

Fans and drive concepts for rail technology

version 2014-10

ebmpapst

The engineer's choice



ebm-papst: Your highly competent partner in rail engineering

Creating the ideal fan solution.

The area of railways places particular requirements on a product. Fans developed uniquely for rail technology and for the specific field of application will help to achieve a high level of customer satisfaction in the long-term. Introducing standard products in rail vehicles is frivolous and sooner or later becomes expensive for the customer.

To find the best solution for the individual rail use in each case, a comparison of the requirements in the field and the performance features of the fan is necessary.

- **EN 50155: 2007 Railway applications. Electronic equipment used on rolling stock** / rail technology fans by ebm-papst are compliant with EN 50155.

- **IEC 61373: 2010 Shock and vibration tests**

The fans are tested according to category 1B. The entire system must be tested separately.

- **EN 60721-3-5: 1998 Environmental conditions**

Climatic environmental conditions: 5K2

Chemically active substances: 5C1

Mechanically active substances: 5S1

Biological environmental conditions: 5B1

Contamination agents: 5F1

Mechanical environmental conditions: 5M1

Environmental conditions tested according to EN 50155

Section 12.2, table 2

- **EN 50121-3-2: 2006 Electromagnetic compatibility**

- **EN 50124-1: 2010 Insulation coordination**

Note on routine testing of customer units with 24 VDC fans:

Before insulation testing, all fan connections must be disconnected from the customer unit.

- **EN 15085-1/3: 2013 Welding of railway vehicles and components** / weld seam quality CPC3

- **EN 45545-2: 2013 Fire protection on railway vehicles**

The fans fulfil the requirements according to HL3. The fire protection requirements of the entire system must be assessed separately.

Our advantage lies in the perfect interaction.

Significantly increased passenger and cargo demands due to advancing globalisation require new solutions, particularly in rail traffic. Powerful and reliable vehicle concepts provide the basis for vehicles for transport solutions that are more efficient and, above all, more environmentally friendly.

An essential part of this effort is cooling both diesel-powered and electrically powered rail cars as well as providing maximum comfort for passenger transportation. Precisely in this area, ebm-papst has time and again set new standards with brushless fans.

Leading technologies, groundbreaking application solutions, innovative products – all of these would not be possible if we did not see the big picture:

Aerodynamic optimisation and therefore the perfect combination of motor technology, electronics and aerodynamics. Our three core competencies are in direct relationship to each other in our products. The objective is always to use air and motion as efficiently as possible, whether in the tightest spaces, in large dimensions or under extreme ambient conditions. We believe that this cohesive strategy is the only way to give our customers high quality and perfectly optimised end products. Whether they are high-performance driver's cab climate control systems and heating units, versatile passenger compartment systems or effective cooling of power electronics in locomotives.

In order to achieve an aerodynamically optimum shape for our fans, we design fan blades, impellers and ducted housings to match the relevant application environment. From seemingly small details, such as the blade-tip slip with winglets, result significant optimisations for noise reduction with even higher efficiencies. And when they are combined with intelligent electronics, the drive engineering and aero dynamics then operate as a system solution optimally matched to each other. The perfect combination thus arises: our lead in global competition.

If the conditions under application exceed the tested requirements, then please arrange a consultation with ebm-papst.

Table of contents

| | | | |
|--|----|--|----|
| ebm-papst: Your highly competent partner in rail engineering | 2 | Drive concepts ebm-papst ZEITLAUF | 42 |
| GreenTech: The Green Company | 4 | Electrical connections | 46 |
| Tractionised fans for railway applications 24 VDC | 6 | Technical parameters & scope | 52 |
| Tractionised fans for railway applications 110 VDC | 20 | ebm-papst representatives & subsidiaries | 56 |



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 groundwater 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.

This supports our position as Germany's most sustainable company 2013, as does the DEKRA Award 2012 we received in the category "Umwelt – Herausforderung Energiewende / Environment – Challenge: Transition to more sustainable energy systems", to name only a few of a large number of examples. The environmental advantage gained in the performance of the products developed from our GreenTech philosophy can also be measured in the fulfillment 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 ebm-papst. 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 ebm-papst 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.



GreenTech means
ecologically improving
every new product.



Tractionised fans for railway applications - 24 VDC




EC dual centrifugal fan

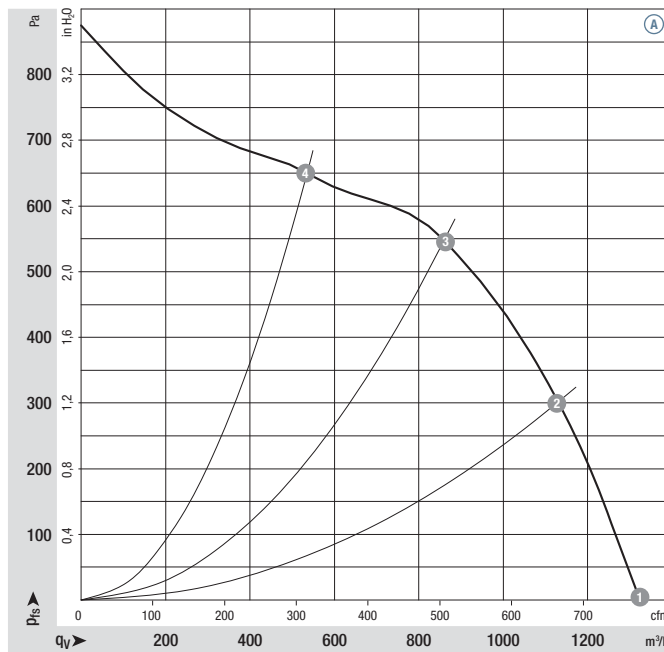
with housing, for railway applications, Ø 097



- **Material:** Housing and Impeller: plastic PA UL94 V0, black conforms to EN 45545-2 (HL3)
- **Type of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Mounting position:** Any
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings on both sides
- **Cable exit:** Lateral
- **Protection class:** III
- **Product conforming to standards:** See page 2
- **Approvals:** EAC, E1 is applied for
- **Technical features:** See electrical connections p. 46

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm | Input power | Input current | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|---------------------------------|------------|--|-----------------|--------------------------------------|----------|-----------|-------------|---------------|-------------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| K3G 097-AS81 -81 ⁽¹⁾ | M3G 084-BF |  26 | 16-32 | 1325 | 3900 | 435 | 16,6 | 84 | -40..+85 ⁽²⁾ | 2,0 | p. 46 | |
| subject to alterations | | (1) 24-volt variant | | (2) over + 70 °C with power derating | | | | | | | | |

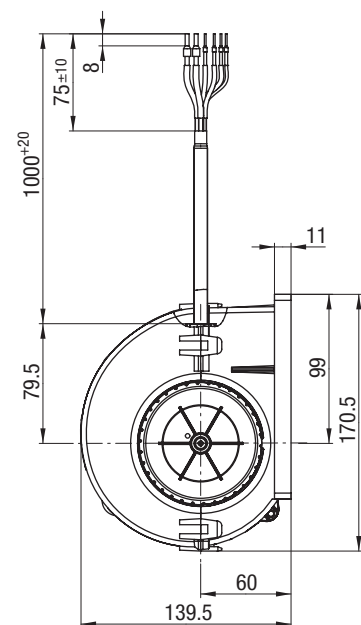
Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 3900 | 435 | 16,6 | 84 |
| Ⓐ ② | 4375 | 412 | 15,8 | 82 |
| Ⓐ ③ | 4620 | 324 | 12,5 | 80 |
| Ⓐ ④ | 4820 | 233 | 9,0 | 79 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst scroll housing without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

+ UB (black)
GND (brown)
PWM/LIN (yellow)
INVLIN (orange)
ABSENK (blue)
Diagnostic output (white)



EC dual centrifugal fan

with housing, for railway applications, Ø 097

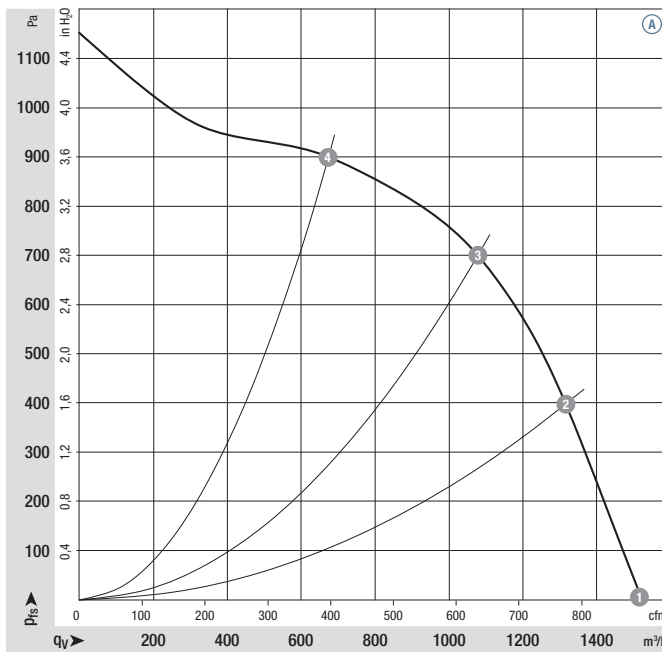


- **Material:** Housing and Impeller: plastic PA UL94 V0, black conforms to EN 45545-2 (HL3)
- **Type of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Mounting position:** Any
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings on both sides
- **Cable exit:** Lateral
- **Protection class:** III
- **Product conforming to standards:** See page 2
- **Approvals:** EAC, E1 is applied for
- **Technical features:** See electrical connections p. 50

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm | Input power | Input current | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|---------------------------------|------------|-------|-----------------|-----------------------|----------|-----------|-------------|---------------|-------------------|------------------|------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| K3G 097-AS82 -82 ⁽¹⁾ | M3G 084-BF | Ⓐ | 26 | 16-32 | 1525 | 4550 | 700 | 27,0 | 87 | -40...+60 | 2,0 | p. 50 |

subject to alterations (1) 24-volt variant

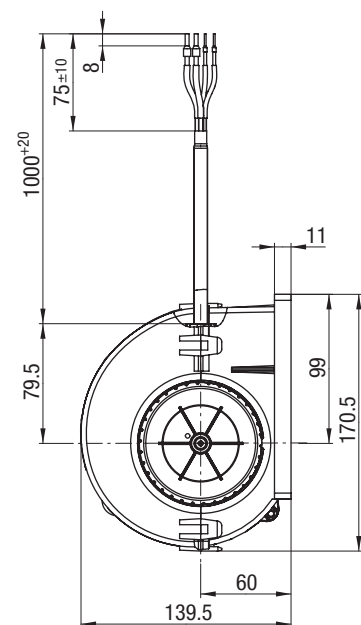
Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 4550 | 700 | 27,0 | 87 |
| Ⓐ ② | 5140 | 689 | 26,5 | 85 |
| Ⓐ ③ | 5430 | 582 | 22,4 | 84 |
| Ⓐ ④ | 5710 | 397 | 15,2 | 83 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst scroll housing without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

+ UB (black)
GND (brown)
PWM/LIN (yellow)
Diagnostic output (white)




EC axial fan

for railway applications, Ø 300



- **Material:** Housing and Impeller: plastic PA UL94 V0, black conforms to EN 45545-2 (HL3)
- **Direction of air flow:** "V" (sucking over rotor)
- **Type of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Mounting position:** Any
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings
- **Cable exit:** Lateral
- **Protection class:** III
- **Product conforming to standards:** See page 2
- **Approvals:** EAC, E1
- **Technical features:** See electrical connections p. 46

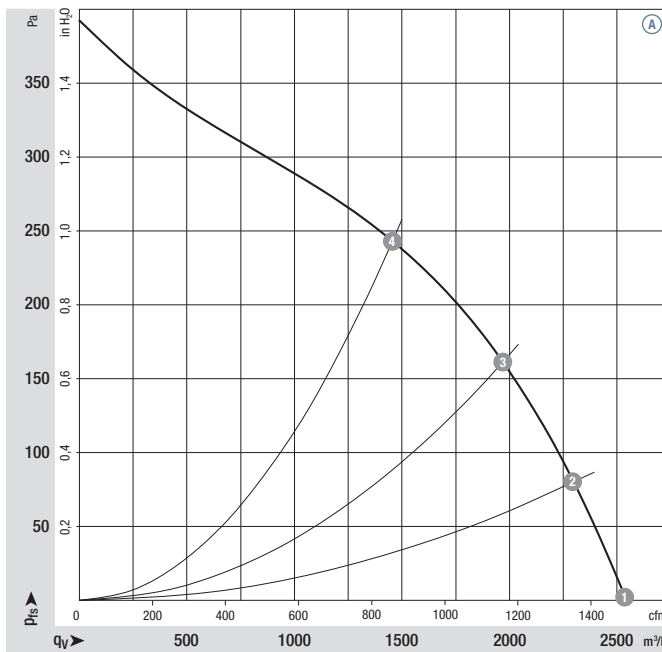
| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm | Input power | Input current | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|---------------------------------|------------|--|-----------------|-----------------------|----------|-----------|-------------|---------------|--------------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| W3G 300-BV24 -81 ⁽¹⁾ | M3G 084-BF |  26 | 16-32 | 2570 | 3160 | 205 | 7,90 | 82 | -40..+110 ⁽²⁾ | 2,0 | p. 46 | |

subject to alterations

(1) 24-volt variant

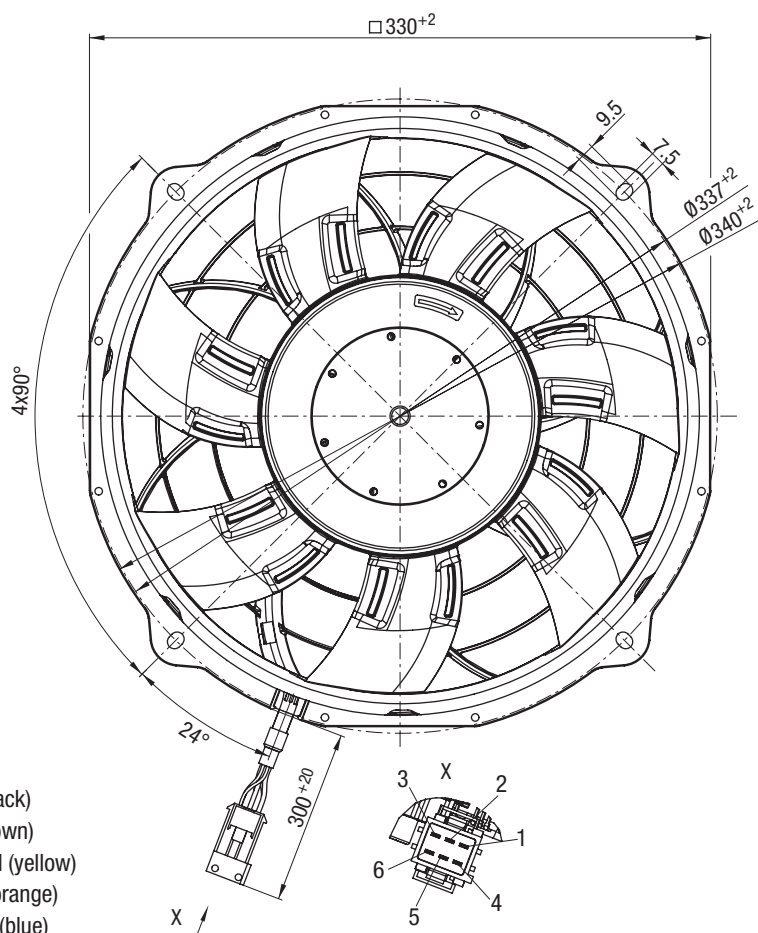
(2) over + 95 °C with power derating

Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 3160 | 205 | 7,90 | 82 |
| Ⓐ ② | 3155 | 216 | 8,32 | 82 |
| Ⓐ ③ | 3085 | 240 | 9,24 | 81 |
| Ⓐ ④ | 2965 | 244 | 9,36 | 80 |

Air performance measured as per: ISO 5801, Installation category A, without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

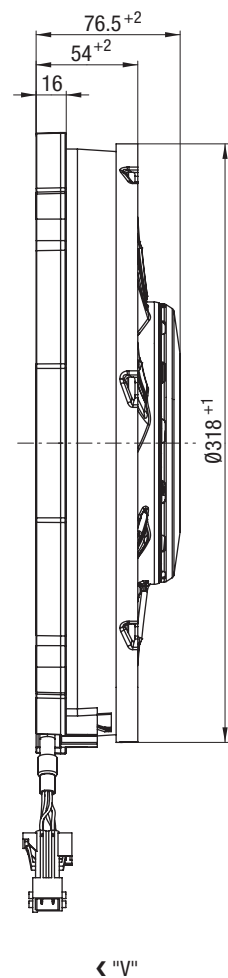


View X:

- 1 = + UB (black)
- 2 = GND (brown)
- 3 = PWM/LIN (yellow)
- 4 = INVLIN (orange)
- 5 = ABSENK (blue)
- 6 = Diagnostic output (white)

Lead connection with plug tyco Junior Power Timer 1-962349-1, 6-pole, coded.

Mating plug tyco 1-963212-1 not included in delivery.




◀ "V"

EC axial fan

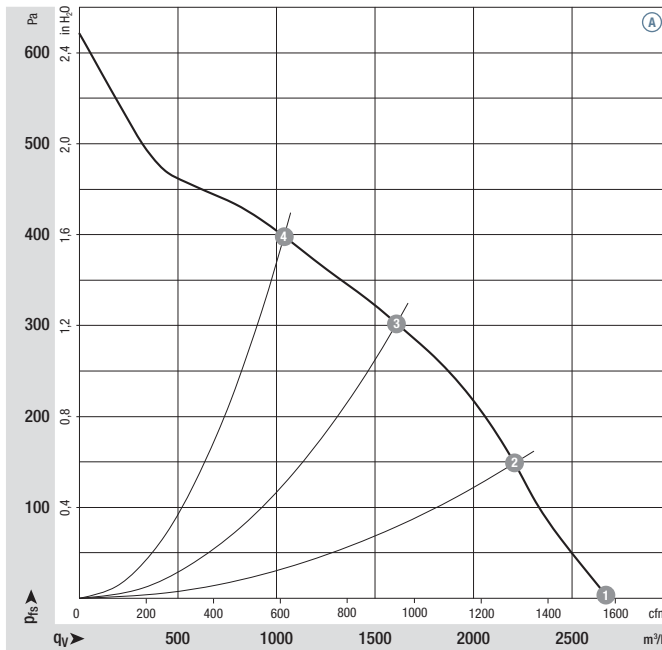
for railway applications, Ø 300



- **Material:** Housing and Impeller: plastic PA UL94 V0, black conforms to EN 45545-2 (HL3)
- **Direction of air flow:** "V" (sucking over rotor)
- **Type of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Mounting position:** Any
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings
- **Cable exit:** Lateral
- **Protection class:** III
- **Product conforming to standards:** See page 2
- **Approvals:** EAC, E1
- **Technical features:** See electrical connections p. 46

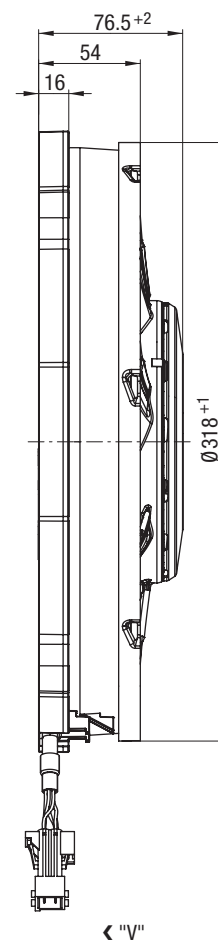
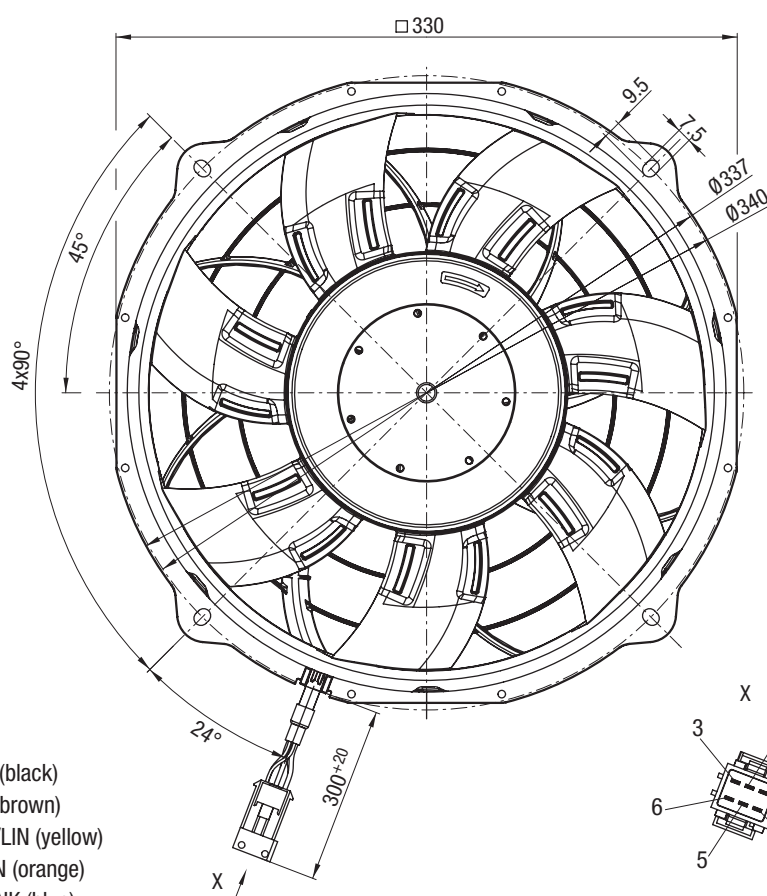
| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm | Input power | Input current | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|---------------------------------|------------|--|-----------------|--------------------------------------|----------|-----------|-------------|---------------|--------------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| W3G 300-BV25 -82 ⁽¹⁾ | M3G 084-BF |  26 | 16-32 | 2685 | 3350 | 230 | 9,00 | 83 | -40..+110 ⁽²⁾ | 2,0 | p. 46 | |
| subject to alterations | | (1) 24-volt variant | | (2) over + 85 °C with power derating | | | | | | | | |

Curves:



| | n rpm | P _{ed} W | I A | L _w A dB(A) |
|-----|----------|----------------------|--------|---------------------------|
| Ⓐ ① | 3350 | 230 | 9,0 | 83 |
| Ⓐ ② | 3350 | 277 | 10,7 | 84 |
| Ⓐ ③ | 3350 | 341 | 13,1 | 84 |
| Ⓐ ④ | 3350 | 379 | 14,6 | 87 |

Air performance measured as per: ISO 5801, Installation category A, without protection against accidental contact. Suction-side noise levels: L_{wA} as per ISO 13347, L_{pA} 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 52 ff.

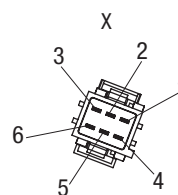


View X:

- 1 = + UB (black)
- 2 = GND (brown)
- 3 = PWM/LIN (yellow)
- 4 = INVLIN (orange)
- 5 = ABSENK (blue)
- 6 = Diagnostic output (white)

Lead connection with plug tyco Junior Power Timer 1-962349-1, 6-pole, coded.

Mating plug tyco 1-963212-1 not included in delivery.




EC axial fan

for railway applications, Ø 385



- **Material:** Housing and Impeller: plastic PA UL94 V0, black conforms to EN 45545-2 (HL3)
- **Direction of air flow:** "V" (sucking over rotor)
- **Type of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Mounting position:** Any
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings
- **Cable exit:** Lateral
- **Protection class:** III
- **Product conforming to standards:** See page 2
- **Approvals:** EAC, E1
- **Technical features:** See electrical connections p. 47

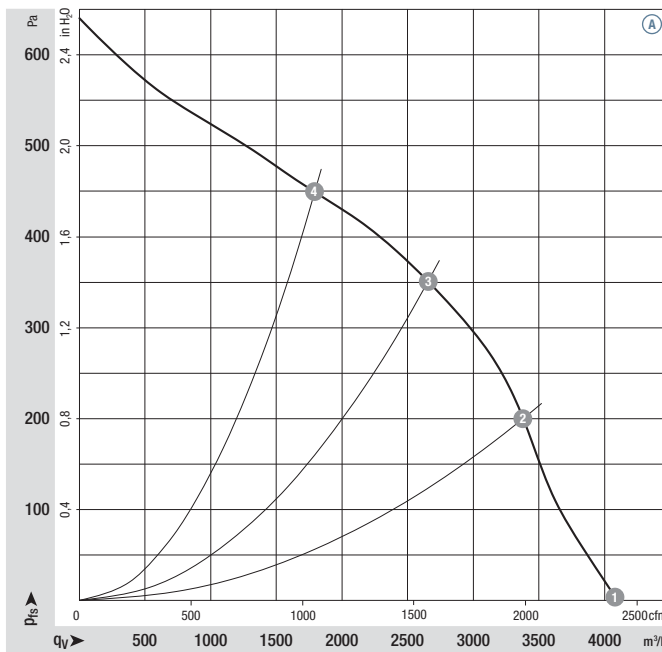
| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm | Input power | Input current | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|---------------------------------|------------|--|-----------------|-----------------------|----------|-----------|-------------|---------------|--------------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| W3G 385-CT65 -81 ⁽¹⁾ | M3G 084-CF |  26 | 16-32 | 4095 | 3140 | 450 | 17,7 | 88 | -40..+110 ⁽²⁾ | 3,1 | p. 47 | |

subject to alterations

(1) 24-volt variant

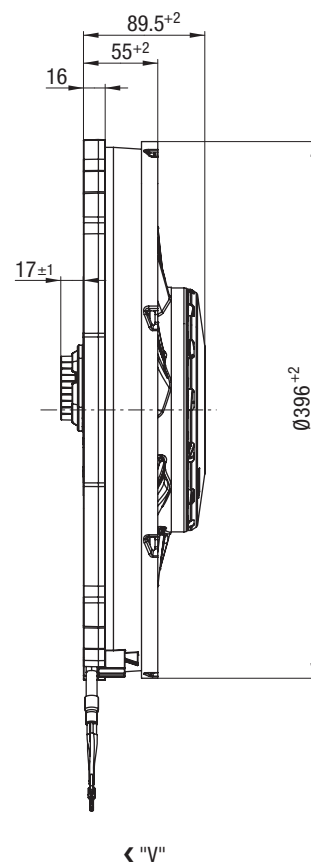
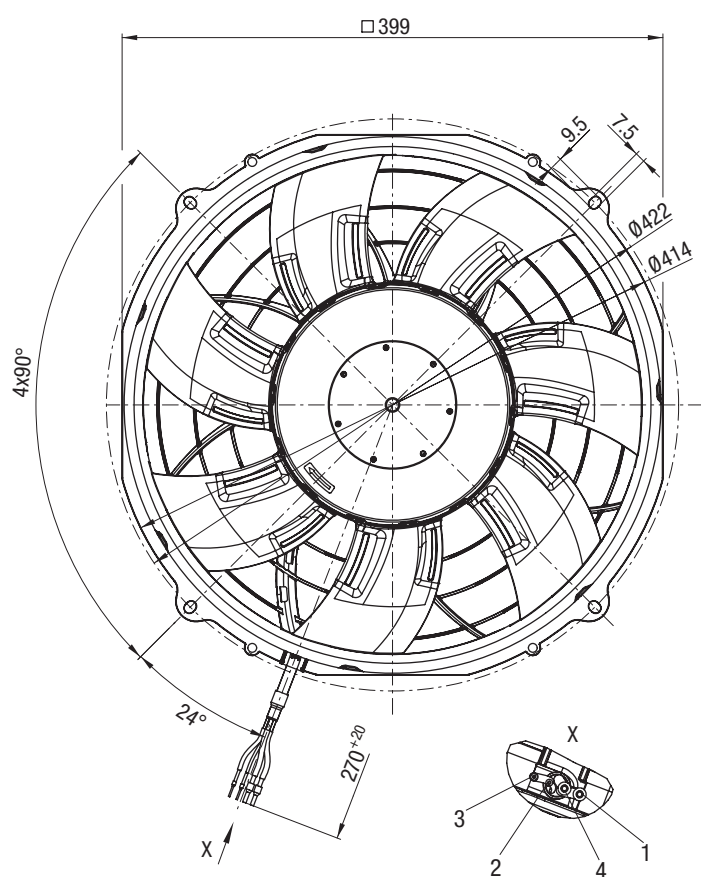
(2) over + 85 °C with power derating

Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 3140 | 450 | 17,7 | 88 |
| Ⓐ ② | 3125 | 562 | 22,6 | 88 |
| Ⓐ ③ | 3060 | 622 | 25,2 | 88 |
| Ⓐ ④ | 2960 | 649 | 26,3 | 89 |

Air performance measured as per: ISO 5801, Installation category A, without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.



Lead connection:


- 1 = + UB (black)
- 2 = Diagnostic output (white)
- 3 = PWM/LIN (yellow)
- 4 = GND (brown)

EC centrifugal fan – RadiCal

for railway applications, Ø 280



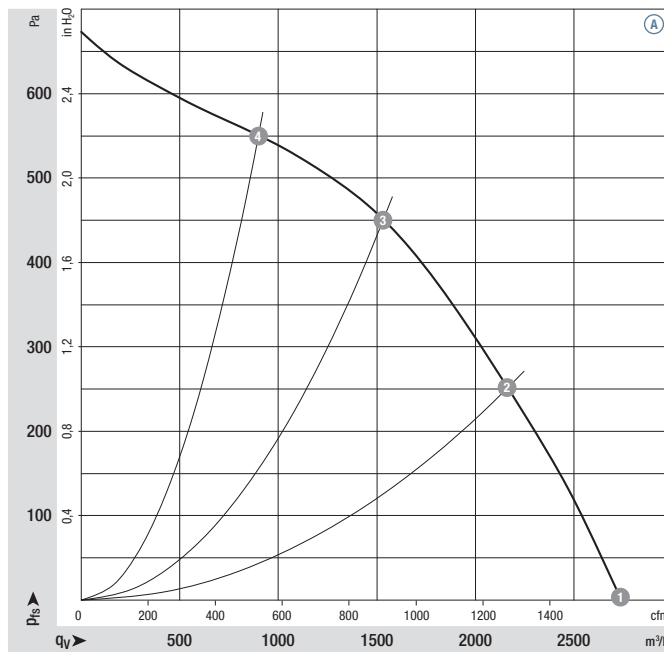
- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium, coated in black
- **Number of blades:** 5
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Mounting position:** Any
- **Condensate discharges:** Rotor side
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm | Input power | Input current | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|---------------------------------|------------|--|-----------------|-----------------------|----------|-----------|-------------|---------------|-------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| R3G 280-RU26 -81 ⁽¹⁾ | M3G 084-CF |  26 | 16-32 | 2740 | 2350 | 252 | 10,5 | 80 | -40..+60 | 3,0 | p. 46 | |

subject to alterations

(1) 24-volt variant

Curves:



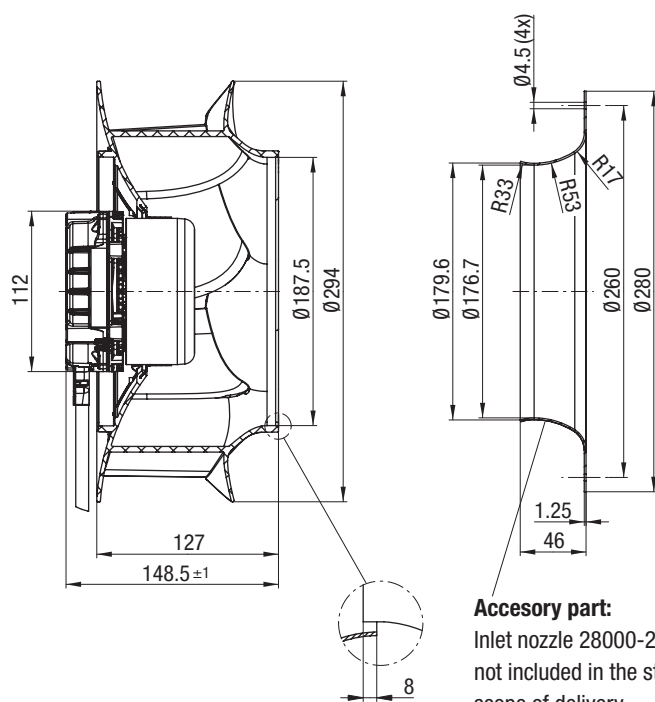
| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ 1 | 2350 | 252 | 10,5 | 80 |
| Ⓐ 2 | 2280 | 298 | 12,4 | 75 |
| Ⓐ 3 | 2265 | 309 | 12,9 | 73 |
| Ⓐ 4 | 2305 | 278 | 11,6 | 74 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

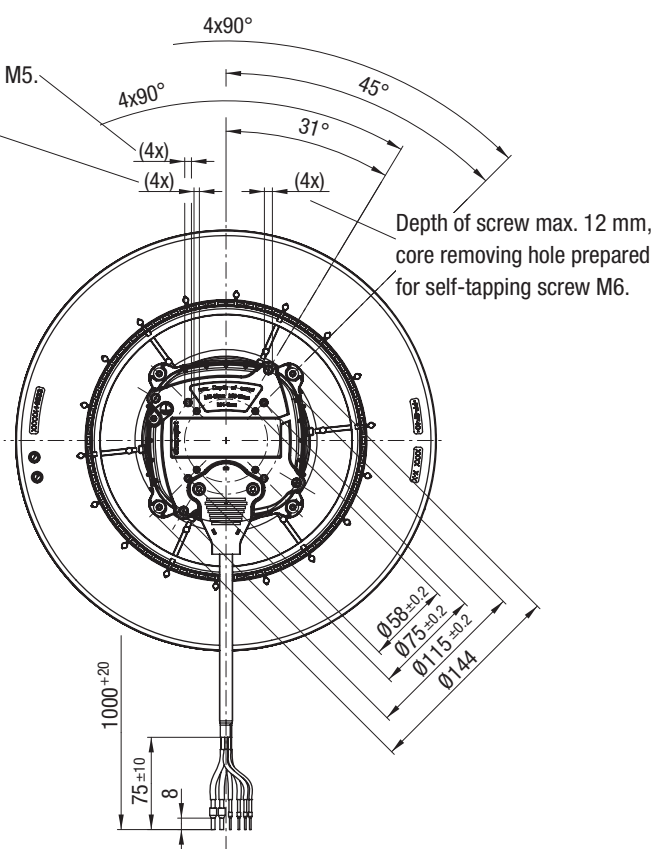
- **Cable exit:** Lateral
- **Protection class:** III
- **Product conforming:**
- **Approvals:** EAC, E1

Depth of screw max. 10 mm, core removing hole prepared for self-tapping screw M5.

Depth of screw max. 8 mm, core removing hole prepared for self-tapping screw M4.



Accessory part:
Inlet nozzle 28000-2-4013,
not included in the standard
scope of delivery.



Lead connection:
2x 2.5 mm², 4x 1.0 mm², 6x core-end sleeve crimped.



Tractionised fans for railway applications - 110 VDC




EC centrifugal fan – RadiCal

for railway applications, Ø 190



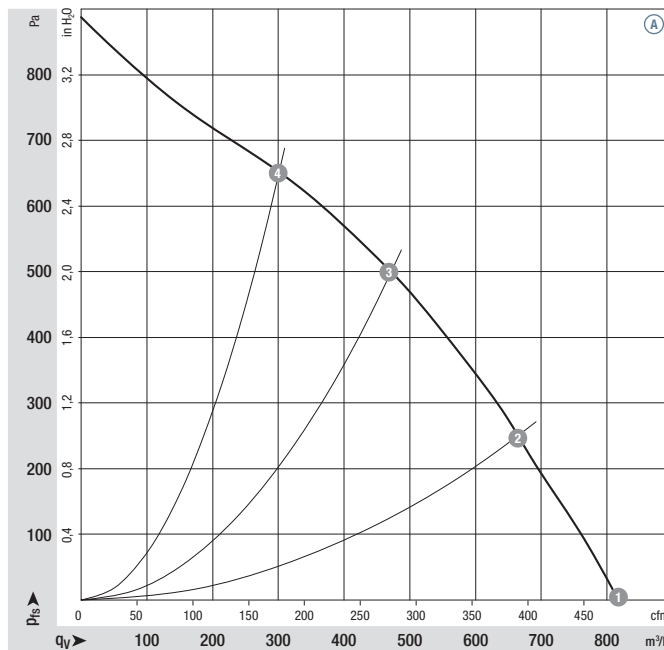
- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 44 according to EN 60529, depending on installation and position
- **Insulation class:** "B"
- **Mounting position:** Shaft horizontal or rotor on top, rotor on bottom on request
- **Condensate discharges:** None
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm ⁽¹⁾ | Max. Input power ⁽¹⁾ | Max. Input current ⁽¹⁾ | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|---------------------------------|------------|---|-----------------|-----------------------|----------|--------------------------|---------------------------------|-----------------------------------|-------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| R3G 190-RV65 -01 ⁽²⁾ | M3G 074-BF |  110 | 77-138 | 815 | 3950 | 155 | 1,40 | 77 | -40..+60 | 1,9 | p. 49 | |

subject to alterations

(1) Nominal data in operating point with maximum load and 110 VDC (2) Only able for inside applications

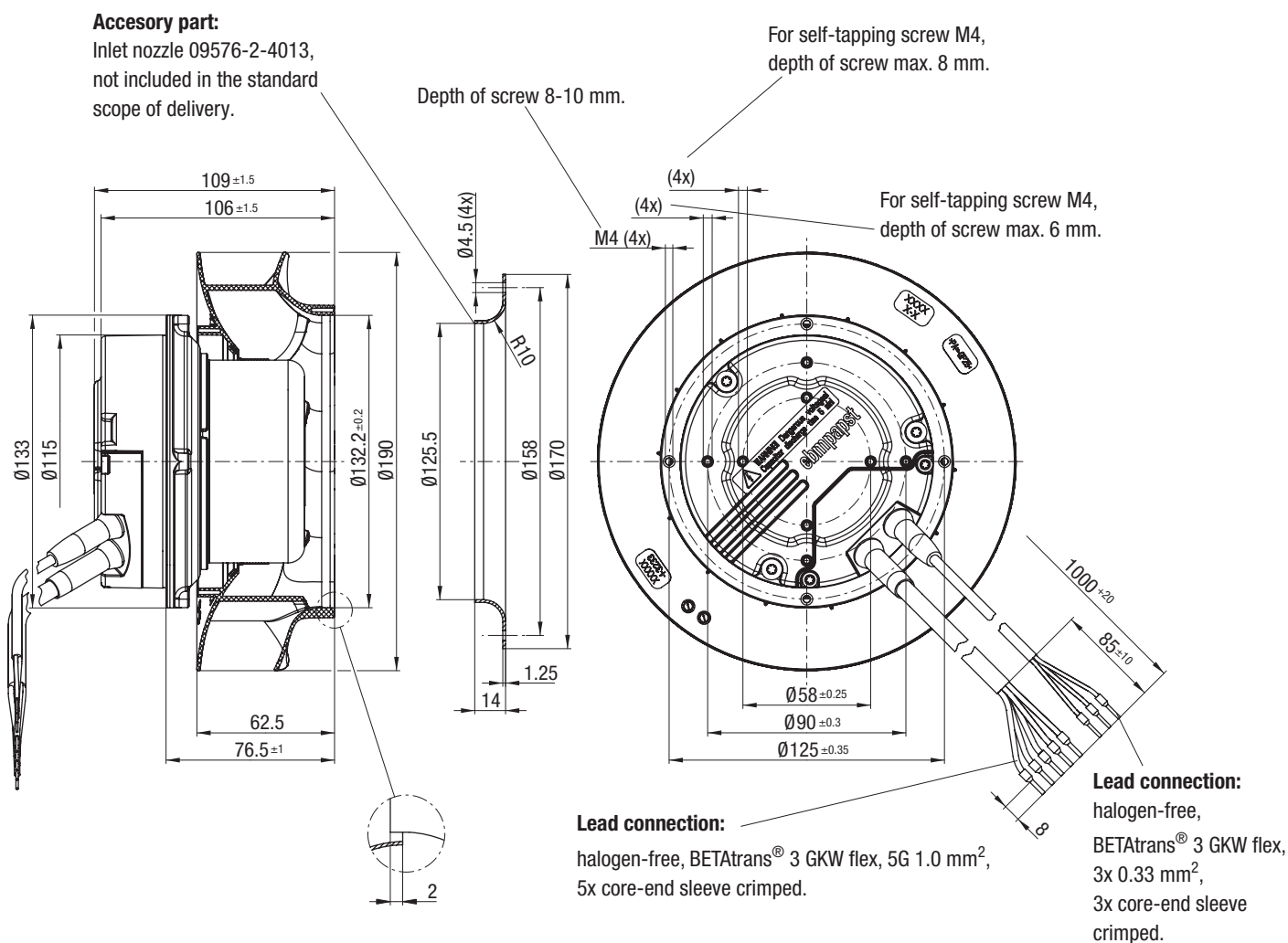
Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ 1 | 4130 | 131 | 1,19 | 77 |
| Ⓐ 2 | 4015 | 146 | 1,33 | 74 |
| Ⓐ 3 | 3950 | 155 | 1,40 | 73 |
| Ⓐ 4 | 4025 | 144 | 1,32 | 75 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

- **Technical features:** See electrical connections p. 49
- **Cable exit:** Variable
- **Protection class:** I (if customer has provided connection for protective earth)
- **Product conforming to standards:** See page 2
- **Approvals:** EAC




EC centrifugal fan – RadiCal

for railway applications, Ø 220



- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 44 according to EN 60529, depending on installation and position
- **Insulation class:** "B"
- **Mounting position:** Shaft horizontal or rotor on top, rotor on bottom on request
- **Condensate discharges:** None
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

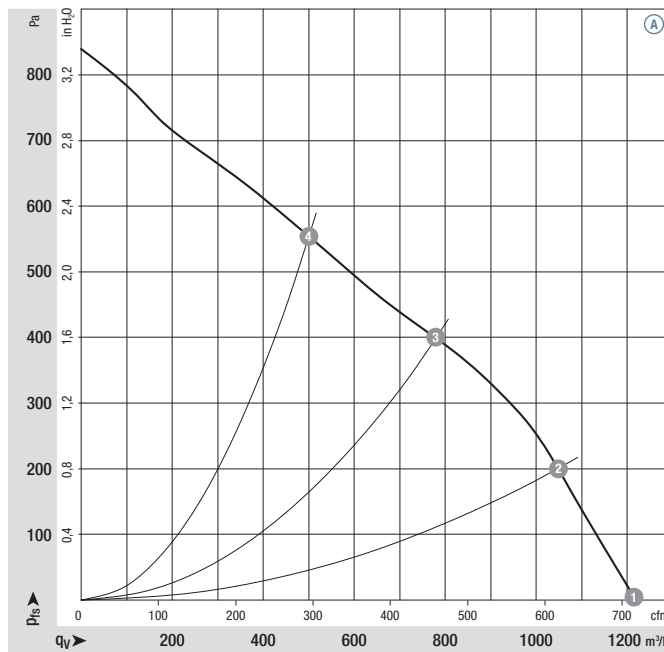
| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm ⁽¹⁾ | Max. Input power ⁽¹⁾ | Max. Input current ⁽¹⁾ | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|---------------------------------|------------|---|-----------------|-----------------------|----------|--------------------------|---------------------------------|-----------------------------------|-------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| R3G 220-RV83 -01 ⁽²⁾ | M3G 074-CF |  110 | 77-138 | 1220 | 3360 | 180 | 1,65 | 79 | -40..+60 | 2,2 | p. 49 | |

subject to alterations

(1) Nominal data in operating point with maximum load and 110 VDC

(2) Only able for inside applications

Curves:



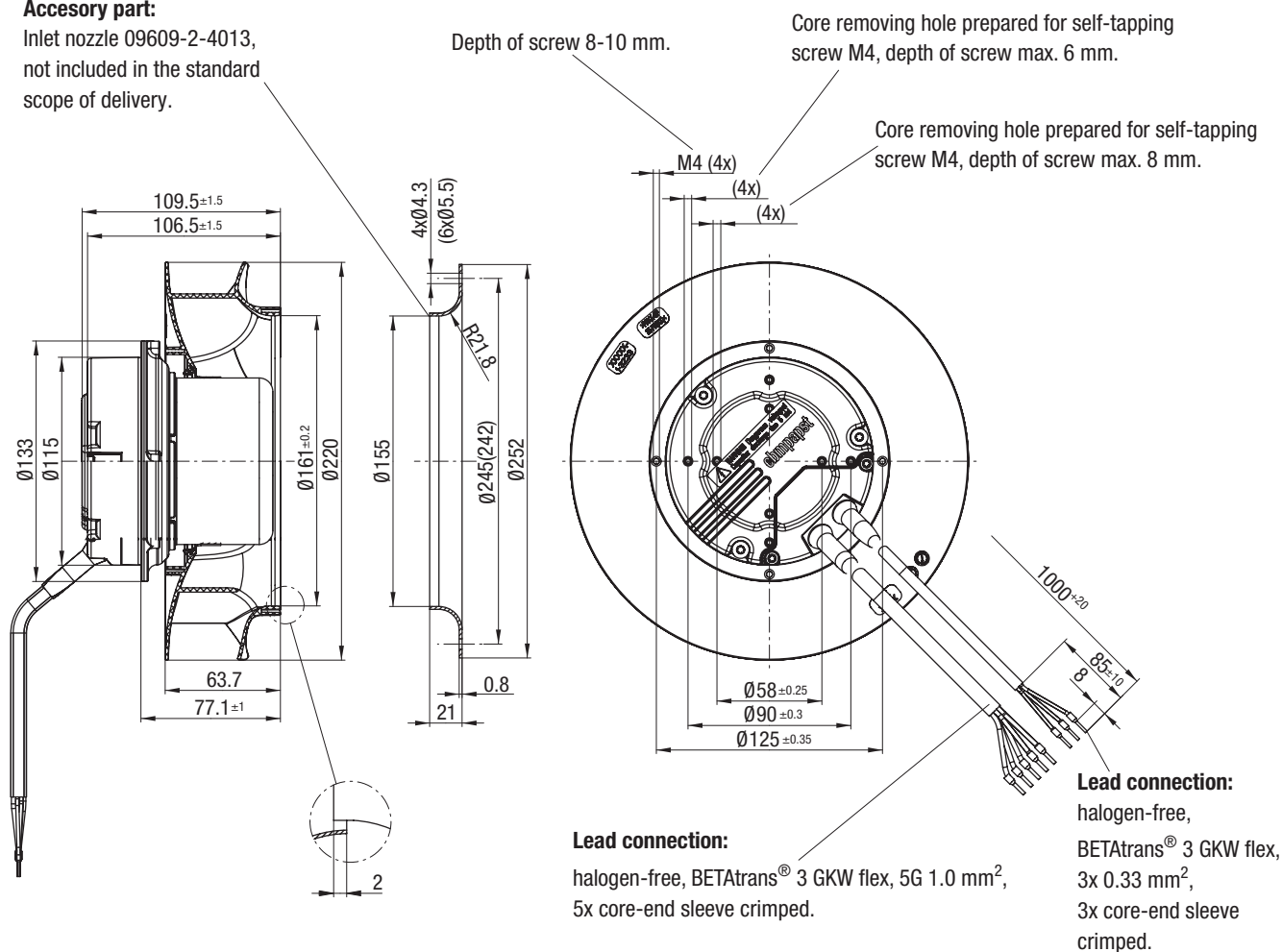
| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 3500 | 176 | 1,60 | 79 |
| Ⓐ ② | 3425 | 180 | 1,63 | 76 |
| Ⓐ ③ | 3360 | 180 | 1,65 | 73 |
| Ⓐ ④ | 3390 | 174 | 1,59 | 75 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

- **Technical features:** See electrical connections p. 49
- **Cable exit:** Variable
- **Protection class:** I (if customer has provided connection for protective earth)
- **Product conforming to standards:** See page 2
- **Approvals:** EAC

Accessory part:

Inlet nozzle 09609-2-4013,
not included in the standard
scope of delivery.




EC centrifugal fan – RadiCal

for railway applications, Ø 250



- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 44 according to EN 60529, depending on installation and position
- **Insulation class:** "B"
- **Mounting position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensate discharges:** Rotor-side
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

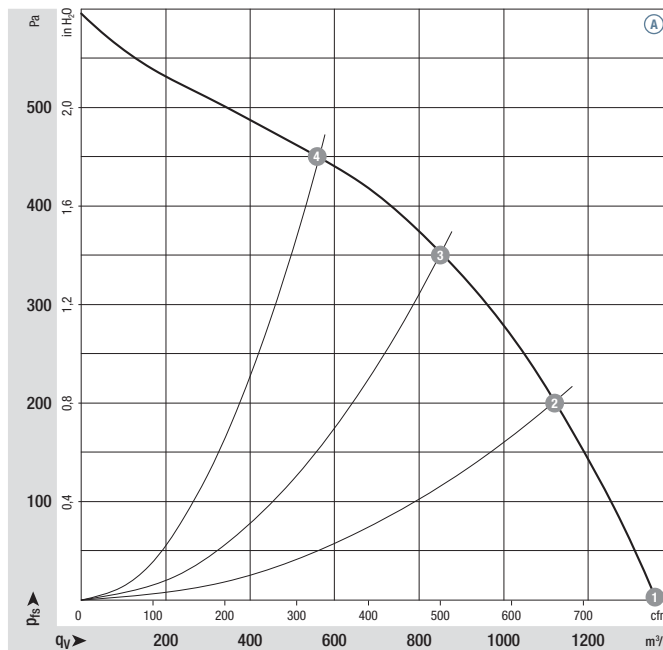
| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm ⁽¹⁾ | Max. Input power ⁽¹⁾ | Max. Input current ⁽¹⁾ | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|---------------------------------|------------|---|-----------------|-----------------------|----------|--------------------------|---------------------------------|-----------------------------------|-------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| R3G 250-RV83 -01 ⁽²⁾ | M3G 074-CF |  110 | 77-138 | 1360 | 2485 | 160 | 1,50 | 74 | -40..+60 | 2,3 | p. 49 | |

subject to alterations

(1) Nominal data in operating point with maximum load and 110 VDC

(2) Only able for inside applications

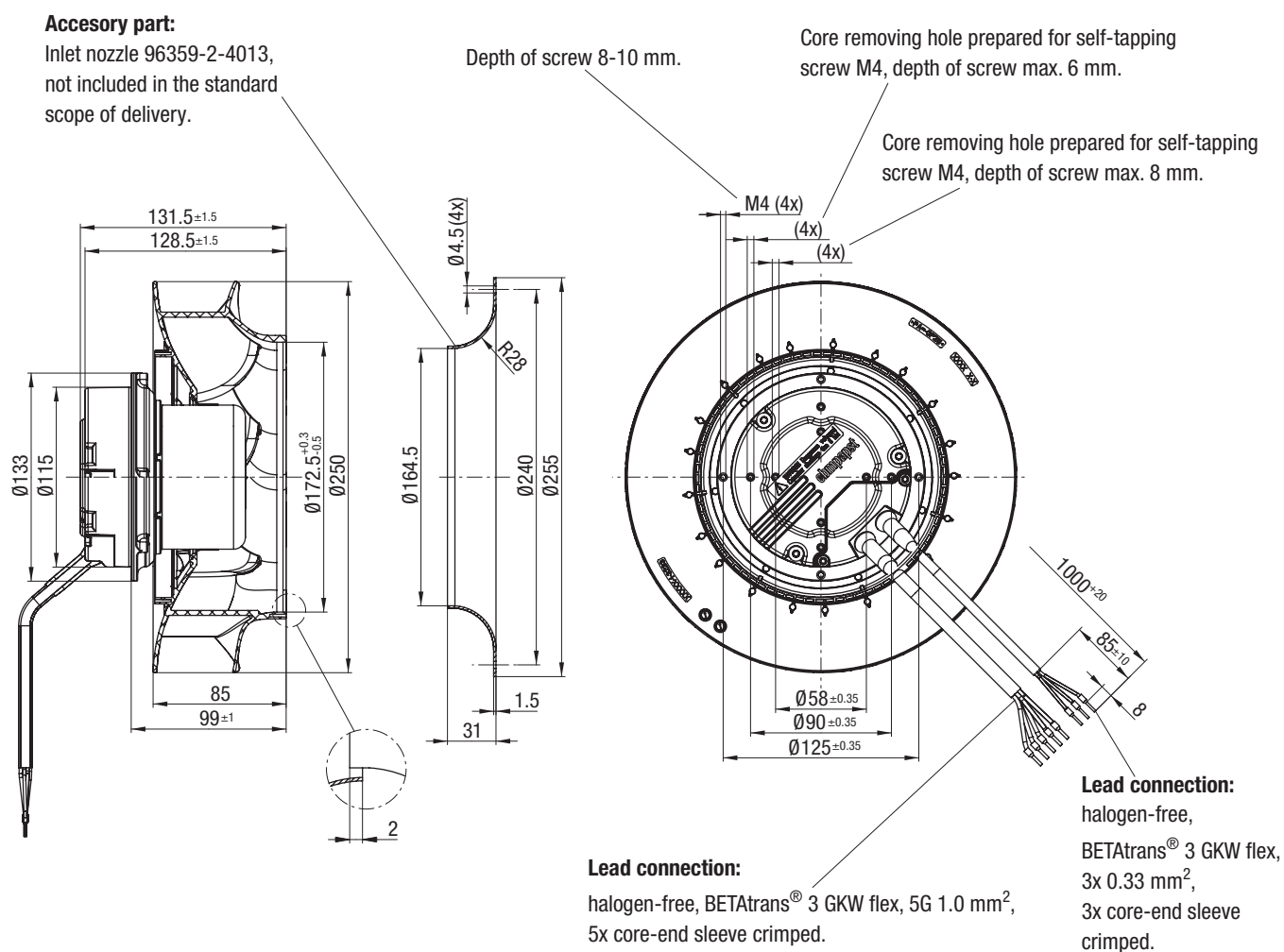
Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 2525 | 131 | 1,19 | 74 |
| Ⓐ ② | 2490 | 155 | 1,41 | 70 |
| Ⓐ ③ | 2485 | 160 | 1,50 | 66 |
| Ⓐ ④ | 2505 | 152 | 1,38 | 73 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

- **Technical features:** See electrical connections p. 49
- **Cable exit:** Variable
- **Protection class:** I (if customer has provided connection for protective earth)
- **Product conforming to standards:** See page 2
- **Approvals:** EAC



EC centrifugal fan – RadiCal

for railway applications, Ø 250



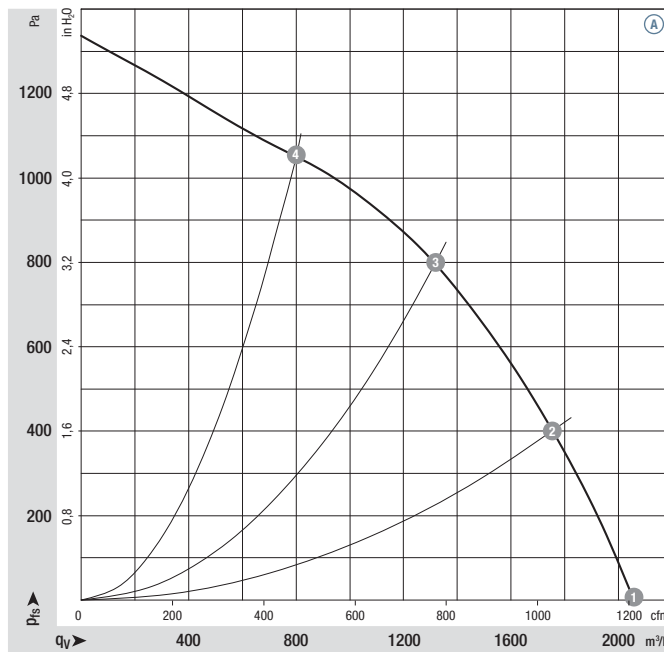
- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 54 according to EN 60529
- **Insulation class:** "B"
- **Mounting position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensate discharges:** Rotor-side
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm ⁽¹⁾ | Max. Input power ⁽¹⁾ | Max. Input current ⁽¹⁾ | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|------------------|------------|-------|-----------------|-----------------------|----------|--------------------------|---------------------------------|-----------------------------------|-------------------|------------------|------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| R3G 250-RR09 -P1 | M3G 084-DF | Ⓐ | 110 | 77-138 | 2060 | 3800 | 515 | 4,70 | 87 | -40...+60 | 4,1 | p. 48 |

subject to alterations

(1) Nominal data in operating point with maximum load and 110 VDC

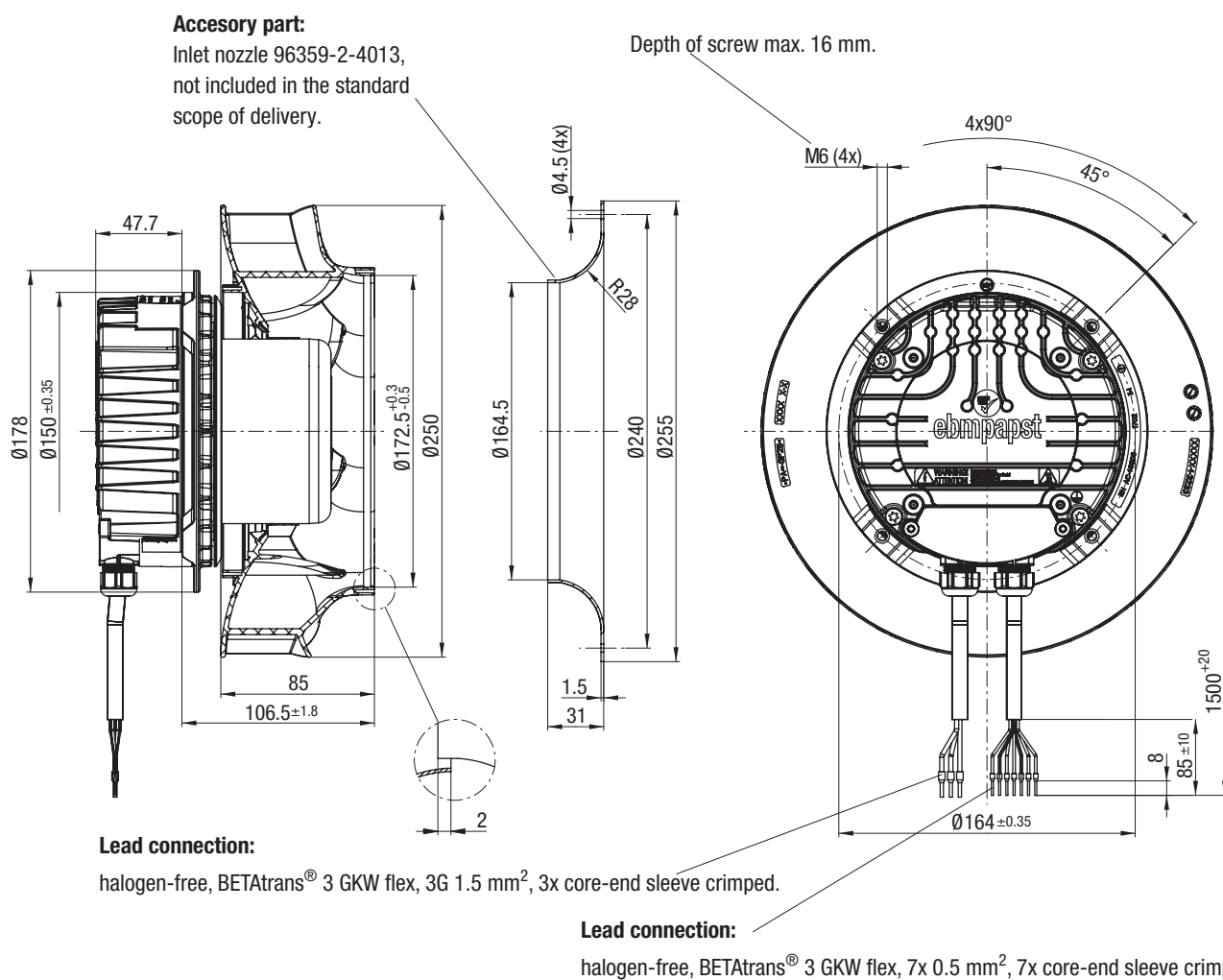
Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 3870 | 420 | 3,81 | 87 |
| Ⓐ ② | 3810 | 452 | 4,12 | 82 |
| Ⓐ ③ | 3800 | 515 | 4,70 | 78 |
| Ⓐ ④ | 3820 | 472 | 4,29 | 83 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

- **Technical features:** See electrical connections p. 48
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Product conforming to standards:** See page 2
- **Approvals:** EAC



EC centrifugal fan – RadiCal

for railway applications, Ø 280



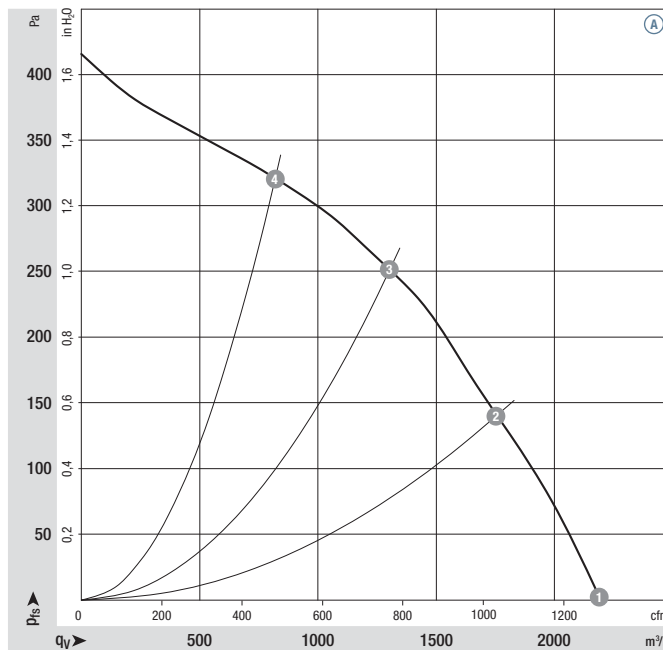
- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 44 according to EN 60529, depending on installation and position
- **Insulation class:** "B"
- **Mounting position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensate discharges:** Rotor-side
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm ⁽¹⁾ | Max. Input power ⁽¹⁾ | Max. Input current ⁽¹⁾ | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|---------------------------------|------------|-------|-----------------|-----------------------|----------|--------------------------|---------------------------------|-----------------------------------|-------------------|------------------|------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| R3G 280-RV70 -01 ⁽²⁾ | M3G 074-CF | Ⓐ | 110 | 77-138 | 2195 | 1750 | 155 | 1,40 | 72 | -40..+50 | 2,8 | p. 49 |

subject to alterations

(1) Nominal data in operating point with maximum load and 110 VDC (2) Only able for inside applications

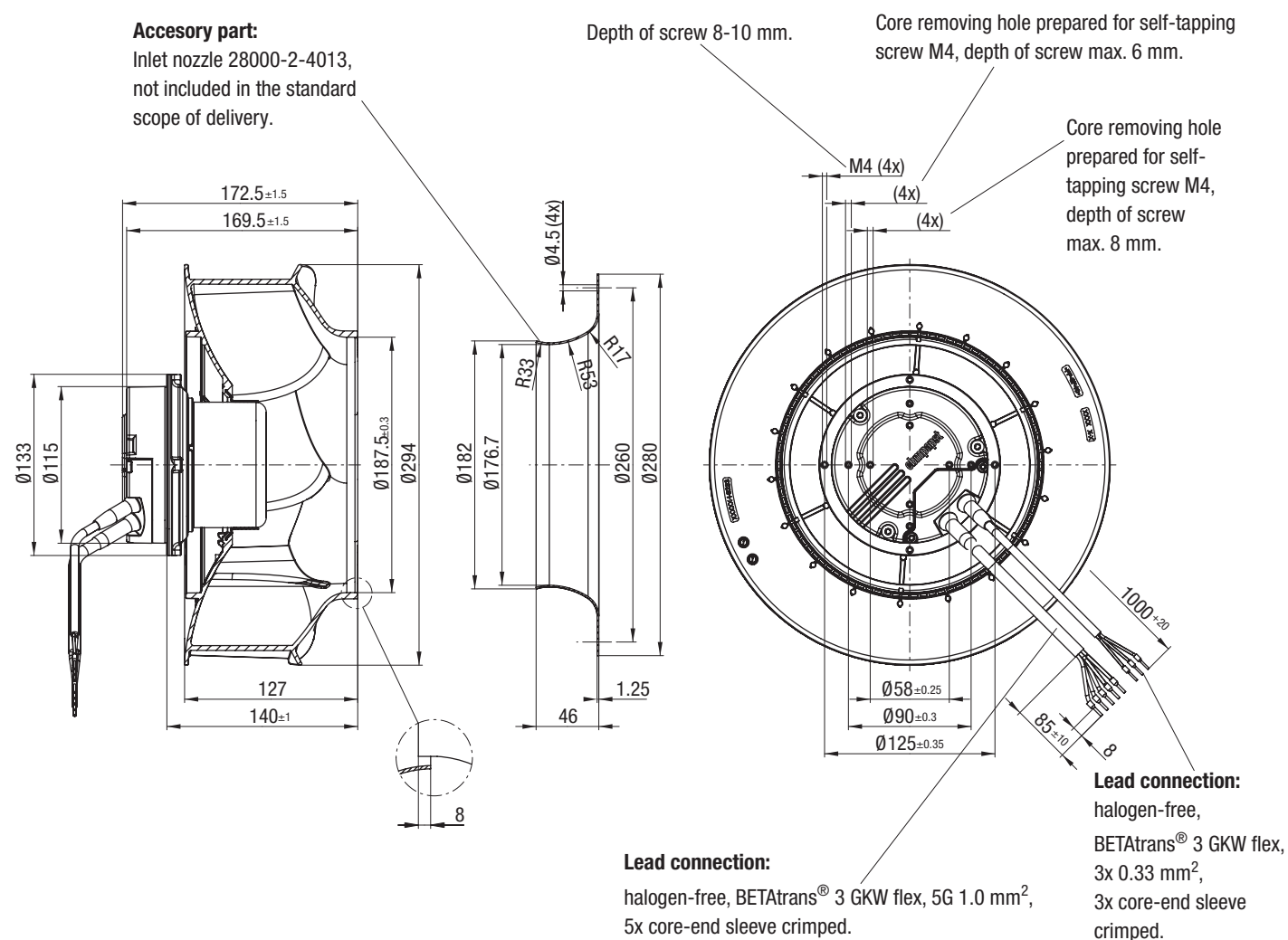
Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 1820 | 120 | 1,09 | 72 |
| Ⓐ ② | 1785 | 146 | 1,33 | 66 |
| Ⓐ ③ | 1750 | 155 | 1,40 | 63 |
| Ⓐ ④ | 1780 | 145 | 1,32 | 64 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

- **Technical features:** See electrical connections p. 49
- **Cable exit:** Variable
- **Protection class:** I (if customer has provided connection for protective earth)
- **Product conforming to standards:** See page 2
- **Approvals:** EAC




EC centrifugal fan – RadiCal

for railway applications, Ø 280



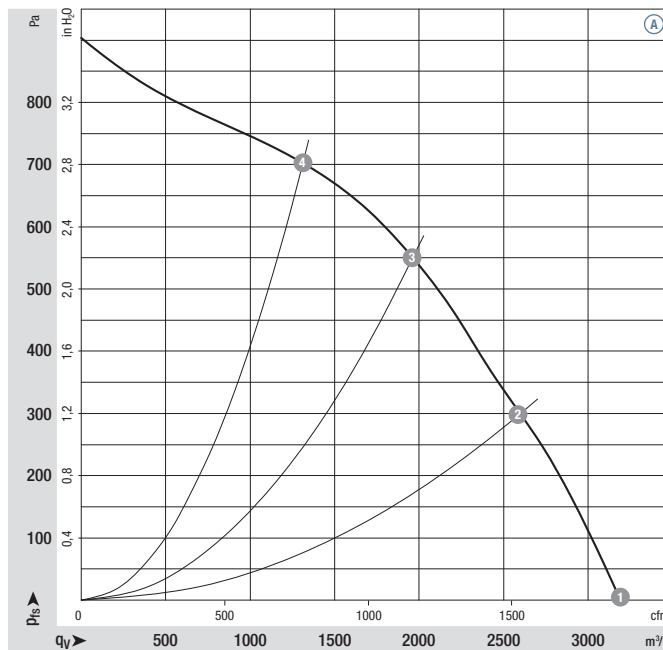
- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 54 according to EN 60529
- **Insulation class:** "B"
- **Mounting position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensate discharges:** Rotor-side
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm ⁽¹⁾ | Max. Input power ⁽¹⁾ | Max. Input current ⁽¹⁾ | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|------------------|------------|---|-----------------|-----------------------|----------|--------------------------|---------------------------------|-----------------------------------|-------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| R3G 280-RR10 -P1 | M3G 084-DF |  110 | 77-138 | 3190 | 2600 | 475 | 4,30 | 83 | -40..+60 | 4,2 | p. 48 | |

subject to alterations

(1) Nominal data in operating point with maximum load and 110 VDC

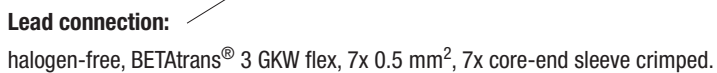
Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 2670 | 377 | 3,42 | 83 |
| Ⓐ ② | 2625 | 442 | 4,00 | 77 |
| Ⓐ ③ | 2600 | 475 | 4,30 | 73 |
| Ⓐ ④ | 2630 | 443 | 4,02 | 75 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

- ebm papst




EC centrifugal fan – RadiCal

for railway applications, Ø 310



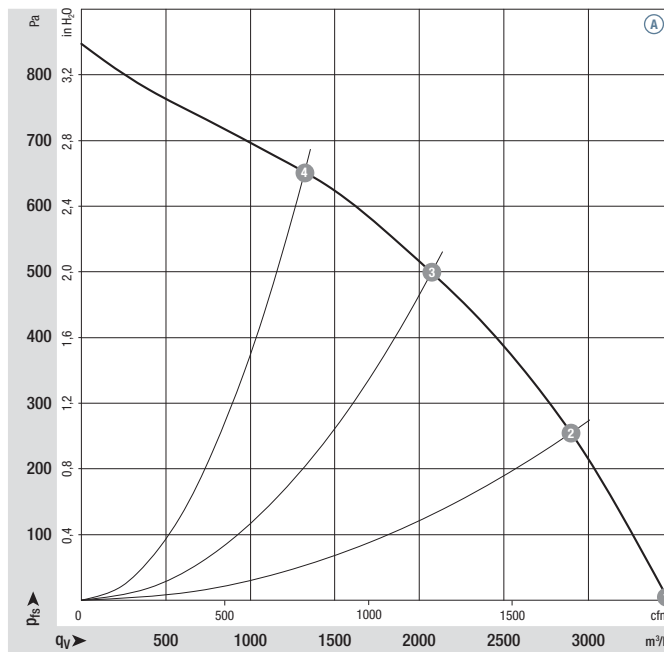
- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 54 according to EN 60529
- **Insulation class:** "B"
- **Mounting position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensate discharges:** Rotor-side
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm ⁽¹⁾ | Max. Input power ⁽¹⁾ | Max. Input current ⁽¹⁾ | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|------------------|------------|---|-----------------|-----------------------|----------|--------------------------|---------------------------------|-----------------------------------|-------------------|------------------|------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| R3G 310-RR12 -P1 | M3G 084-DF |  | 110 | 77-138 | 3475 | 2260 | 465 | 4,20 | 80 | -40...+60 | 4,6 | p. 48 |

subject to alterations

(1) Nominal data in operating point with maximum load and 110 VDC

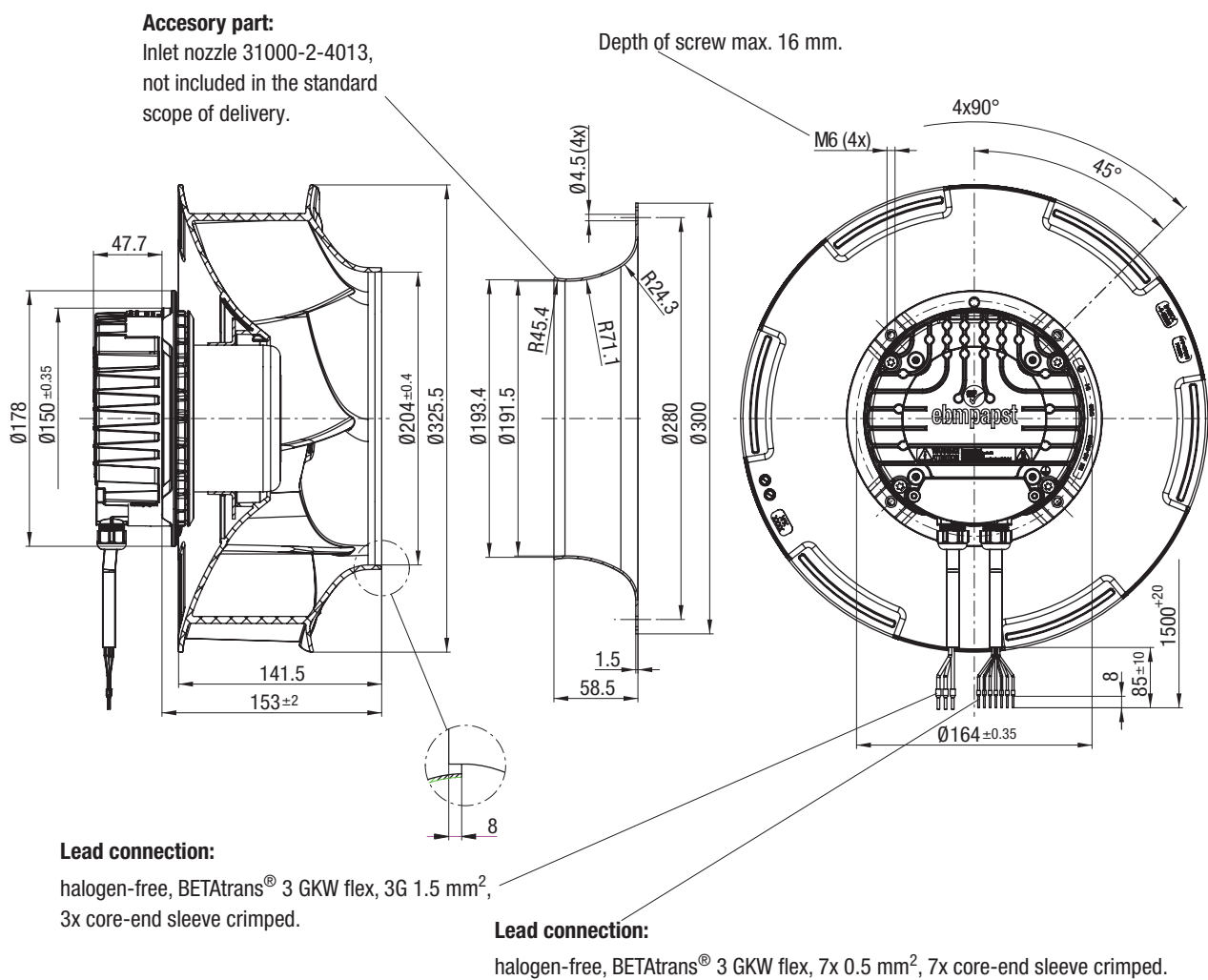
Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ 1 | 2355 | 356 | 3,24 | 80 |
| Ⓐ 2 | 2290 | 436 | 3,96 | 75 |
| Ⓐ 3 | 2260 | 465 | 4,20 | 68 |
| Ⓐ 4 | 2300 | 441 | 4,00 | 72 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

- **Technical features:** See electrical connections p. 48
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Product conforming to standards:** See page 2
- **Approvals:** EAC




EC centrifugal fan – RadiCal

for railway applications, Ø 355



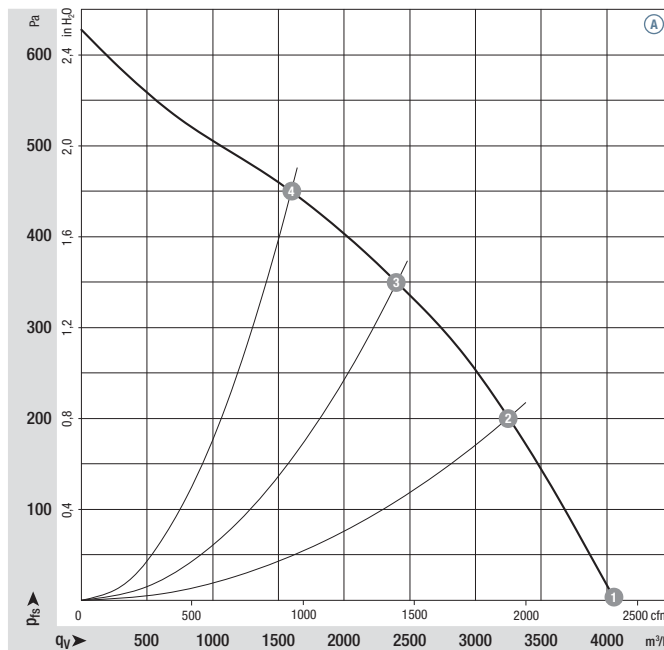
- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Type of protection:** IP 54 according to EN 60529
- **Insulation class:** "B"
- **Mounting position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensate discharges:** Rotor-side
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm ⁽¹⁾ | Max. Input power ⁽¹⁾ | Max. Input current ⁽¹⁾ | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|------------------|------------|---|-----------------|-----------------------|----------|--------------------------|---------------------------------|-----------------------------------|-------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| R3G 355-RR13 -P1 | M3G 084-DF |  110 | 77-138 | 4065 | 1660 | 380 | 3,40 | 78 | -40..+60 | 5,2 | p. 48 | |

subject to alterations

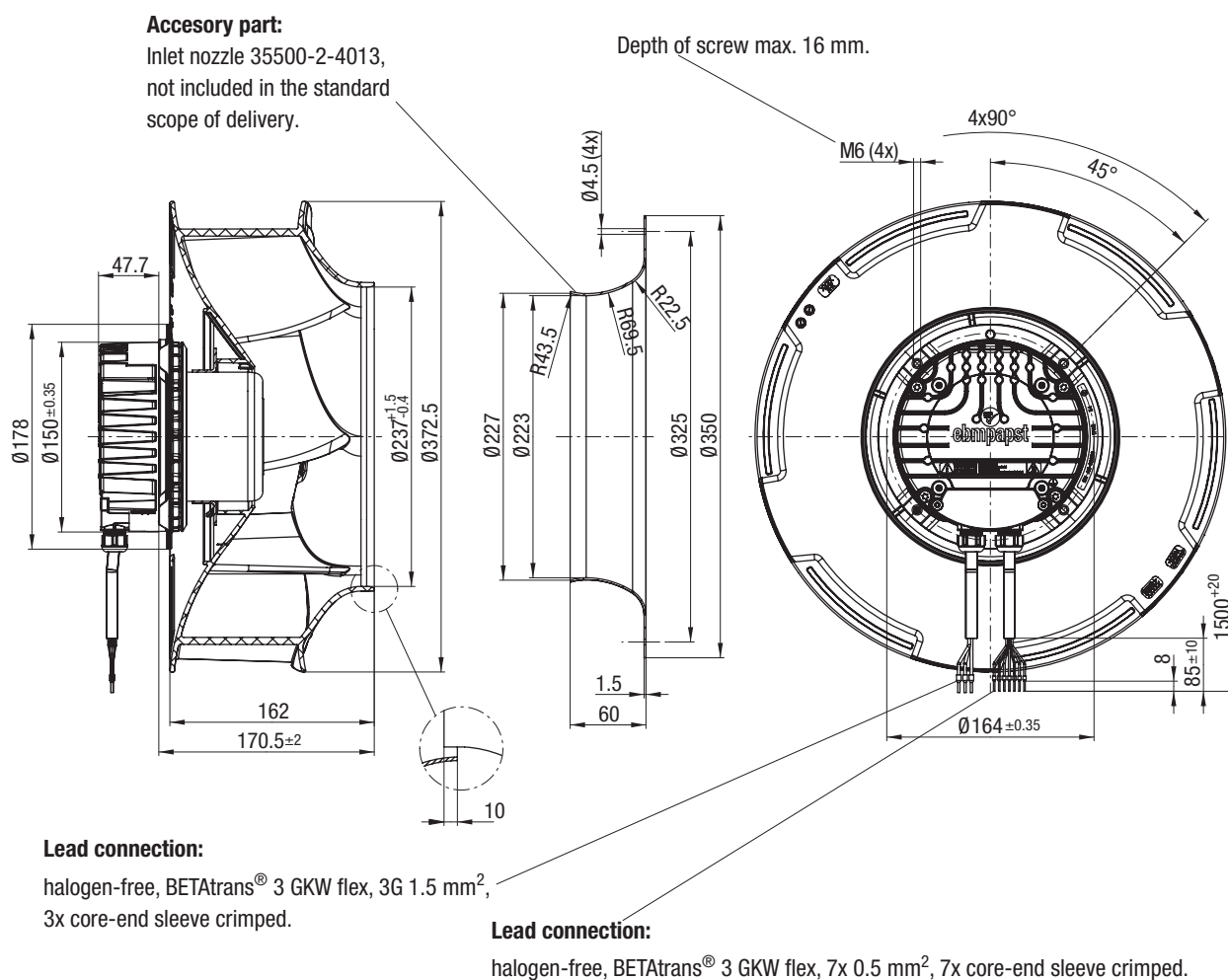
(1) Nominal data in operating point with maximum load and 110 VDC

Curves:



Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

- **Technical features:** See electrical connections p. 48
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Product conforming to standards:** See page 2
- **Approvals:** EAC




EC axial fan

for railway applications, Ø 400



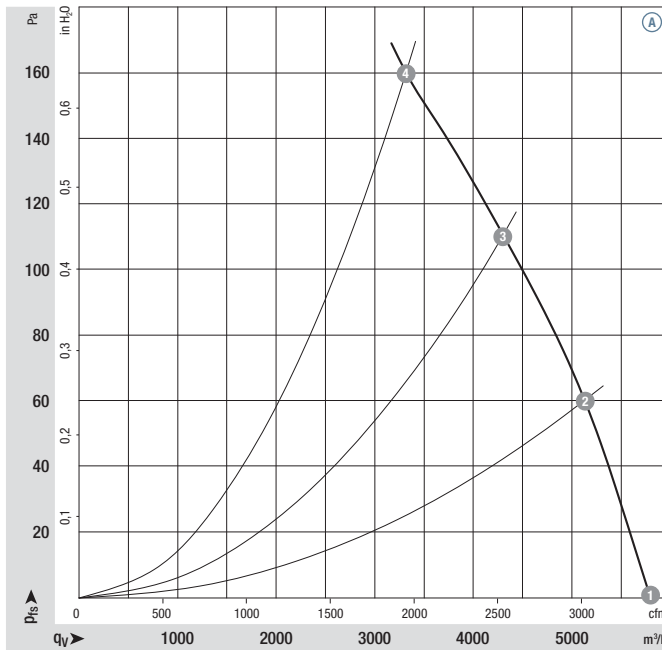
- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium, coated in black
- **Number of blades:** 5
- **Direction of rotation:** Counter-clockwise, seen on rotor
- **Type of protection:** IP 54 according to EN 60529
- **Insulation class:** "B"
- **Mounting position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensate discharges:** Rotor-side
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm ⁽¹⁾ | Max. Input power ⁽¹⁾ | Max. Input current ⁽¹⁾ | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|------------------|------------|---|-----------------|-----------------------|----------|--------------------------|---------------------------------|-----------------------------------|-------------------|------------------|------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| A3G 400-BK13 -P1 | M3G 084-DF |  | 110 | 77-138 | 5795 | 1650 | 425 | 3,90 | 78 | -40..+60 | 4,7 | p. 48 |

subject to alterations

(1) Nominal data in operating point with maximum load and 110 VDC

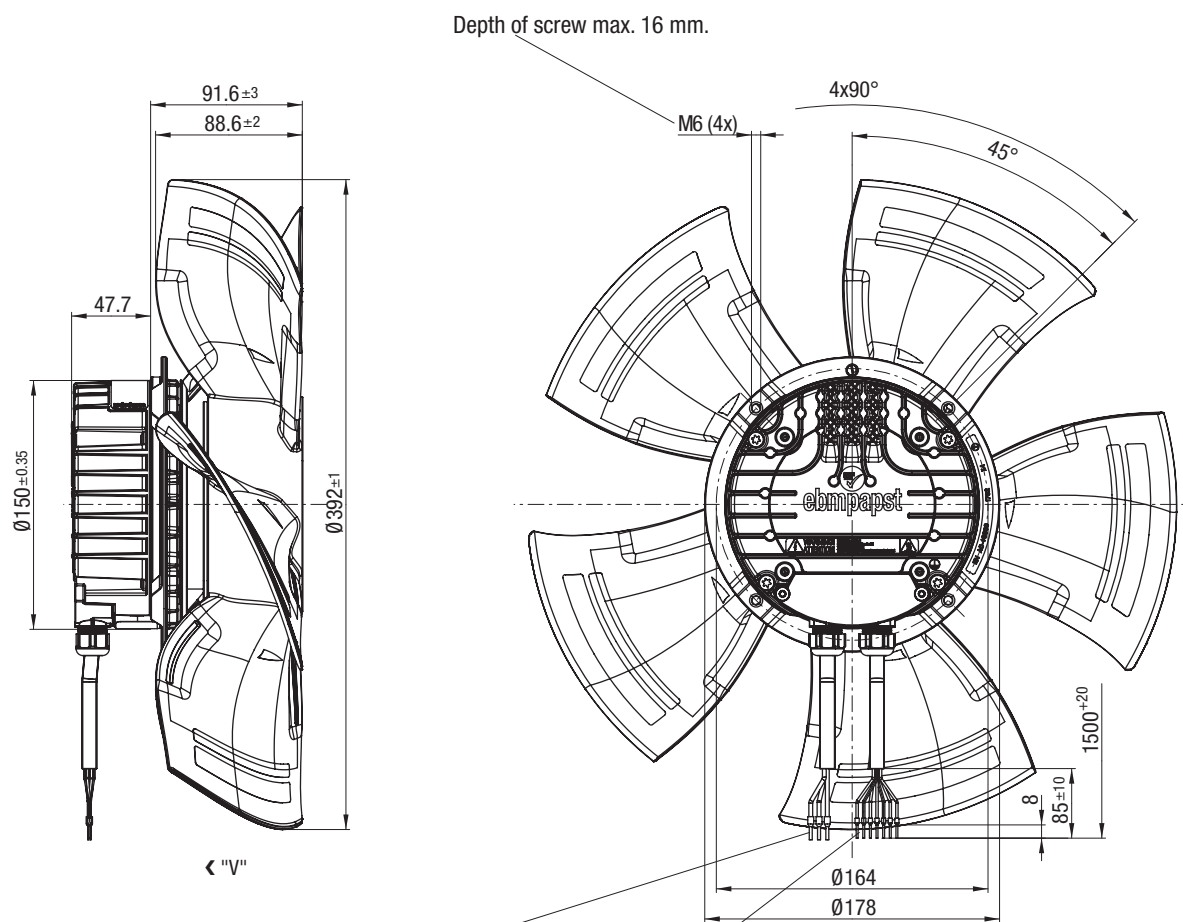
Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 1690 | 379 | 3,43 | 78 |
| Ⓐ ② | 1670 | 402 | 3,64 | 76 |
| Ⓐ ③ | 1655 | 414 | 3,75 | 73 |
| Ⓐ ④ | 1650 | 425 | 3,90 | 80 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst full nozzle without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

- **Technical features:** See electrical connections p. 48
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Product conforming to standards:** See page 2
- **Approvals:** EAC



Lead connection:

halogen-free, BETAtans® 3 GKW flex, 3G 1.5 mm²,
3x core-end sleeve crimped.

Lead connection:


halogen-free, BETAtans® 3 GKW flex, 7x 0.5 mm², 7x core-end sleeve crimped.

EC axial fan

for railway applications, Ø 450



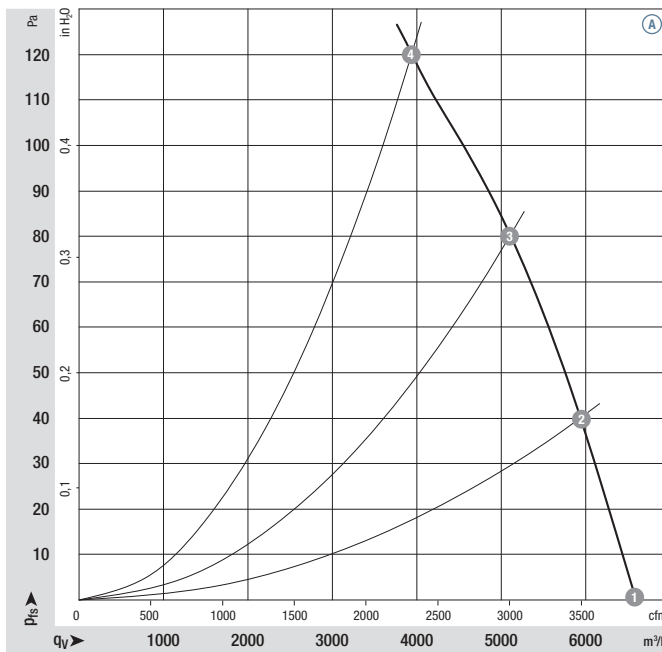
- **Material:** Impeller: plastic PA UL94 V0, black, conforms to EN 45545-2 (HL3)
Rotor: coated in black
Electronics housing: Die-cast aluminium, coated in black
- **Number of blades:** 5
- **Direction of rotation:** Counter-clockwise, seen on rotor
- **Type of protection:** IP 54 according to EN 60529
- **Insulation class:** "B"
- **Mounting position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensate discharges:** Rotor-side
- **Mode of operation:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

| Nominal data | | Curve | Nominal voltage | Nominal voltage range | Air flow | Speed/rpm ⁽¹⁾ | Max. Input power ⁽¹⁾ | Max. Input current ⁽¹⁾ | Sound power level | Perm. amb. temp. | Mass | Technical features and electrical connection |
|------------------|------------|---|-----------------|-----------------------|----------|--------------------------|---------------------------------|-----------------------------------|-------------------|------------------|-------|--|
| Type | Motor | VDC | VDC | m³/h | rpm | W | A | dB(A) | °C | kg | | |
| A3G 450-BK14 -P1 | M3G 084-DF |  110 | 77-138 | 6595 | 1300 | 340 | 3,10 | 71 | -40..+60 | 4,7 | p. 48 | |

subject to alterations

(1) Nominal data in operating point with maximum load and 110 VDC

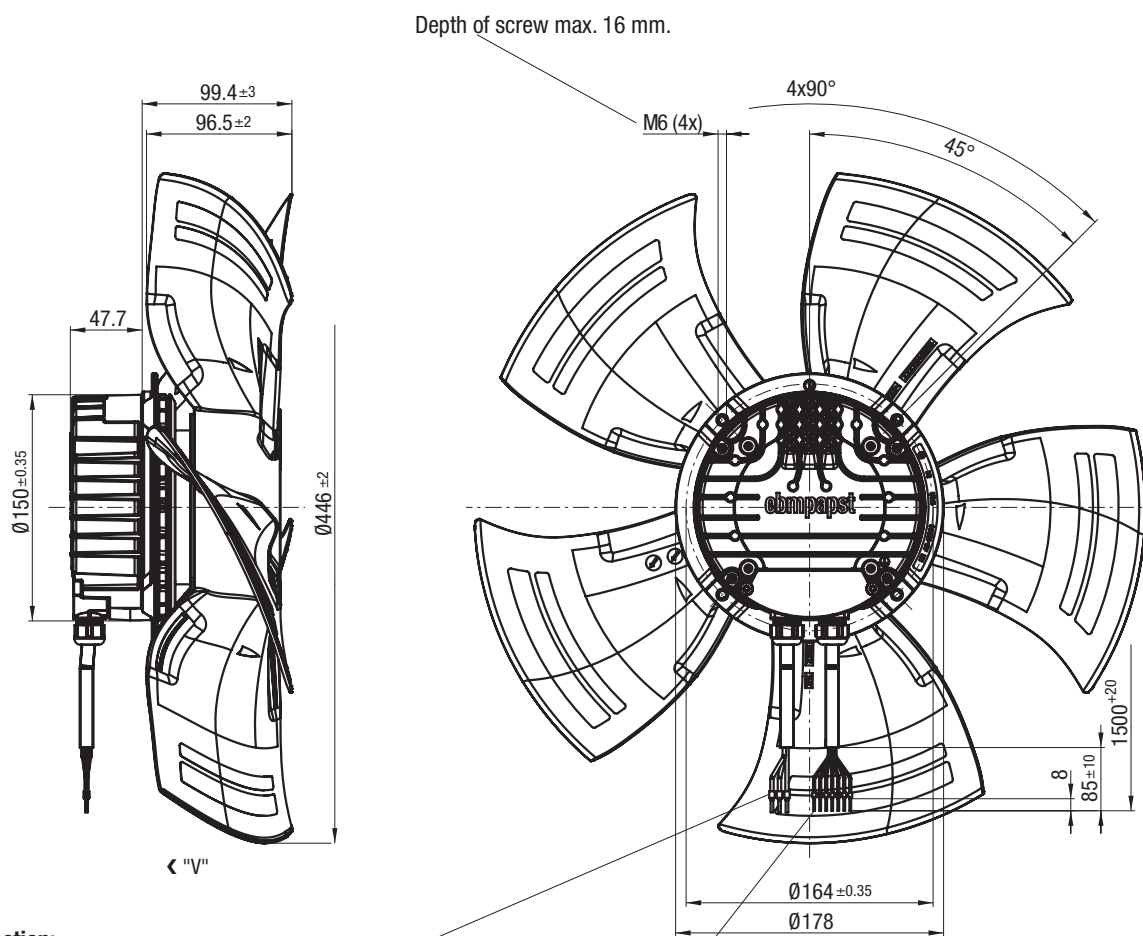
Curves:



| | n rpm | P _{ed} W | I A | L _{WA} dB(A) |
|-----|----------|----------------------|--------|--------------------------|
| Ⓐ ① | 1300 | 297 | 2,69 | 71 |
| Ⓐ ② | 1300 | 316 | 2,87 | 70 |
| Ⓐ ③ | 1300 | 330 | 3,00 | 67 |
| Ⓐ ④ | 1300 | 340 | 3,10 | 68 |

Air performance measured as per: ISO 5801, Installation category A, with ebm-papst full nozzle without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} 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 52 ff.

- **Technical features:** See electrical connections p. 48
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Product conforming to standards:** See page 2
- **Approvals:** EAC



Lead connection:

halogen-free, BETrans® 3 GKW flex, 3G 1.5 mm²,
3x core-end sleeve crimped.

Lead connection:

halogen-free, BETrans® 3 GKW flex, 7x 0.5 mm², 7x core-end sleeve crimped.

it's time for tomorrow

We extend the limits of what's feasible every day. Our longstanding engineering expertise gives us the capability to lead the way in technological development.

We have a range of products with an enormous potential for efficient all-round solutions to meet each individual facet of your needs.

We're your partner at every phase of the process chain, coming up with new ideas while keeping the big picture in mind.

We have a wide range of product-specific knowledge in building the right drive designs for you.

We're always in tune with the times to offer you excellent ideas, outstanding innovations and hands-on-service.

EQ³ – Inclusive of Economic Quality

EQ³ is the ebm-papst ZEITLAUF concept for the future, which combines intelligent drive solutions with important performance characteristics. All gear motors impress with unsurpassed values in terms of lifetime and performance, and move the future through environmental protection with the highest level of efficiency.

Creating the future together – it's time for tomorrow!



Drive concepts ebm-papst ZEITLAUF

Powerful. Safe. Reliable.



Solutions for the most demanding requirements

Drive concepts with future

The highest level of safety for passenger transportation

Personal safety plays an especially important role in the transportation of passengers in public transit. In this context, the focus is on components for moving entry aids and door systems, which have their own special requirements with regard to performance.

Demographic change also puts high demands on systems that automatically open and close doors, and with respect the management of barriers.

The right drive concept at every step

With its technologically exemplary drive concepts, ebm-papst ZEITLAUF implements innovative and reliable gear motors for many conceivable motion requirements in the area of passenger transportation.

Mature technologies, maximum efficiency and reliability along with extreme resilience and lifetime are supplemented by technical refinements and a broad service range.

Comprehensive development services and decades of experience stand for extraordinary solutions that also allow for the combination of planetary, spur and angle gearheads.

Trailblazing drive solutions

Motion components are subject to great loads, especially when it comes to train operations, and result in important aspects in terms of implementation:

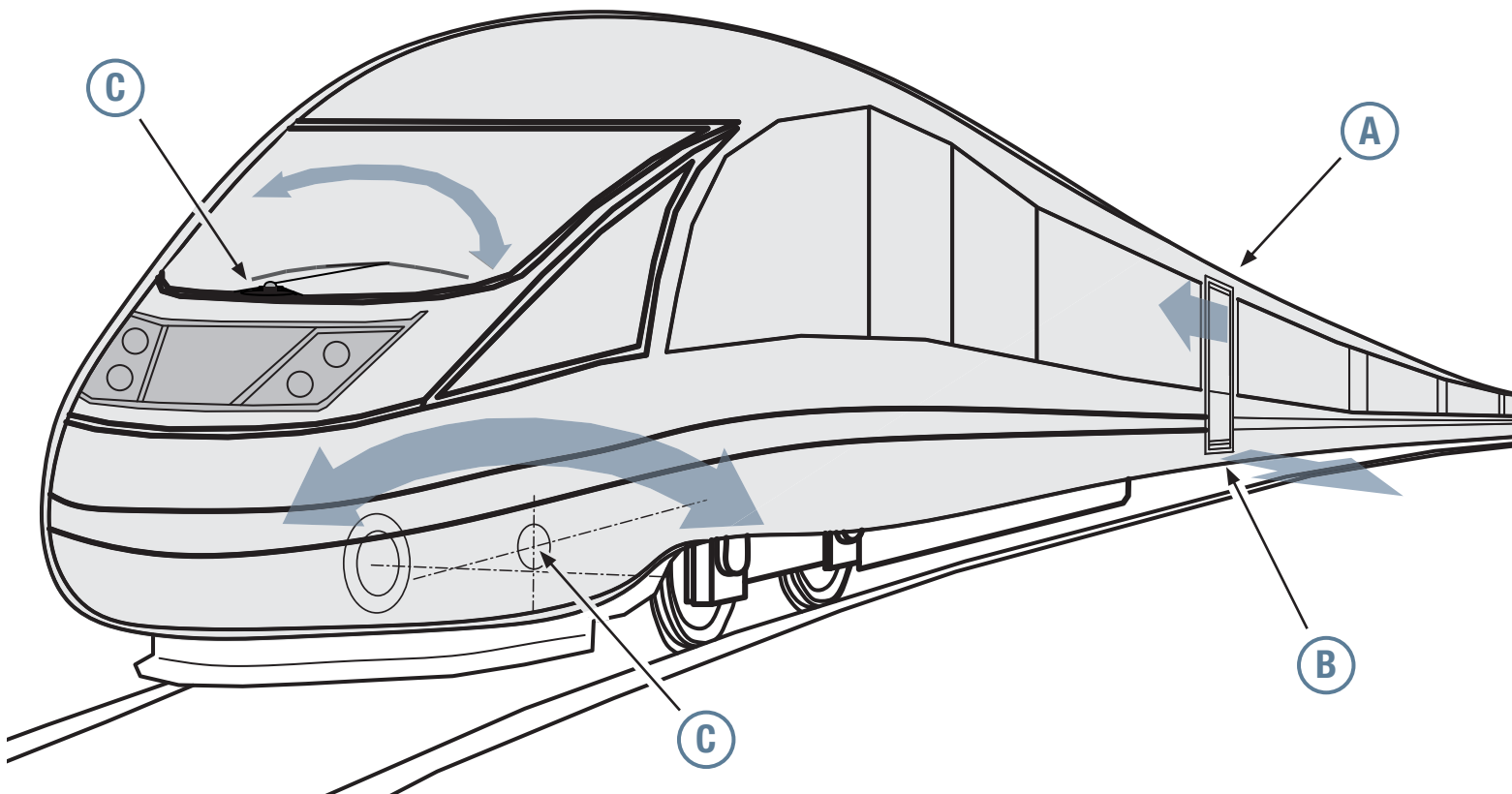
- **Target-oriented implementation of demanding market requirements in view of performance density and durability**
- **Compliance with specifications and technical requirements by legislation and standards**
- **High corrosion-resistance and functional safety even in extreme weather conditions**
- **Vibration resistance to compensate for vibration responses**

ebm-papst ZEITLAUF considers these requirements the main criteria for the design of these intelligent and powerful gear motors. They are virtually unbeatable when it comes to durability, quality and safety, and hence represent a safe and profitable investment.

Services for sophisticated needs

Our well-rounded range of effective services adds to your advantages. We assume responsibility for the finished, delivered product providing you with reliability, attentiveness and excellent performance throughout the entire product design and manufacturing cycles. Our employees, who daily live up their commitment to service, are your guarantee for success.

The bottom line is service unparalleled in the market



A Door drives:



One-stage planetary gearhead for train doors.



Planetary gearhead motor Performax 63 for sliding and locking.



Angle/planetary gearhead combination for the safe sliding and locking of train doors.



Special drive for sliding plug door drives with two outputs.



Special drive for train doors with basic functions such as opening, closing and locking as well as integration of additional functions like emergency unlocking, external door locking and remote isolation.

B Drives for entry aids:



Three-stage spur gearheads for the sliding and holding of sliding steps.



Special angle gearhead with combined planetary/crown technology for folding steps and ramps.

C Special applications:



Two-stage EtaCrown gearhead with special reinforcements for windscreen wipers.



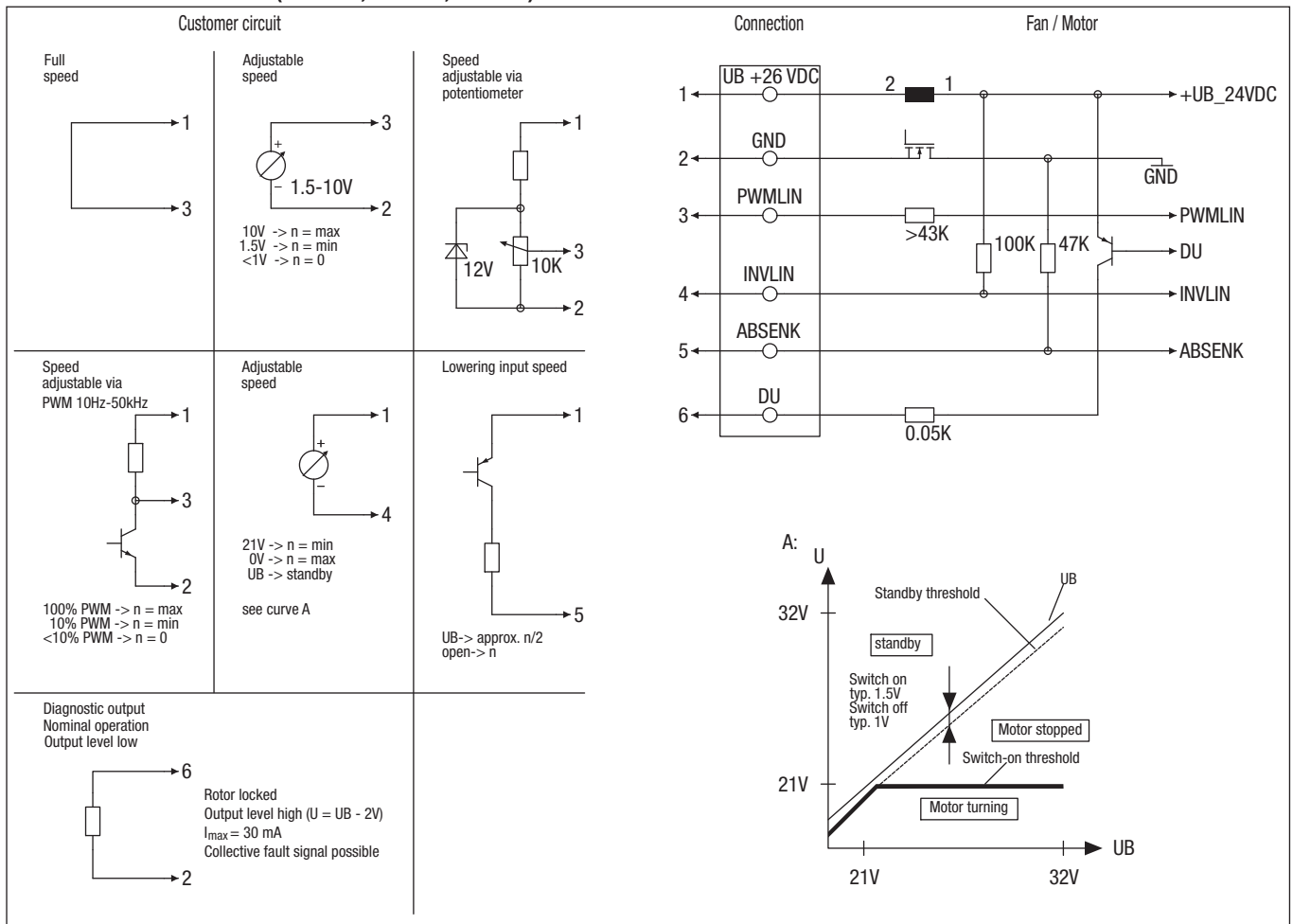
One-stage EtaCrown angle gearhead for tilt technology.

Electrical connections rail technology

Technical features:

- Control input 0-10 VDC / PWM
- Lowering input
- INVLIN (control input, inverse linear)
- Fault output (high-side switch max. 30mA)
- Line undervoltage detection
- Output limit
- Reverse polarity and locked-rotor protection
- Soft start
- Over-temperature protected electronics
- Motor current limit
- Overvoltage detection
- Temperature derating
- Load dump (58V)

Electrical connection: 26 VDC (W3G 300, K3G 097, R3G 280)



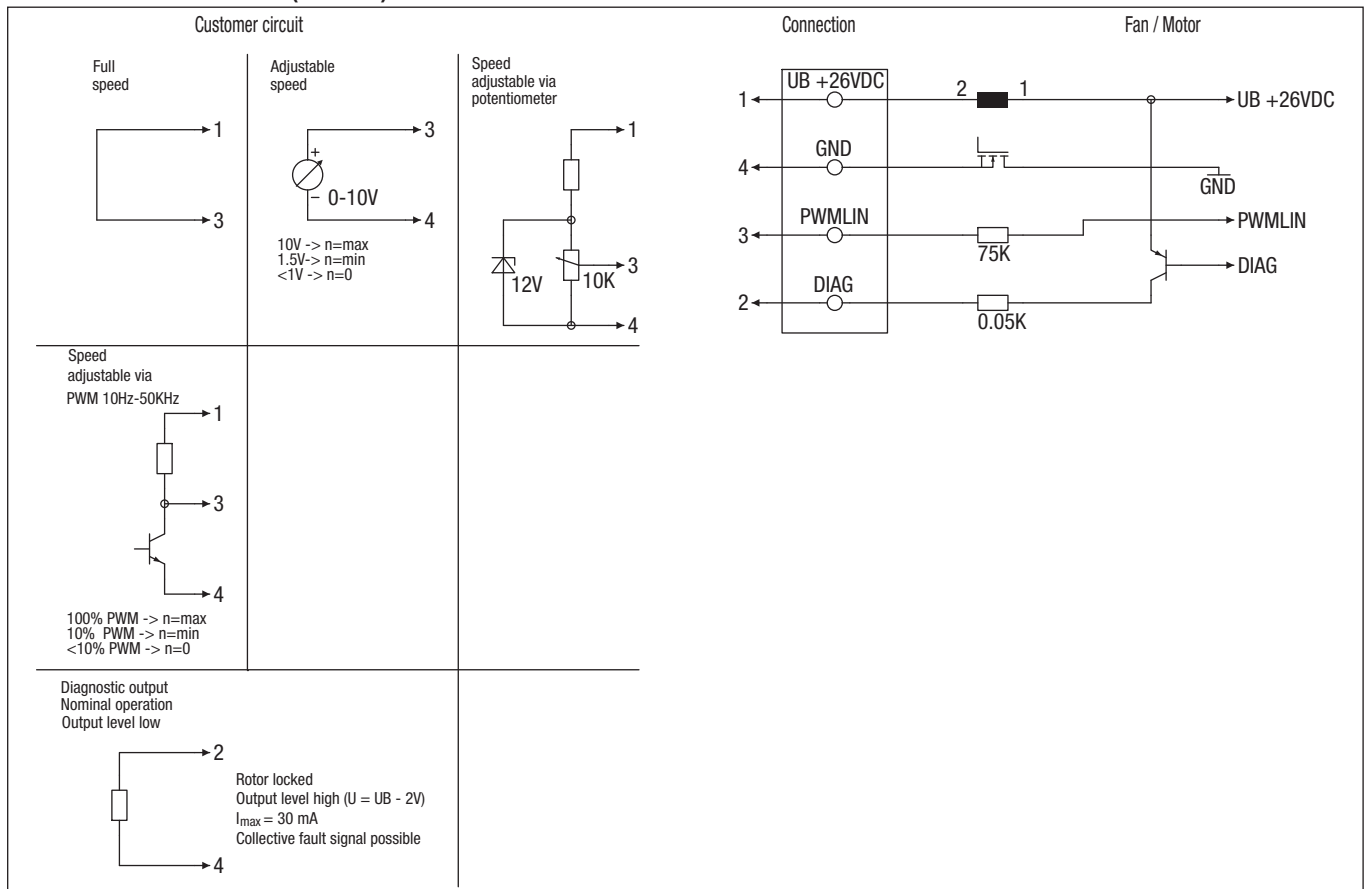
| Connection | Designation | Colour | Assignment / function |
|------------|-------------|--------|--|
| 1 | UB +26 VDC | black | Power supply 26 VDC |
| 2 | GND | brown | Power supply GND, reference ground |
| 3 | PWMLIN | yellow | Analogue voltage control input 0-10 V or PWM |
| 4 | INVLIN | orange | Control input, inverse linear |
| 5 | ABSENK | blue | Lowering input |
| 6 | DU | white | Diagnostic output |

Electrical connections rail technology

Technical features:

- Control input 0-10 VDC / PWM
- Fault output (high-side switch max. 30mA)
- Line undervoltage detection
- Output limit
- Reverse polarity and locked-rotor protection
- Soft start
- Over-temperature protected electronics
- Motor current limit
- Overvoltage detection
- Temperature derating
- Load dump (58V)

Electrical connection: 26 VDC (W3G 385)



| Connection | Designation | Colour | Assignment / function |
|------------|-------------|--------|--|
| 1 | UB +26 VDC | black | Power supply 26 VDC |
| 2 | DIAG | white | Diagnostic output |
| 3 | PWMLIN | yellow | Analogue voltage control input 0-10 V or PWM |
| 4 | GND | brown | Power supply GND, reference ground |

Electrical connections rail technology

Technical features:

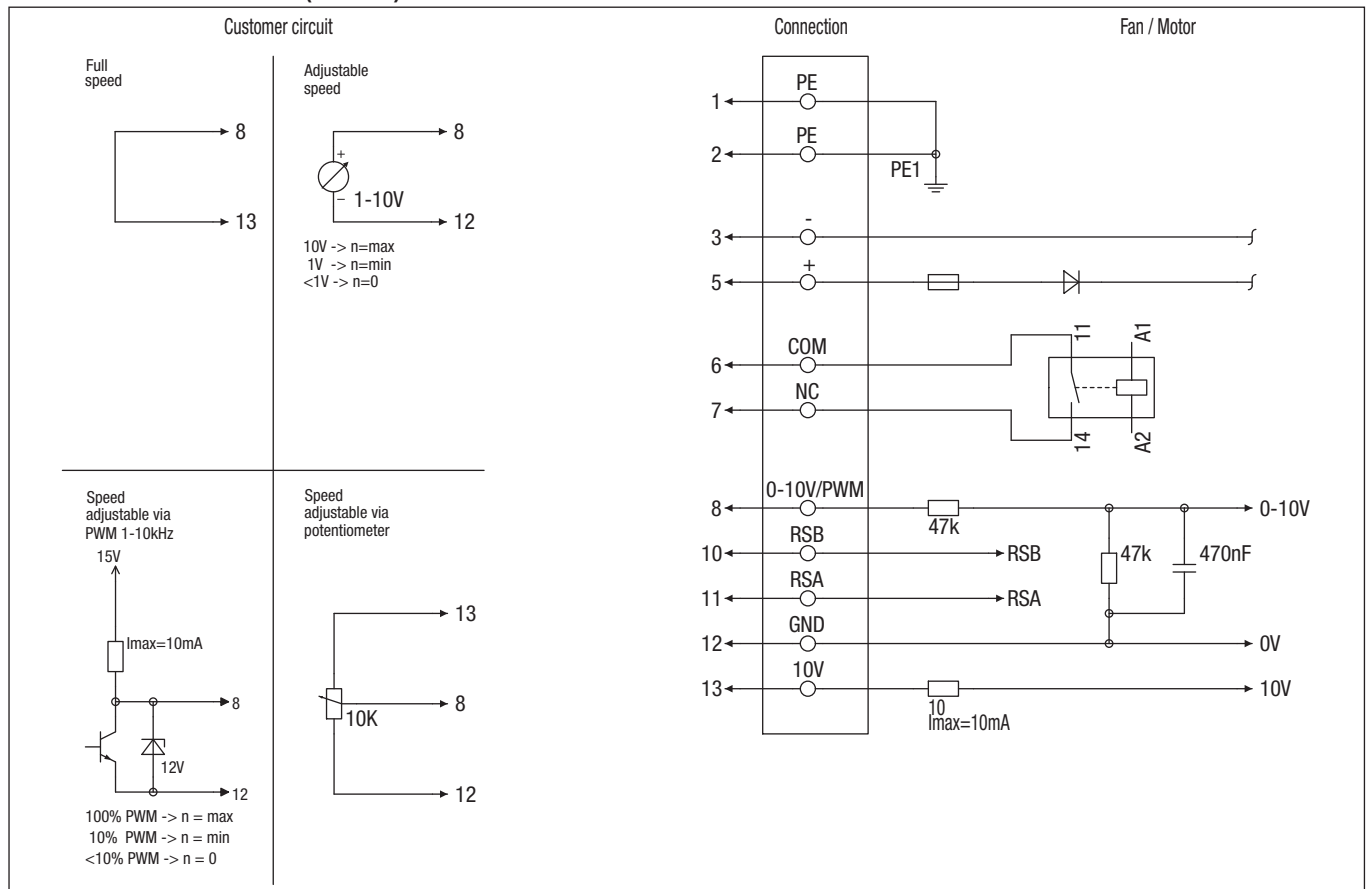
- Control input 0-10 VDC / PWM
- Output 10 VDC, max. 10 mA
- Operation and alarm display
- Integrated PID controller
- Line undervoltage detection
- Output limit
- Run monitoring
- Soft start
- Over-temperature protected electronics / Motor
- Motor current limit
- Overvoltage detection
- RS485 MODBUS-RTU
- Maximum EEPROM write cycles 100.000
- Control interface with SELV potential safely disconnected from the mains
- Thermal overload protector (TOP) wired internally

Note:

If voltage (e.g. 230 VAC) is passed through the alarm relay, the SELV signal wires lose their increased insulation, meaning they only have basic insulation.

The SELV properties (increased insulation) are not lost if up to 110 VDC of voltage is passed through the alarm relay.

Electrical connection: 110 VDC (M3G 084)



| Connection | Designation | Colour | Assignment / function |
|------------|-------------|--------------|--|
| 1, 2 | PE | green/yellow | Protective earth |
| 3 | - | black | Power supply GND, see type plate for voltage range |
| 5 | + | brown | Power supply, see type plate for voltage range |
| 6 | COM | grey | Status relay, floating status contact, break for failure, Contact rating 250 VAC / max. 2 A (AC1) / min. 1 mA / 5 V, basic insulation on mains side and on control interface |
| 7 | NC | orange | Status relay, floating status contact, common connection, Contact rating 250 VAC / max. 2 A (AC1) / min. 1 mA / 5 V, basic insulation on mains side and on control interface |
| 8 | 0-10 V/PWM | yellow | Analogue input 1, set value: 0-10 V or PWM, Ri = 100 kΩ, parametrisable curve, SELV |
| 10 | RSB | brown | RS485 interface for MODBUS, RSB, SELV |
| 11 | RSA | white | RS485 interface for MODBUS, RSA, SELV |
| 12 | GND | blue | Signal ground for control interface, SELV |
| 13 | +10 V | red | Fixed voltage output 10 VDC, +10 V +/- 3 %, max. 10 mA, short-circuit-proof, power supply for external devices (e.g. potentiometer), SELV |

Electrical connections rail technology

Technical features:

- Control input 0-10 VDC / PWM
- Output 10 VDC, max. 10 mA
- Alarm relay
- Output limit
- Run monitoring
- Motor current limit
- Over-temperature protected electronics
- Control interface with SELV potential safely disconnected from the mains

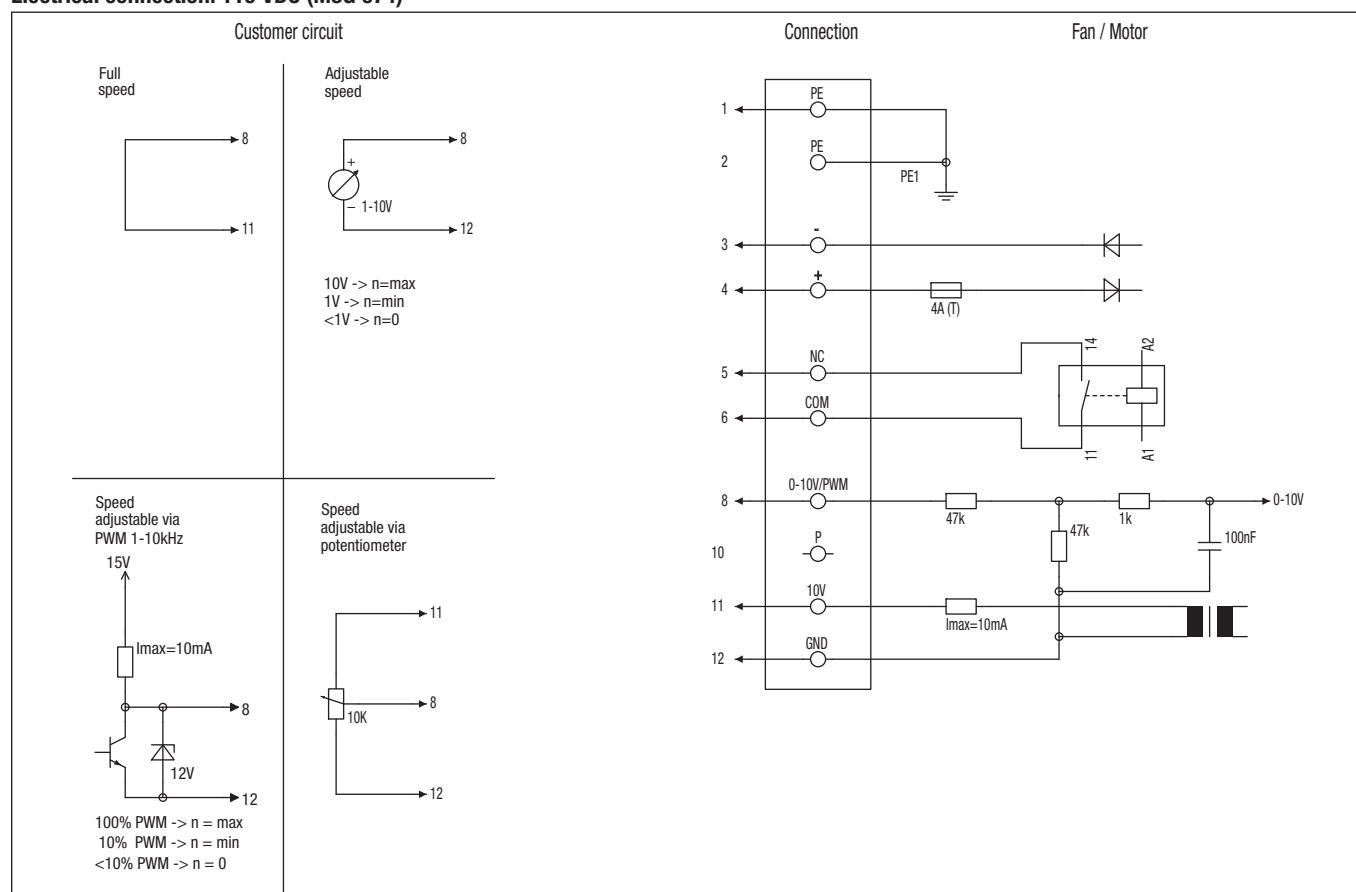
- Thermal overload protector (TOP) wired internally

Note:

If voltage (e.g. 230 VAC) is passed through the alarm relay, the SELV signal wires lose their increased insulation, meaning they only have basic insulation.

The SELV properties (increased insulation) are not lost if up to 110 VDC of voltage is passed through the alarm relay.

Electrical connection: 110 VDC (M3G 074)



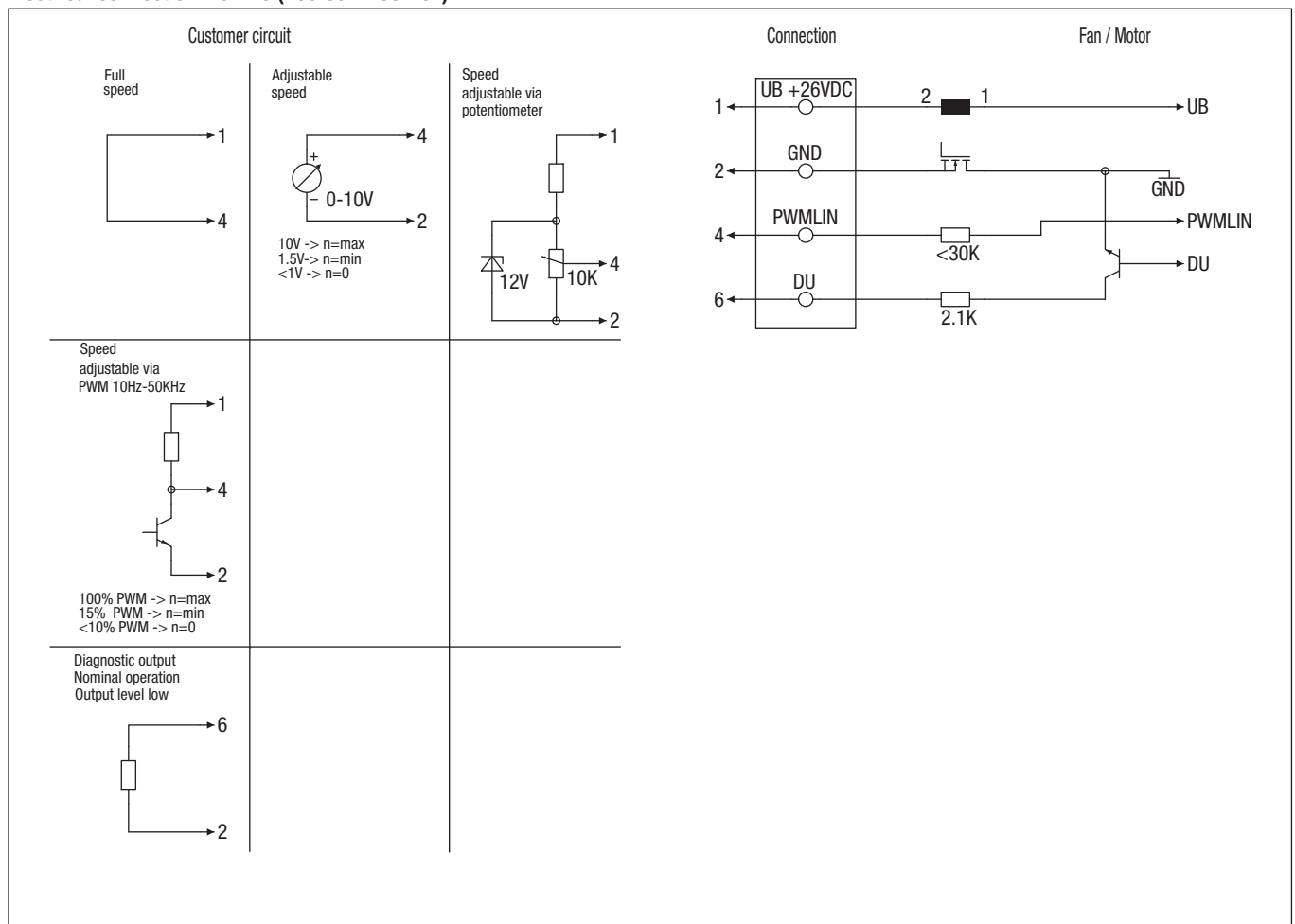
| Connection | Designation | Colour | Assignment / function |
|------------|-------------|--------------|--|
| 1 | PE | green/yellow | Protective earth |
| 3 | - | bue | Supply voltage, GND (110 VDC) |
| 4 | + | red | Supply voltage, 110 VDC |
| 5 | NC | white 2 | Floating status contact (0,3 A - 110 VDC, 1 A - 60 VDC, 3 A - 30 VDC) closed at $n \geq 100$ rpm, break for failure |
| 6 | COM | white 1 | Floating status contact, closed at $n \geq 100$ rpm, break for failure |
| 8 | 0-10 V/PWM | yellow | Control input, set value 0-10 VDC or PWM, impedance 100 k Ω , SELV |
| 11 | 10 VDC | red | Voltage output 10 VDC (+/-3 %), max. 10 mA, power supply for external devices (e.g. potentiometer), SELV |
| 12 | GND | blue | Reference ground for control interface (SELV) |

Electrical connections rail technology

Technical features:

- Control input 0-10 VDC / PWM
- Fault output (open collector)
- Line undervoltage detection
- Output limit
- Soft start
- Over-temperature protected electronics
- Motor current limit
- Overvoltage detection
- Load dump (58V)

Electrical connection: 26 VDC (K3G 097-AS82-82)



| Connection | Designation | Colour | Assignment / function |
|------------|-------------|--------|--|
| 1 | UB +26 VDC | black | Power supply 26 VDC |
| 2 | - UB 0 VDC | brown | Power supply GND, reference ground |
| 4 | PWMLIN | yellow | Analogue voltage control input 0-10 V or PWM |
| 6 | DU | white | Diagnostic output |

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 automotive products depends:

- 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.

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 protector, connected
- PTC/NTC with electronic evaluation
- Current limiting using electronics

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.

High voltage and insulation testing

If high voltage or insulation testing is carried out in the application, then all connection lines from the fan must be disconnected in advance.



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:

The products in this catalogue have been specifically configured for use in the rail 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.

Approvals

In case you require a specific approval for your ebm-papst product (e1, UL, 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/m³.

Technical parameters & scope



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.

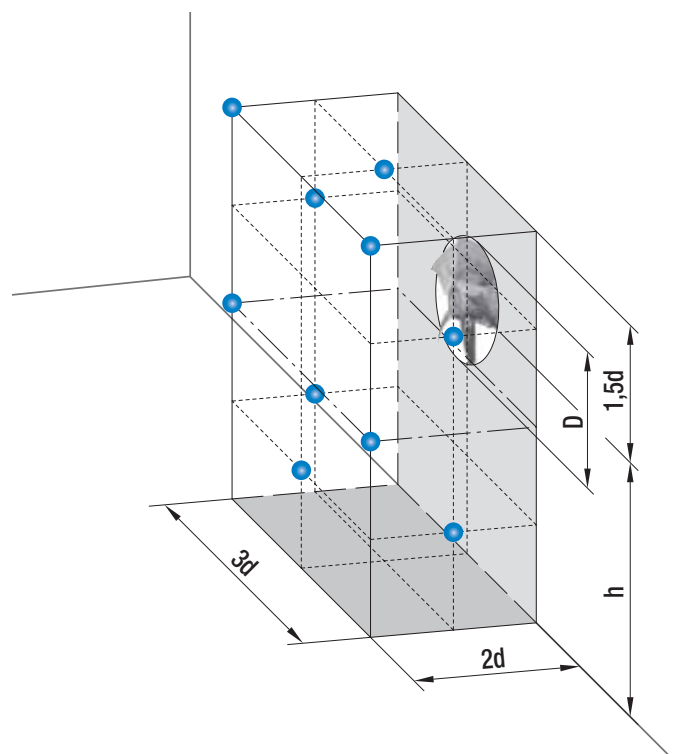
Measuring configuration as per ISO 13347-3 respectively DIN 45635-38:

- 10 measuring points

$$d \geq D$$

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

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



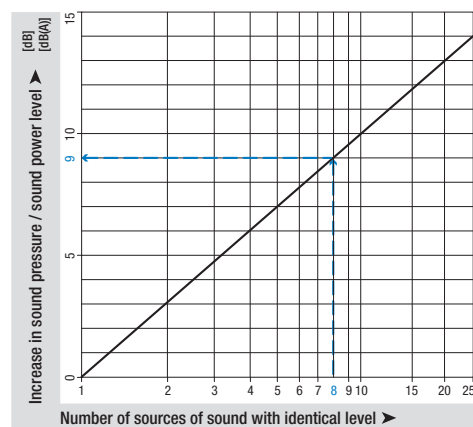


Combined level of multiple same-level sound sources

Adding 2 noise sources with the same level 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).

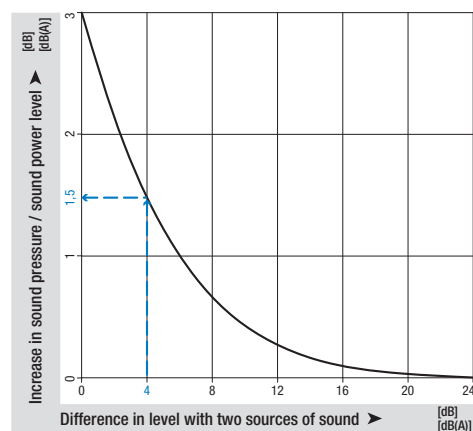


Combined level of two different-level sound sources

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.

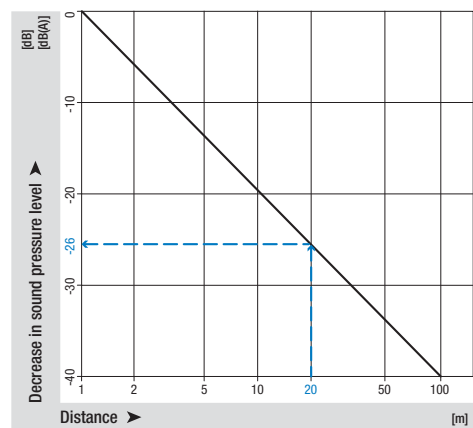
The level increase can now be read in the diagram as approx. 1.5 dB. This means that the overall sound level of the unit can be expected to be 76.5 dB(A).



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).



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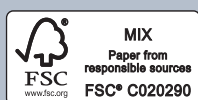
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