an axial fan A3G800 with a sound pressure level of 75 dB(A) at the operating point and an axial fan A3G710 with 71 dB(A) in a ventilation unit. The level difference is 4 dB. The level increase can now be read in the diagram as approx. 1.5 dB. This means that the overall sound level of the unit can be expected to be 76.5 dB(A).







### Distance laws

Sound power level is independent of distance to the sound source. In contrast to this, sound pressure level decreases the further away the noise source is. The adjacent diagram shows the decrease in level under far sound field conditions. Far sound field conditions apply whenever the distance between microphone and fan is big when compared to fan diameter and wavelength to be considered. For more information on far sound field, please consult the relevant literature on this complex topic. Per doubling of distance, the level in the far sound field decreases by 6 dB. In the near field of the fan, other correlations apply and the decrease in levels can be considerably smaller. The following example only applies to far sound field conditions and can vary strongly depending on the installation effects:

With an axial fan A3G300, a sound pressure level of 65 dB(A) was measured at a distance of 1 m. According to the adjacent diagram, at a distance of 20 m we would get a reduction by 26 dB, i.e. a sound pressure level of 39 dB(A).



-  fan agent
-  compact fan agent
-  motor specialist
-  motor agent

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
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
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