

Fans and drive concepts for rail technology

Edition 2016-11

ebmpapst

The engineer's choice



About ebm-papst

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

Six reasons that make us the ideal partner:

Our systems expertise.

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

The ebm-papst spirit of invention.

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

Our lead in technology.

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

Proximity to our customers.

ebm-papst employs approximately 13,000 people at 25 production sites (in Germany, China, the United States and elsewhere) and in 49 sales offices worldwide. You will always have a local contact, someone who speaks your language and knows your market.

Our standard of quality.

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

Our sustainable approach.

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

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Photo: Deutsche Bahn AG / Claus Weber

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: 2006/2015 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.

- **EN 50533: 2011 Properties of 3-phase electrical system voltage**

Class 1 electrical system architecture is a prerequisite for using EC fans.

Our advantage lies in the perfect interaction.

Significantly increased passenger and cargo demands due to advancing globalization 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 optimization 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 optimized 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 optimizations 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.

Fire safety in rail vehicles

The European standard EN 45545 for fire safety in rail vehicles was ratified in 2013, and the transitional period for national sets of rules expired at the end of March 2016.

The seven-part standard has the objective of protecting passengers and staff in case of fire on board and assuring evacuation. Part 2 of the standard describes the requirements for the degree of flammability of materials and components.

The level of severity of the limit values to be adhered to depends on the hazard level. There are three hazard levels (HL). HL1 is the lowest level and HL3 designates the strictest limit values.

The operating and construction classes of the respective components determine the component's hazard level.

With its series for railway applications, ebm-papst offers fans that are precisely tailored to comply with the fire safety criteria.

Compliance with the requirements of the standards is proven with material tests and extensive product assessment, as well as with independent appraisals.

The findings confirm that the design and material selection completely satisfy the requirements of DIN EN 45545-2 and meet the requirements for HL3.

Concretely, this means that all the relevant components possess the test certificates they require and that they are all currently valid. Specific properties of the products' construction were also verified.

ebm-papst subjected the products to voluntary testing and certification by TÜV SÜD.

The test certificates granted confirm that the ebm-papst fans presented in this catalog an intended for railway applications meet all the relevant safety requirements and possess the relevant product properties required.

The certification also includes regular production facilities monitoring.



The fire safety substantiation confirms the fans' unlimited suitability for use in rail vehicles.

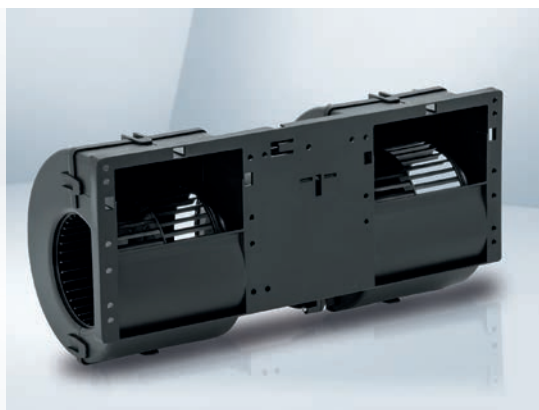
Tractionized fans for railway applications - 24 VDC





EC dual centrifugal fan

with housing, for railway applications, Ø 097

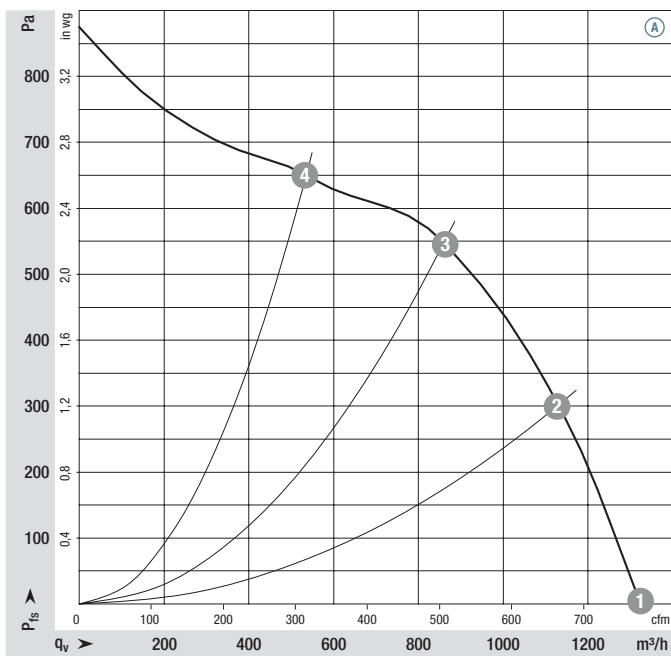


- **Material:** Housing and Impeller: plastic PA UL94 V0, black
- **Degree of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Installation position:** Any
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings
- **Cable exit:** Lateral
- **Protection class:** III
- **Conformity with standards:** See P. 4
- **Approvals:** EAC
- **Technical features:** See electrical connections P. 80

Nominal data		Curve	Nominal voltage	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..+70	2,0	P. 80

subject to change (1) 24-volt variant

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 P. 86 ff.

Cable (halogen-free):BETAtrans® GWK R 2,5 mm², 2x crimped ferrules (brown, black)BETAtrans® GWK R 1,0 mm², 4x crimped ferrules (yellow, orange, blue, white)**Terminal assignment:**

+ UB (black)

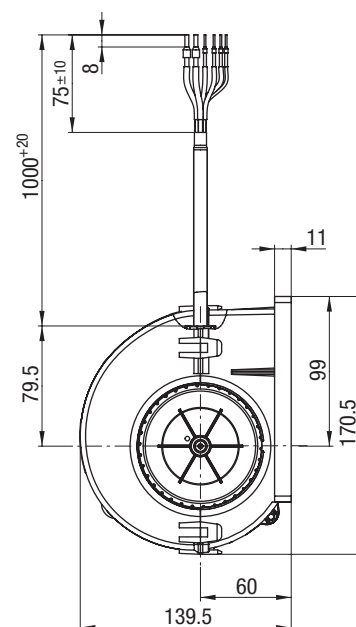
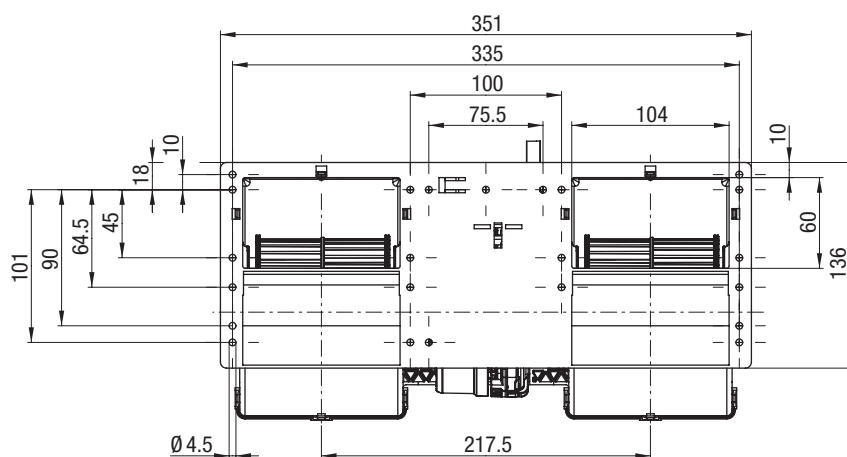
GND (brown)

PWM/LIN (yellow)

INVLIN (orange)

ABSENK (blue)

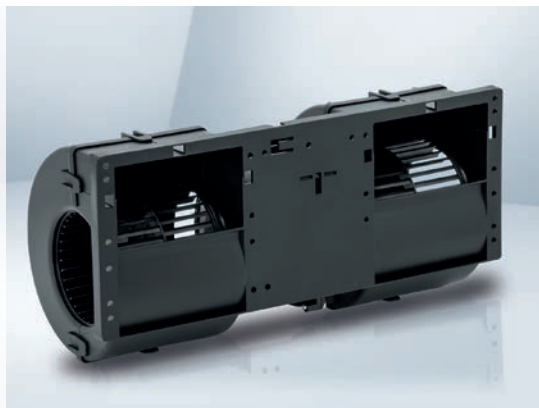
Diagnostic output (white)





EC dual centrifugal fan

with housing, for railway applications, Ø 097

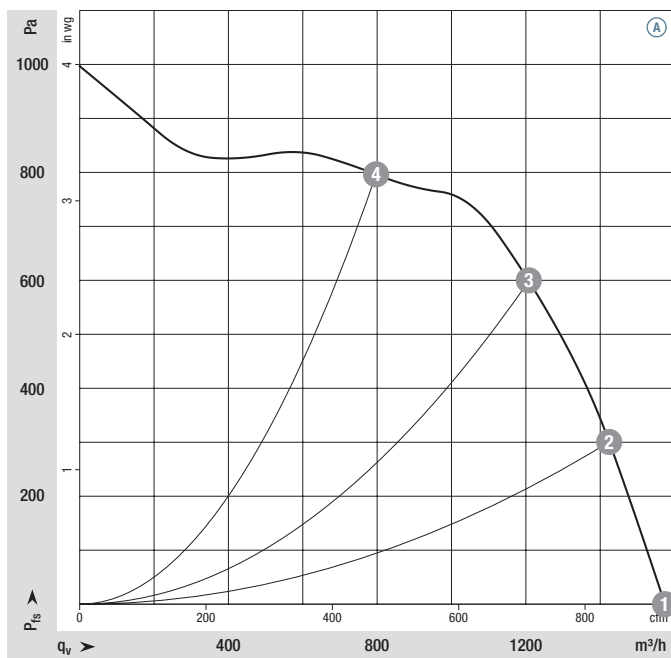


- **Material:** Housing and Impeller: plastic PA UL94 V0, black
- **Degree of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Installation position:** Any
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings
- **Cable exit:** Lateral
- **Protection class:** III
- **Conformity with standards:** See P. 4
- **Approvals:** EAC
- **Technical features:** See electrical connections P. 84

Nominal data		Curve	Nominal voltage	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	1575	4680	740	28,0	88	-40..+70	2,0	P. 84

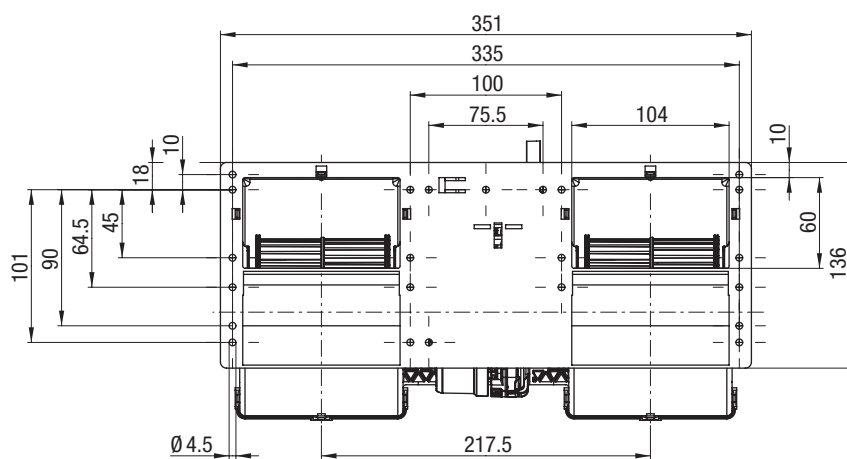
subject to change (1) 24-volt variant

Curves:



	n rpm	P _{ed} W	I A	L _{wA} dB(A)
Ⓐ 1	4680	740	28,0	88
Ⓐ 2	5025	740	28,0	87
Ⓐ 3	5380	659	25,3	85
Ⓐ 4	5500	441	16,9	84

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 P. 86 ff.



Cable (halogen-free):

BETrans® 3 GKW 6 mm², 2x crimped ferrules (brown, black)

BETrans® 3 GKW 1 mm², 2x crimped ferrules (yellow, white)

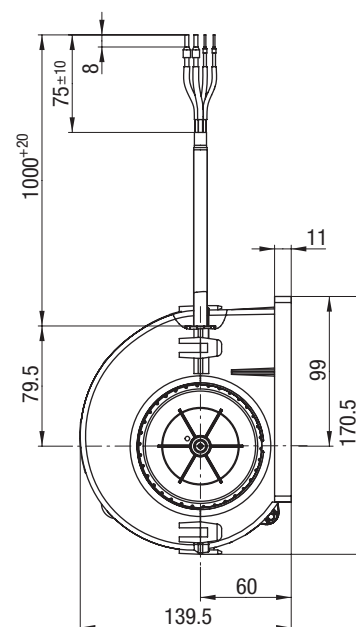
Terminal assignment:

+ UB (black)

GND (brown)

PWM/LIN (yellow)

Diagnostic output (white)





EC axial fan

for railway applications, Ø 300

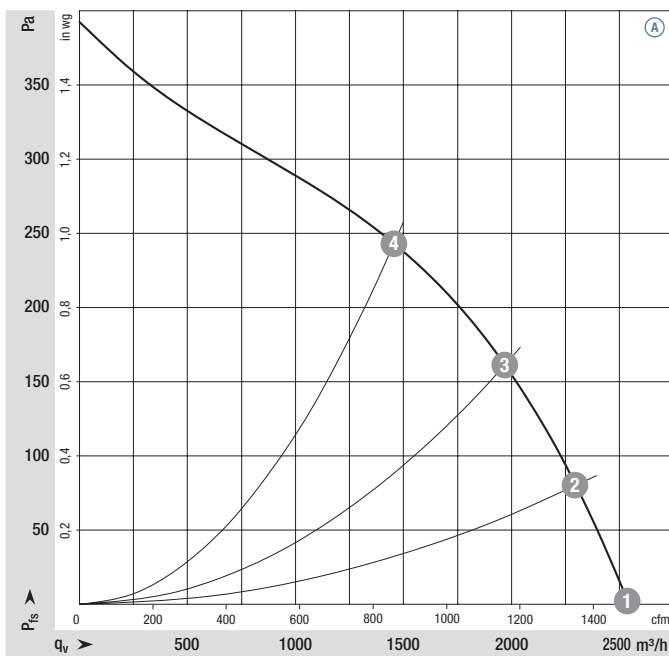


- **Material:** Housing and Impeller: plastic PA UL94 V0, black
- **Direction of air flow:** "V" (sucking over rotor)
- **Degree of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Installation position:** Any
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings
- **Cable exit:** Lateral
- **Protection class:** III
- **Conformity with standards:** See P. 4
- **Approvals:** EAC
- **Technical features:** See electrical connections P. 80

Nominal data		Curve	Nominal voltage	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..+85	2,0	P. 80

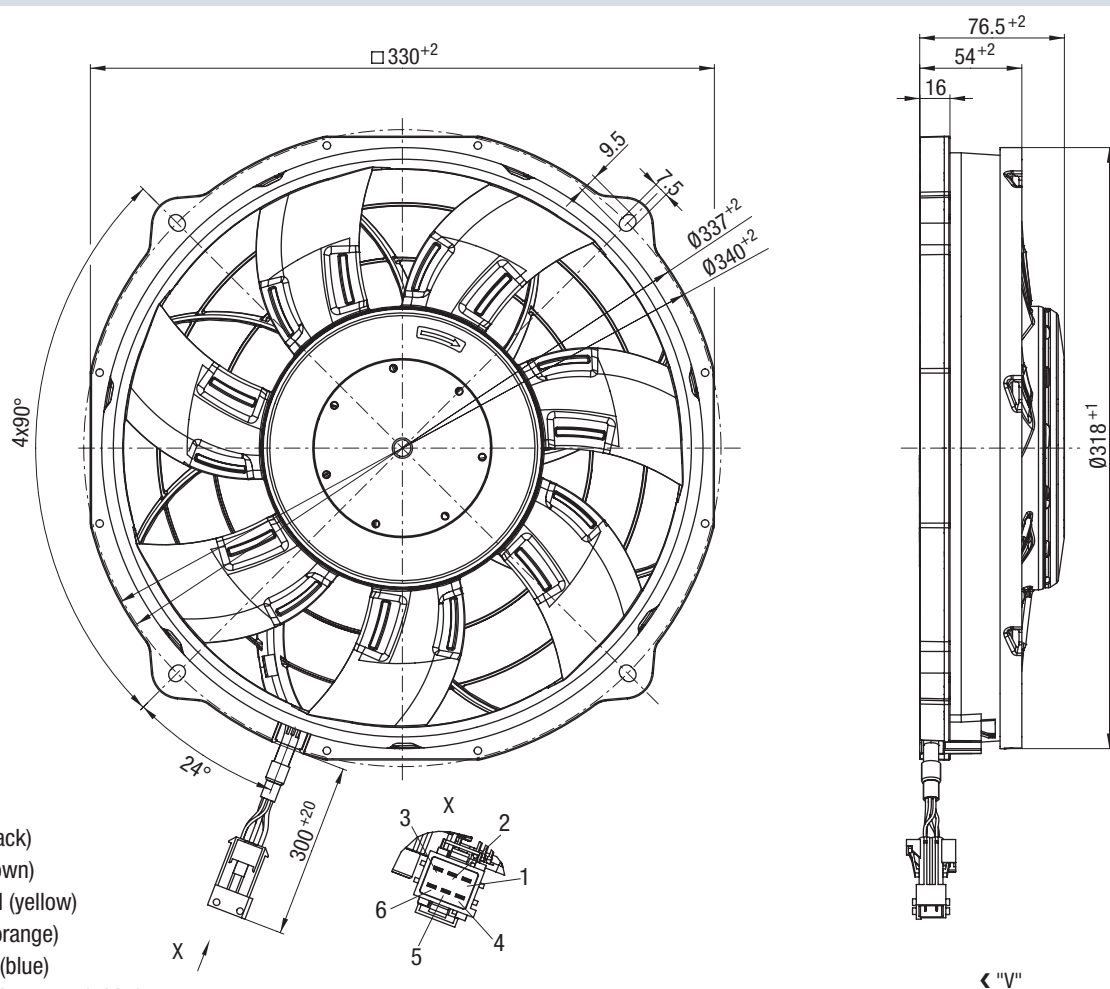
subject to change (1) 24-volt variant

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 P. 86 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

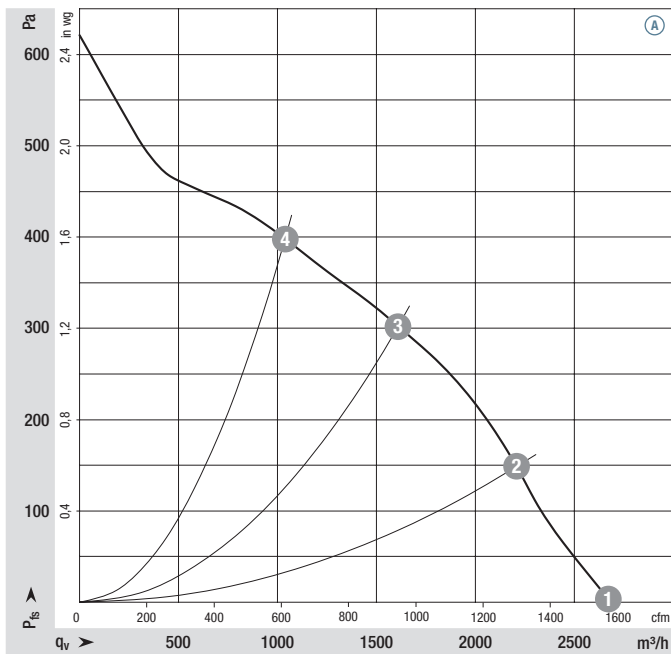


- **Material:** Housing and Impeller: plastic PA UL94 V0, black
- **Direction of air flow:** "V" (sucking over rotor)
- **Degree of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Installation position:** Any
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings
- **Cable exit:** Lateral
- **Protection class:** III
- **Conformity with standards:** See P. 4
- **Approvals:** EAC
- **Technical features:** See electrical connections P. 81

Nominal data		Curve	Nominal voltage	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..+85	2,0	P. 81

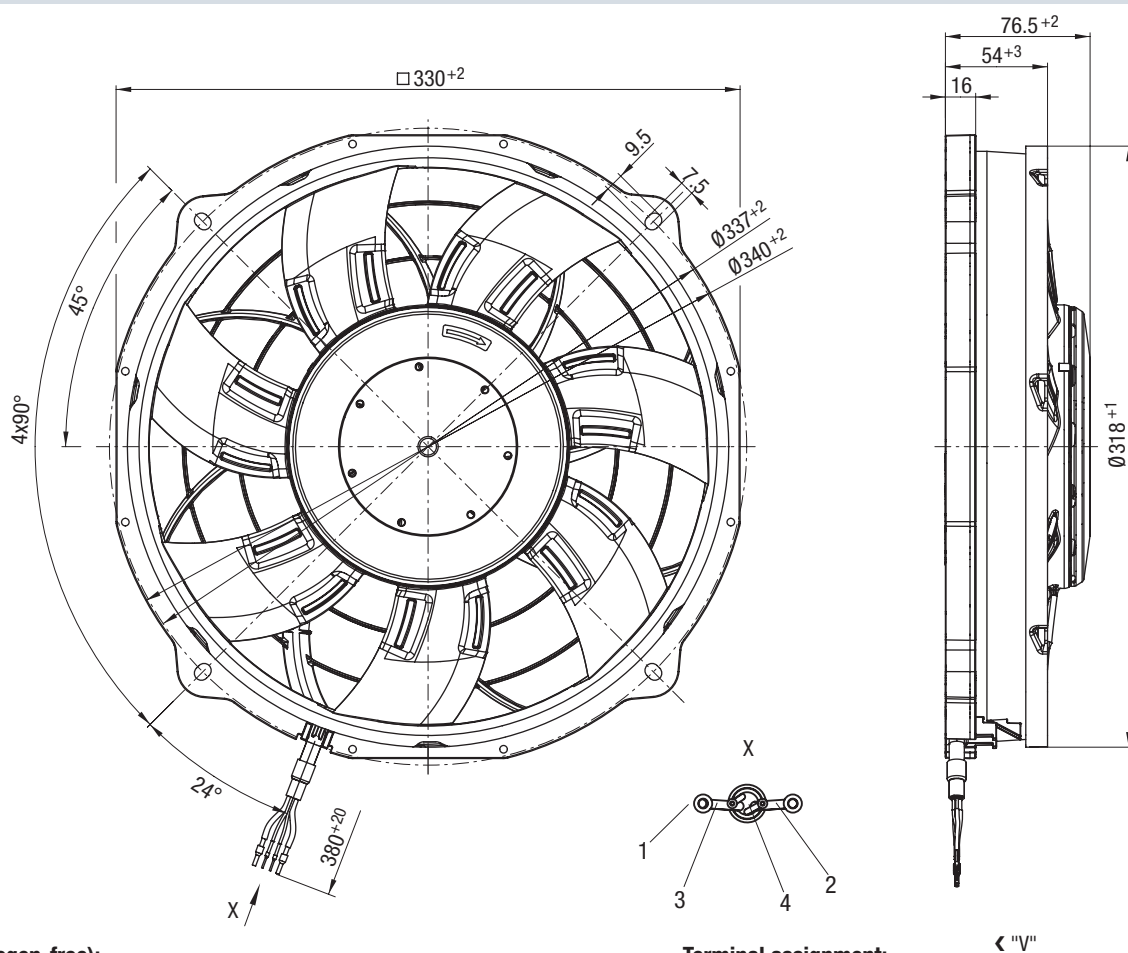
subject to change (1) 24-volt variant

Curves:



	n rpm	P _{ed} W	I A	L _{WA} 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 P. 86 ff.



Cable (halogen-free):

BETAtrans® 3 GKW 6 mm², 2x crimped ferrules (brown, black)

BETAtrans® GKW R 1,0 mm², 2x crimped ferrules (yellow, white)

Terminal assignment:

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

◀ "V"




EC axial fan

for railway applications, Ø 385



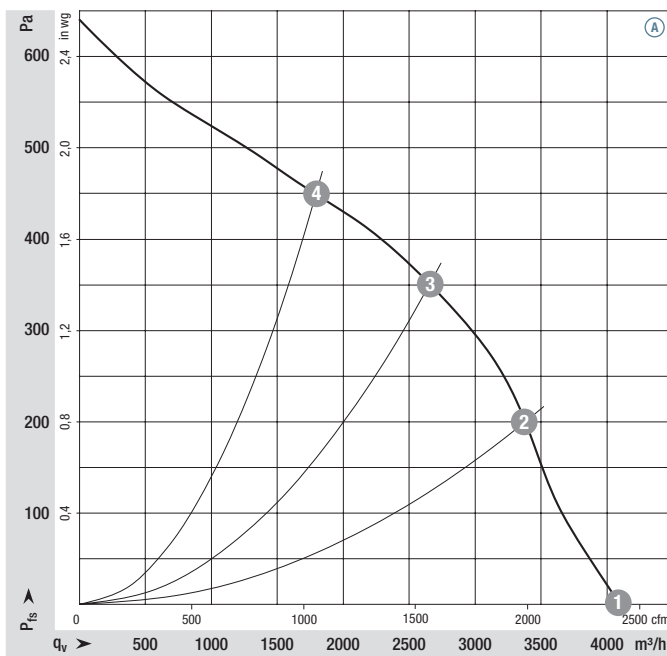
- **Material:** Housing and Impeller: plastic PA UL94 V0, black
- **Direction of air flow:** "V" (sucking over rotor)
- **Degree of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Installation position:** Any
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings
- **Cable exit:** Lateral
- **Protection class:** III
- **Conformity with standards:** See P. 4
- **Approvals:** EAC
- **Technical features:** See electrical connections P. 81

Nominal data		Curve	Nominal voltage	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..+70	3,1	P. 81	

subject to change

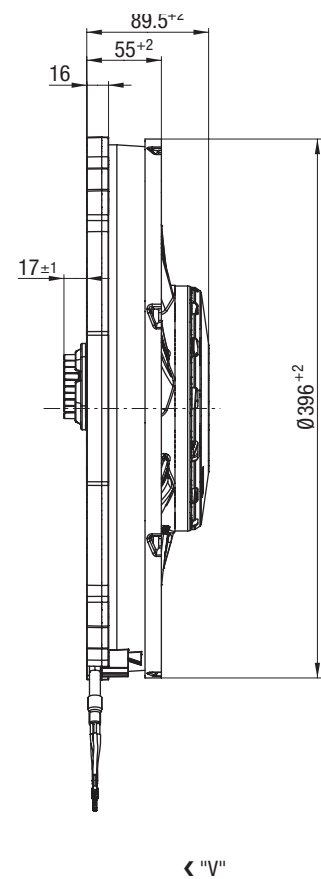
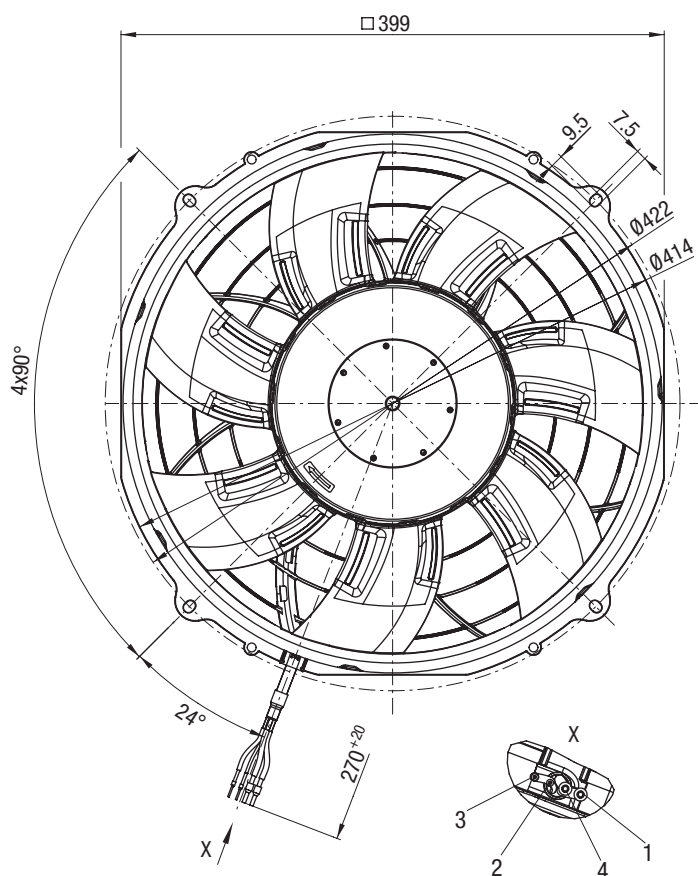
(1) 24-volt variant

Curves:



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 P. 86 ff.

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



Cable (halogen-free):

BETAtrans® 3 GKW 6 mm², 2x crimped ferrules (brown, black)

BETAtrans® GKW R 1,0 mm², 2x crimped ferrules (yellow, white)

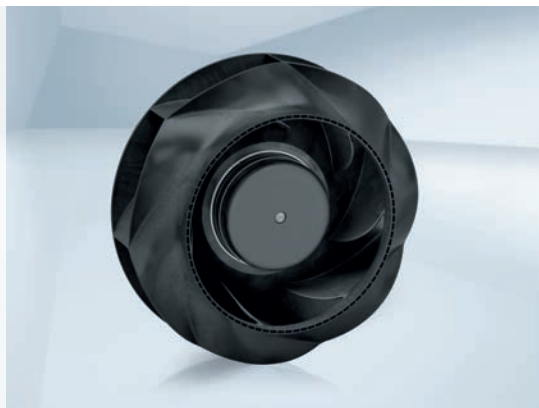
Terminal assignment:

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



EC centrifugal fan – RadiCal

for railway applications, Ø 250



- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium, coated in black
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Installation position:** Any
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

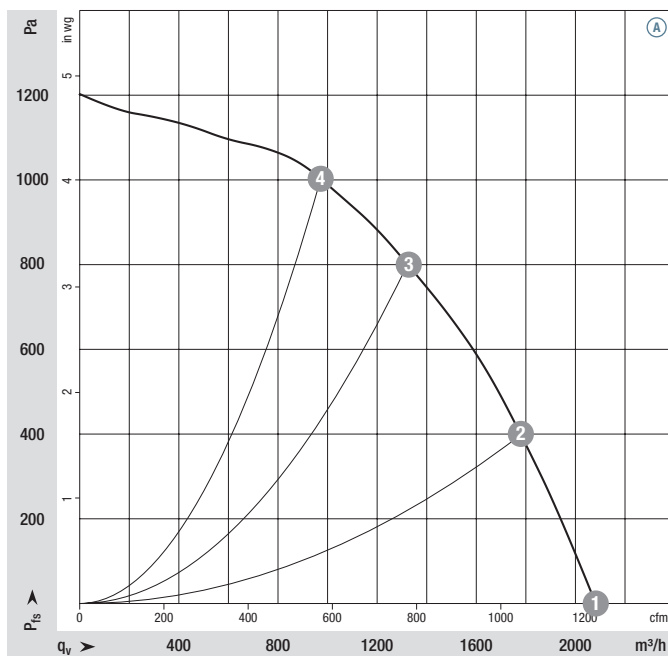
Nominal data

Type	Motor	Curve	Nominal voltage	Voltage range	Air flow	Speed/rpm	Input power	Input current	Sound power level	Perm. amb. temp.	Mass	Technical features and electrical connection
			VDC	VDC	m³/h	rpm	W	A	dB(A)	°C	kg	
R3G 250-RU27 -81 ⁽¹⁾	M3G 084-CF	A	26	16-32	2080	3860	410	15,8	87	-40..+70	2,8	P. 81

subject to change

(1) 24-volt variant

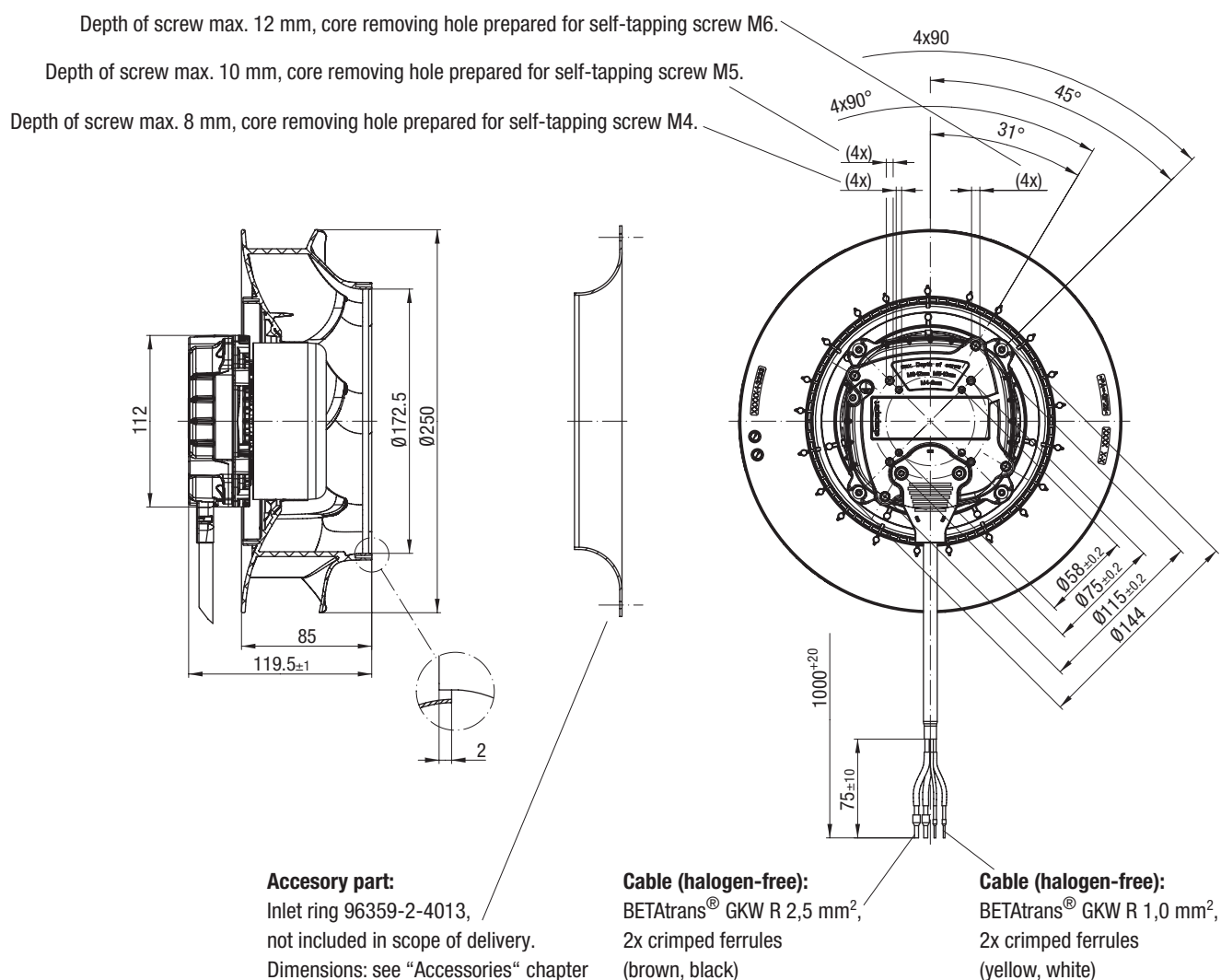
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
A 1	3860	410	15,8	87
A 2	3860	513	19,8	85
A 3	3860	568	21,9	81
A 4	3860	560	21,6	82

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 P. 86 ff.

- **Technical features:** See electrical connections P. 81
- **Cable exit:** Lateral
- **Protection class:** III
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan – RadiCal

for railway applications, Ø 280



- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium, coated in black
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Installation position:** Any
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

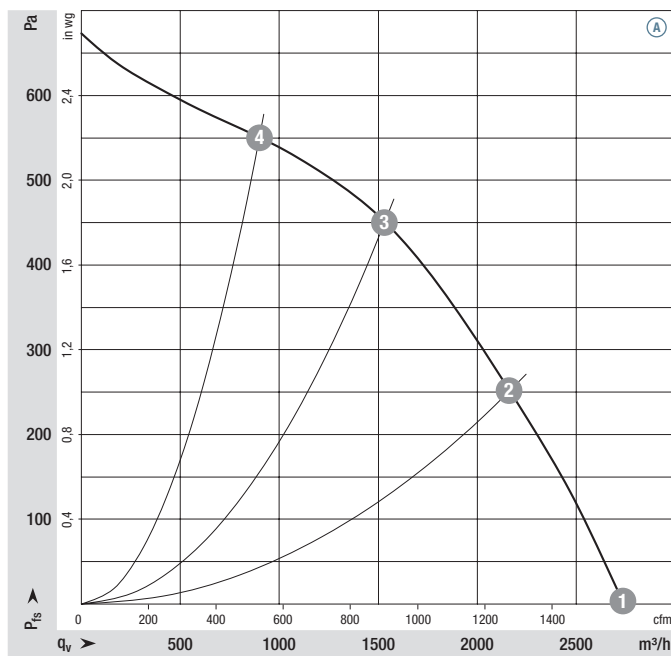
Nominal data

Type	Motor	Curve	Nominal voltage	Voltage range	Air flow	Speed/rpm	Input power	Input current	Sound power level	Perm. amb. temp.	Mass	Technical features and electrical connection
			VDC	VDC	m³/h	rpm	W	A	dB(A)	°C	kg	
R3G 280-RU26 -81 ⁽¹⁾	M3G 084-CF	A	26	16-32	2740	2350	252	10,5	80	-40..+70	3,0	P. 80

subject to change

(1) 24-volt variant

Curves:



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

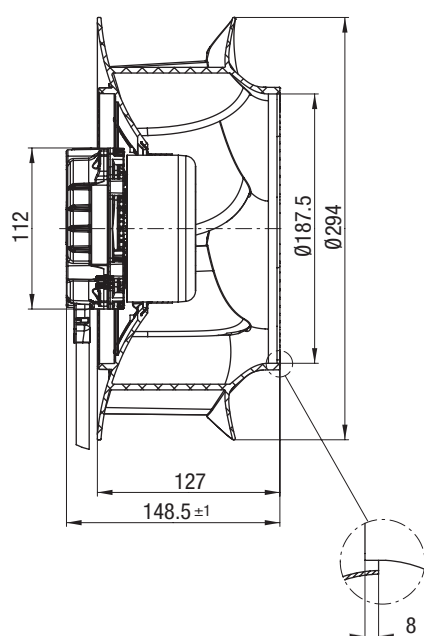
Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} measured at 1 m distance to fan axis. The acoustic values given are only valid under the measurement 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 P. 86 ff.

- **Technical features:** See electrical connections P. 80
- **Cable exit:** Lateral
- **Protection class:** III
- **Conformity with standards:** See P. 4
- **Approvals:** EAC

Depth of screw max. 12 mm, core removing hole prepared for self-tapping screw M6.

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.

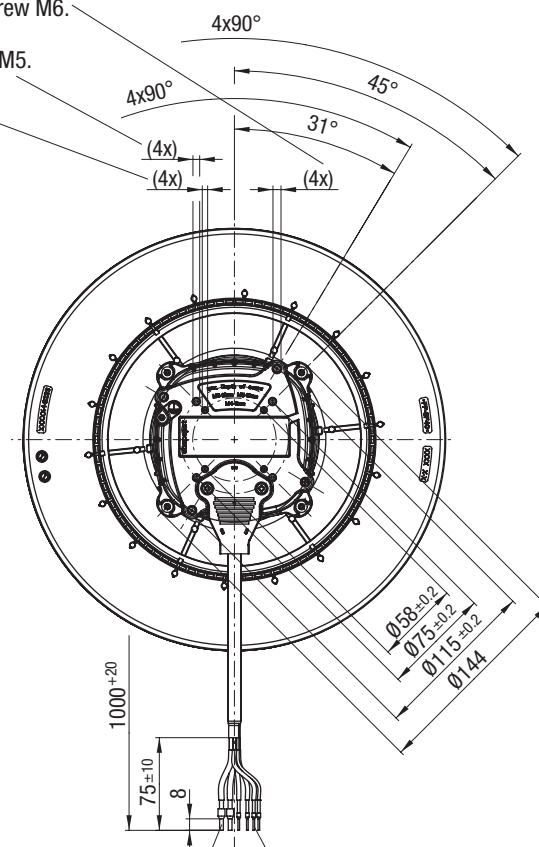


Accessory part:

Inlet ring 28000-2-4013,
not included in scope of delivery.
Dimensions: see "Accessories" chapter

Cable (halogen-free):

BETrans® GKW R 2,5 mm²,
2x crimped ferrules
(brown, black)



Cable (halogen-free):

BETrans® GKW R 1,0 mm²,
4x crimped ferrules
(yellow, white)




EC centrifugal fan – RadiCal

for railway applications, Ø 280



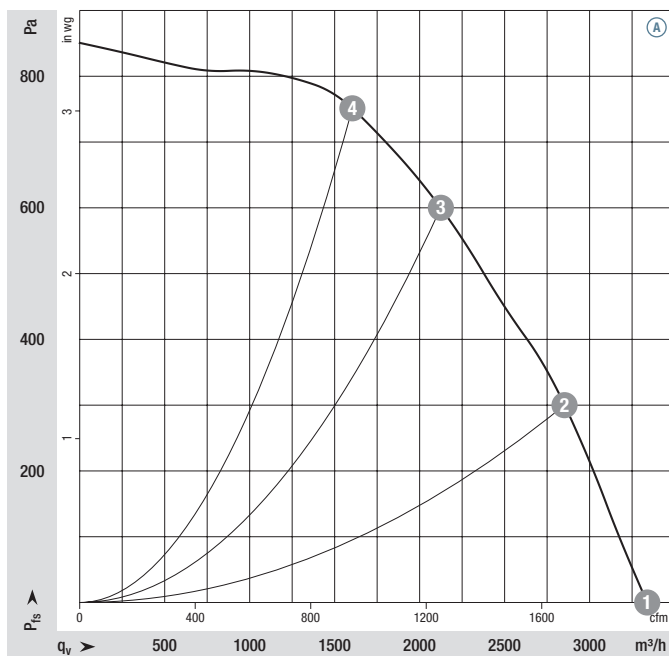
- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium, coated in black
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Installation position:** Any
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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-RU65 -82 ⁽¹⁾	M3G 084-CF		26	16-32	3730	2830	460	18,0	85	-40..+70	3,0	P. 81

subject to change

(1) 24-volt variant

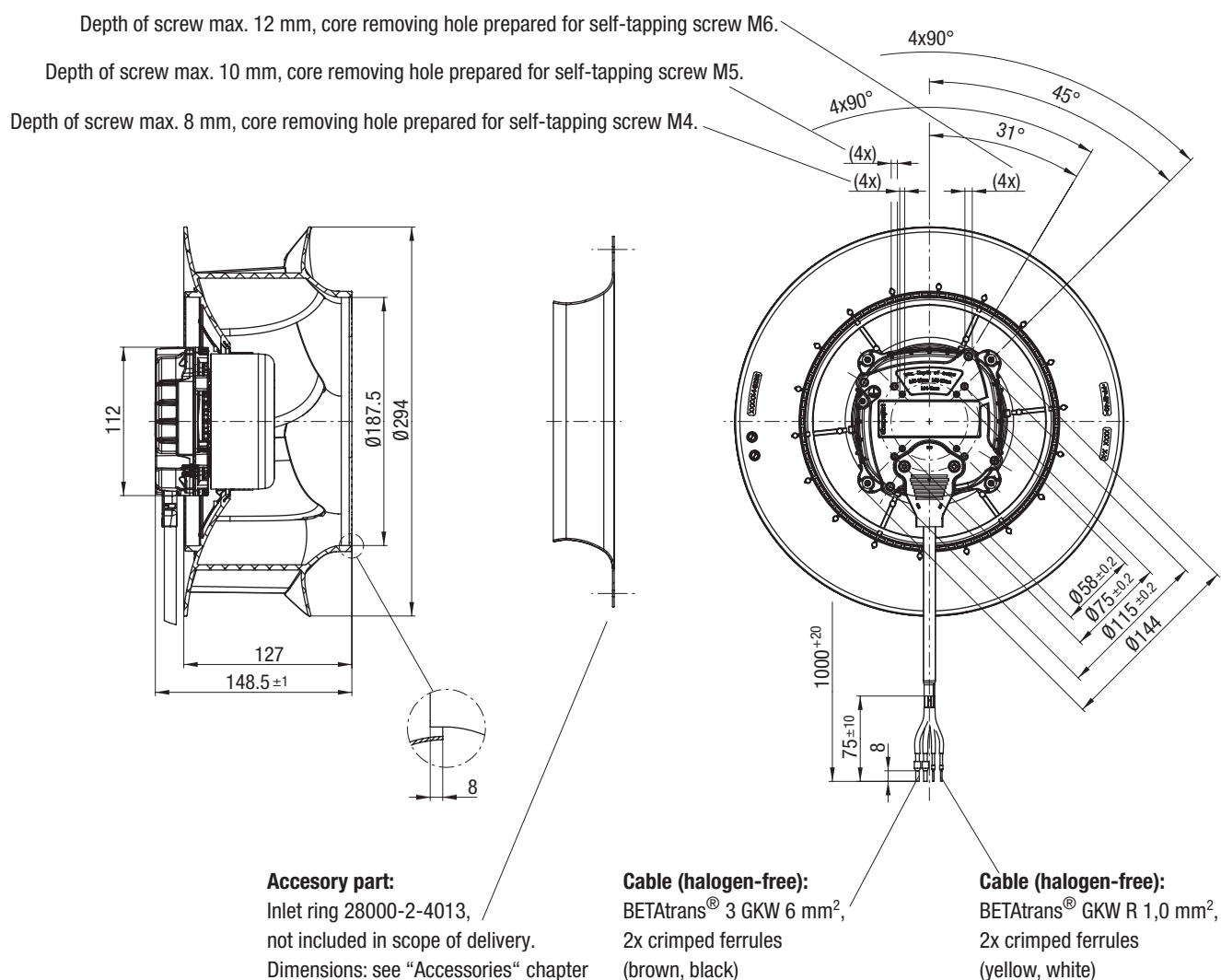
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ 1	2830	460	18,0	85
Ⓐ 2	2810	584	22,4	81
Ⓐ 3	2810	645	24,8	77
Ⓐ 4	2835	623	23,9	77

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 P. 86 ff.

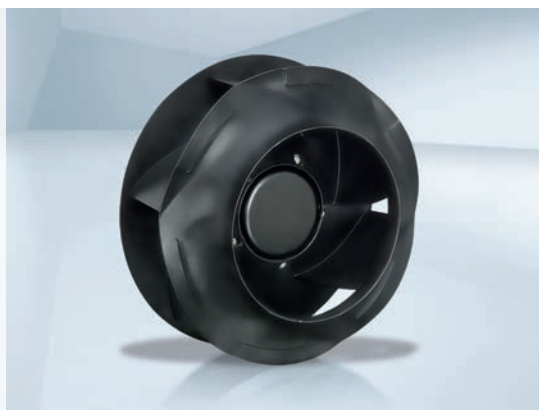
- **Technical features:** See electrical connections P. 81
- **Cable exit:** Lateral
- **Protection class:** III
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan – RadiCal

for railway applications, Ø 310



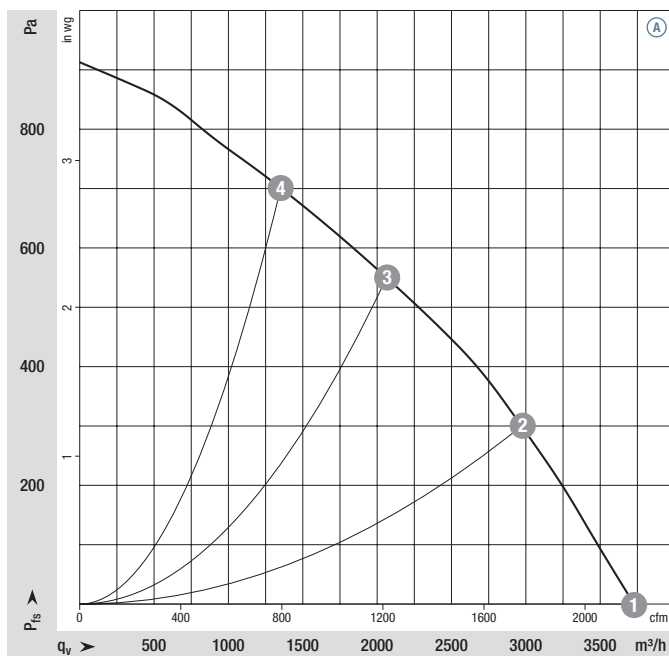
- **Material:** Impeller: plastic PA
Rotor: coated in black
Electronics housing: Die-cast aluminium, coated in black
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** Motor: IP 24 KM, Electronics: IP 66 / 69 K
- **Insulation class:** "B"
- **Installation position:** Any
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data

Type	Motor	Curve	Nominal voltage	Voltage range	Air flow	Speed/rpm	Input power	Input current	Sound power level	Perm. amb. temp.	Mass	Technical features and electrical connection
			VDC	VDC	m³/h	rpm	W	A	dB(A)	°C	kg	
R3G 310-RU29 -81	M3G 084-CF	Ⓐ	24	16-32	3730	2550	470	19,5	81	-40..+60	3,0	P. 81

subject to change

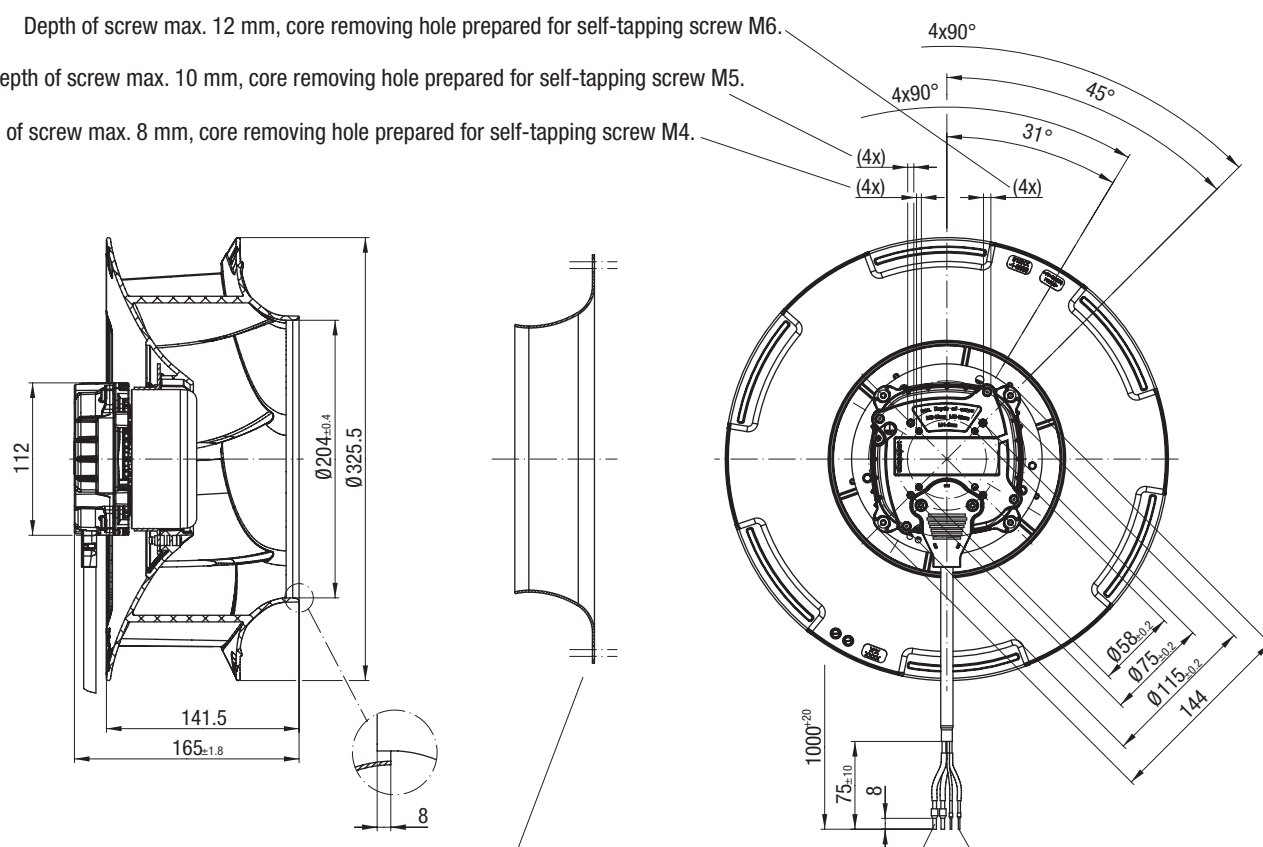
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ 1	2550	470	19,5	81
Ⓐ 2	2415	542	22,4	78
Ⓐ 3	2380	583	24,2	74
Ⓐ 4	2440	553	23,1	76

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 P. 86 ff.

- **Technical features:** See electrical connections P. 81
- **Cable exit:** Lateral
- **Protection class:** III
- **Conformity with standards:** See P. 4
- **Approvals:** EAC



Accessory part:
Inlet ring 31000-2-4013,
not included in scope of delivery.
Dimensions: see "Accessories" chapter

Cable (halogen-free):
BETrans® 3 GKW 6 mm²,
2x crimped ferrules
(brown, black)

Cable (halogen-free):
BETrans® GKW R 1,0 mm²,
2x crimped ferrules
(yellow, white)

Tractionized fans for railway applications - 110 VDC





EC centrifugal fan – RadiCal

for railway applications, Ø 190

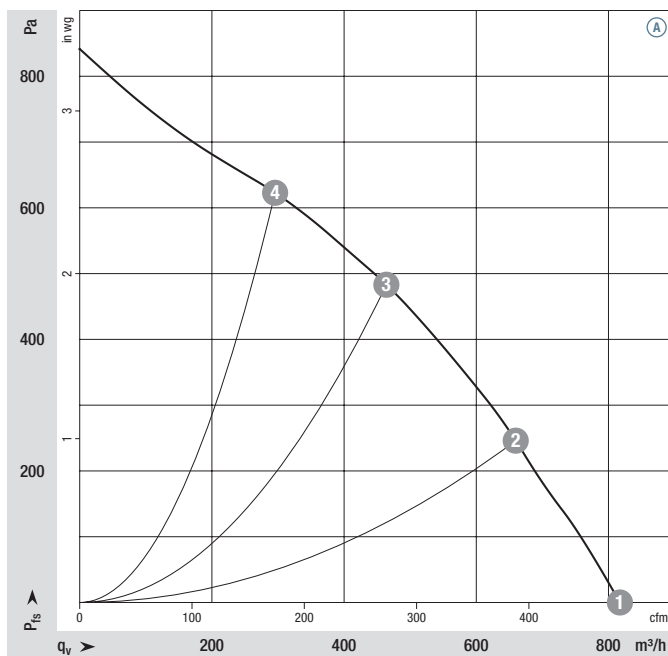


- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 44 according to EN 60529, depending on installation and position
- **Insulation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

Nominal data		Curve	Nominal voltage	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. 83

subject to change (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

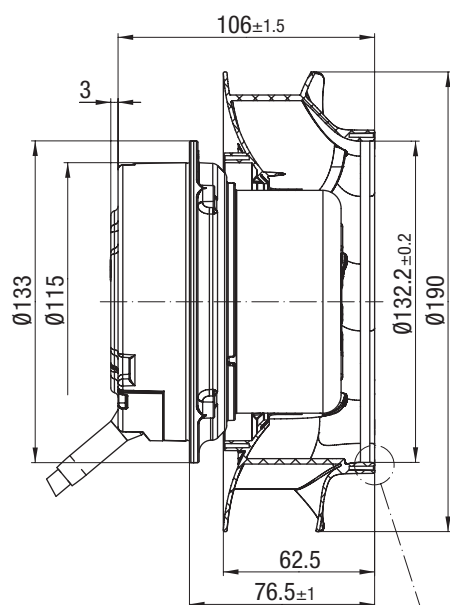
Air performance measured as per: ISO 5801, Installation category A, with ebm-papst inlet nozzle and without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} measured at 1 m distance to fan axis. The acoustic values given are only valid under the measurement 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 P. 86 ff.

- **Technical features:** See electrical connections P. 83
- **Cable exit:** Variable
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC

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

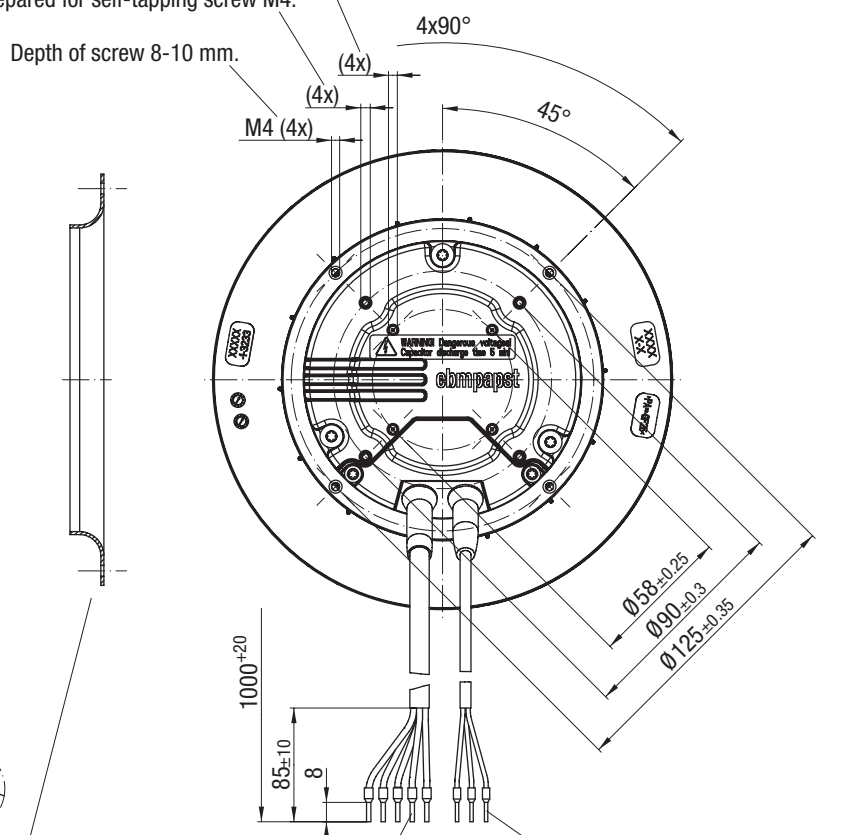
Depth of screw max. 6 mm, core removing hole prepared for self-tapping screw M4.

Depth of screw 8-10 mm.



Accessory part:

Inlet ring 09576-2-4013,
not included in scope of delivery.
Dimensions: see "Accessories" chapter



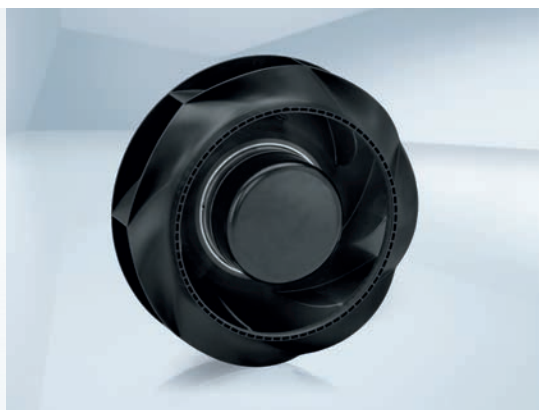
Cable (halogen-free):
BETAtans® 3 GWK flex,
5G 1.0 mm², 5x crimped ferrules

Cable (halogen-free):
BETAtans® 3 GWK flex,
3x 0.33 mm², 3x crimped ferrules




EC centrifugal fan – RadiCal

for railway applications, Ø 220



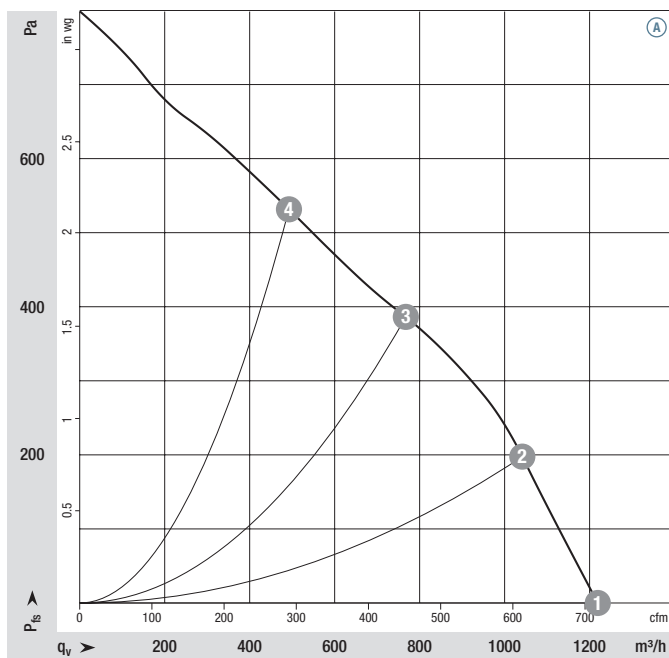
- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 44 according to EN 60529, depending on installation and position
- **Insulation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

Nominal data		Curve	Nominal voltage	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. 83	

subject to change

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

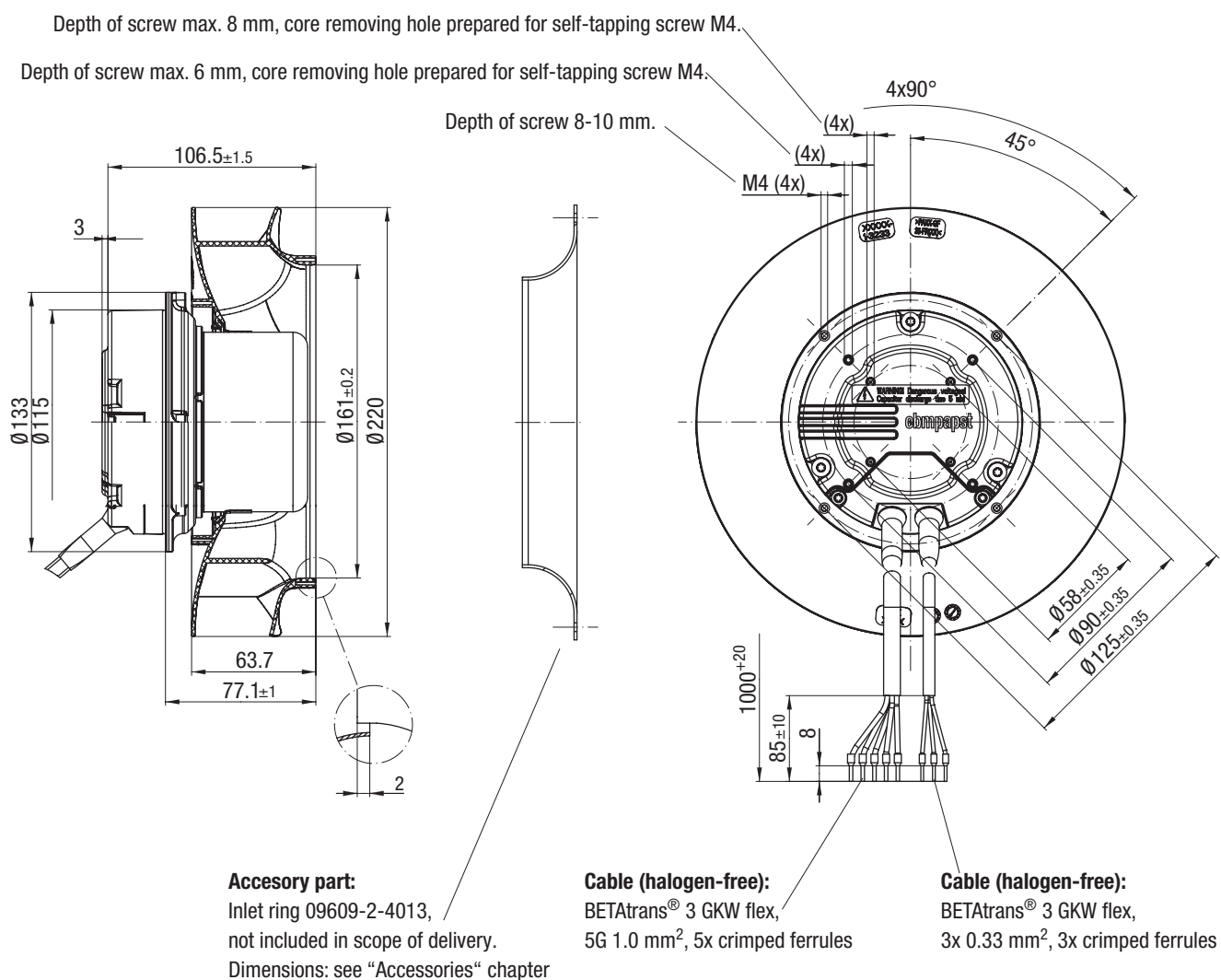
Curves:



	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 P. 86 ff.

- **Technical features:** See electrical connections P. 83
- **Cable exit:** Variable
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC






EC centrifugal fan – RadiCal

for railway applications, Ø 250



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

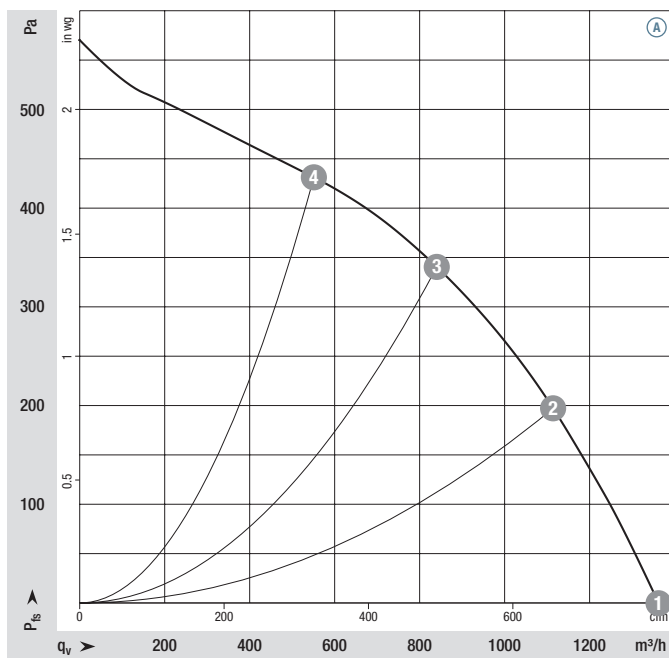
Nominal data		Curve	Nominal voltage	Voltage range	Air flow	Speed/rpm ⁽¹⁾	Max. Input power ⁽¹⁾	Max. Input current ⁽¹⁾	Sound power level	Perm. amb. temp.	Mass	Technical features and electrical connection
Type	Motor	VDC	VDC	m³/h	rpm	W	A	dB(A)	°C	kg		
R3G 250-RV83 -01 ⁽²⁾	M3G 074-CF	 110	77-138	1360	2485	160	1,50	74	-40..+60	2,3	P. 83	

subject to change

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

(2) Only able for inside applications

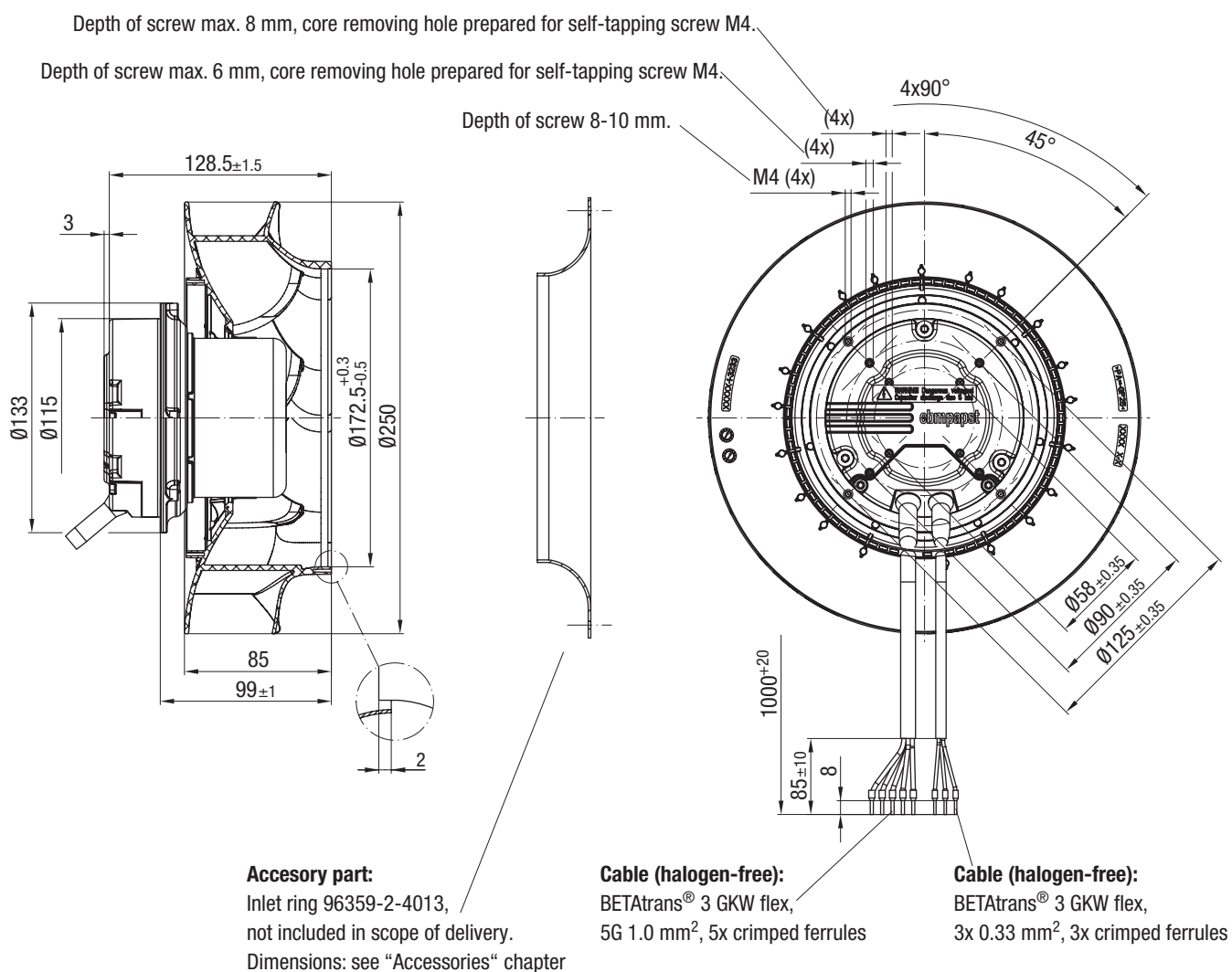
Curves:



	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	67
Ⓐ 4	2505	152	1,38	71

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 P. 86 ff.

- **Technical features:** See electrical connections P. 83
- **Cable exit:** Variable
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan – RadiCal

for railway applications, Ø 250

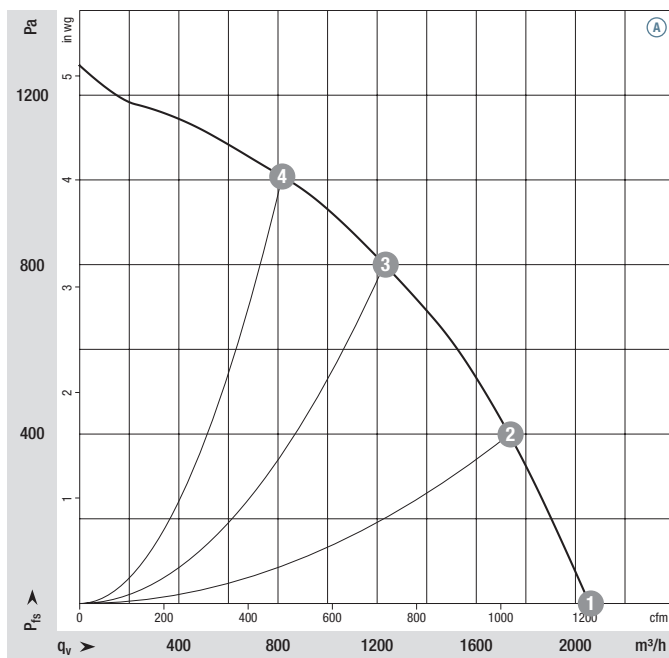


- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor-side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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	2055	3800	540	4,90	86	-40..+60	4,1	P. 82

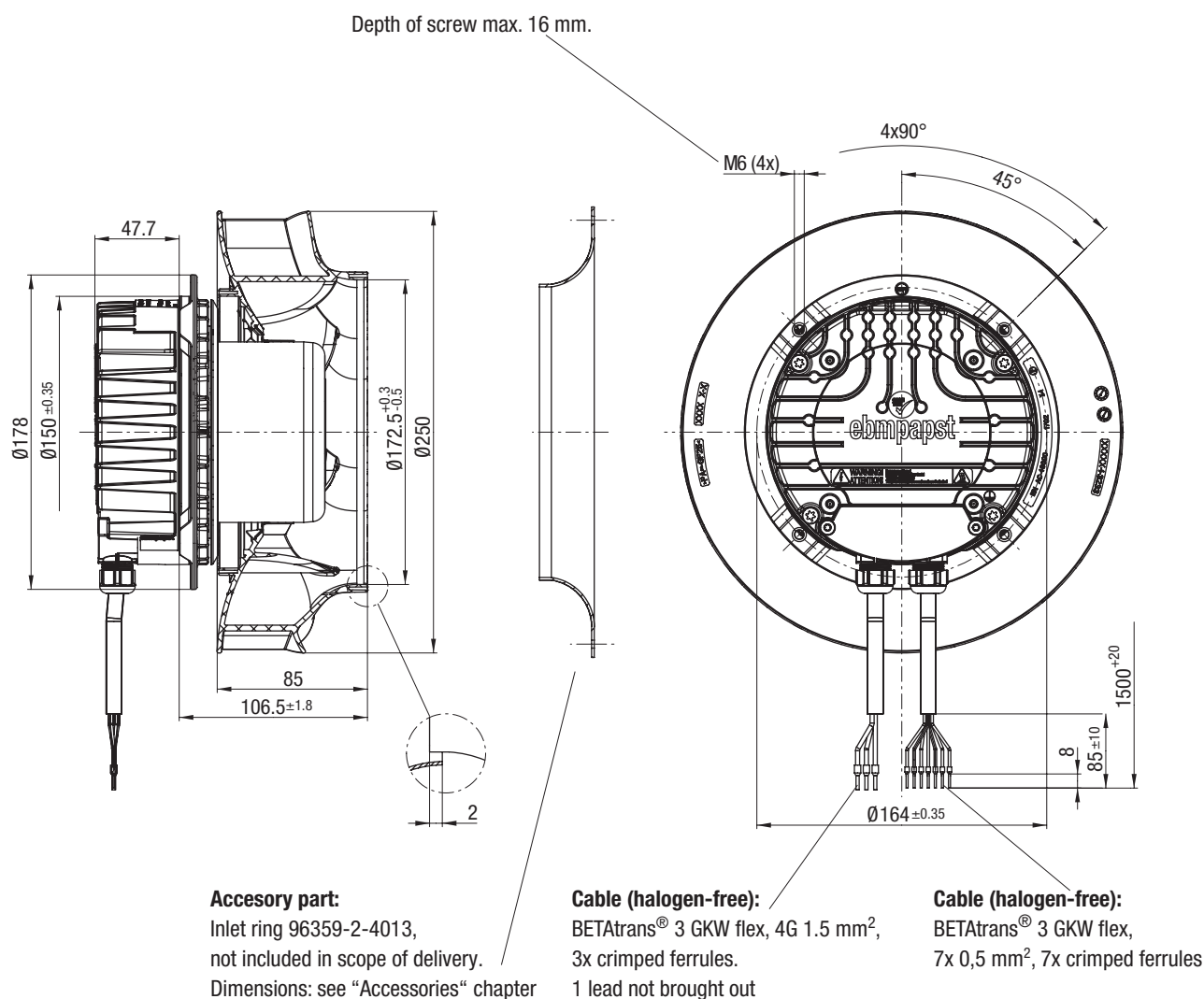
subject to change (1) Nominal data in operating point with maximum load and 110 VDC

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 P. 86 ff.

- **Technical features:** See electrical connections P. 82
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan – RadiCal

for railway applications, Ø 280

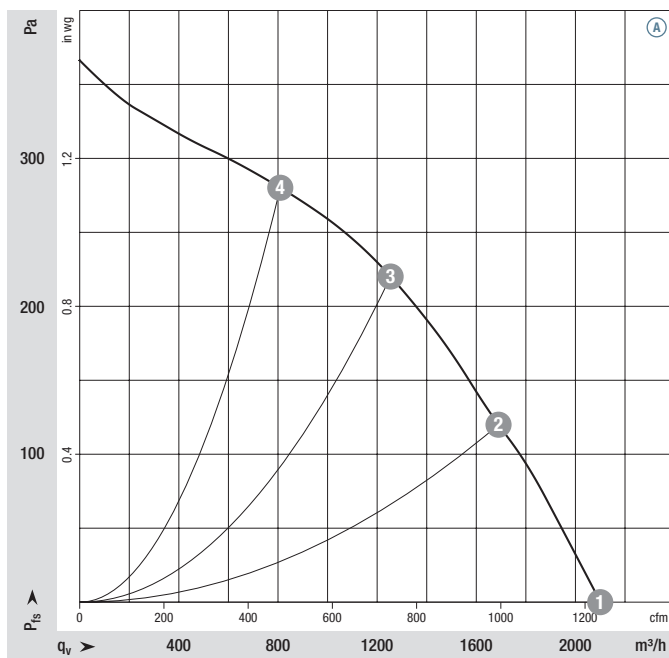


- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 44 according to EN 60529, depending on installation and position
- **Insulation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

Nominal data		Curve	Nominal voltage	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	2100	1670	135	1,25	71	-40..+50	2,8	P. 83

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

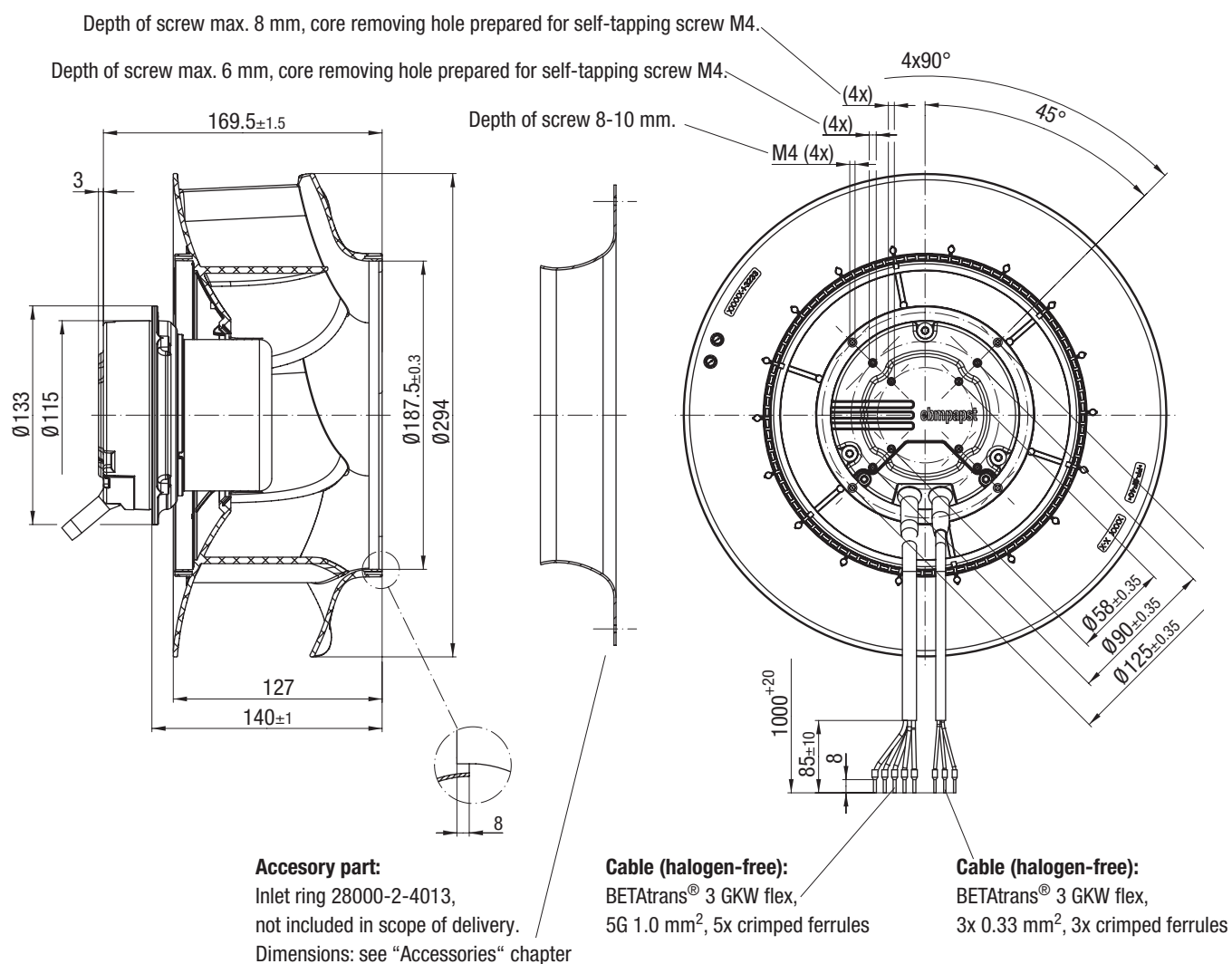
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ 1	1730	109	0,99	71
Ⓐ 2	1690	126	1,15	66
Ⓐ 3	1670	135	1,25	63
Ⓐ 4	1695	129	1,18	63

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 P. 86 ff.

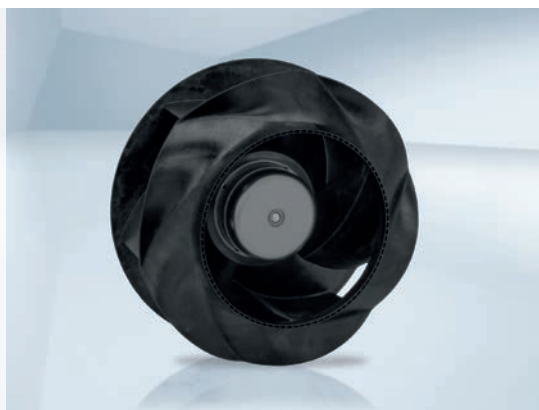
- **Technical features:** See electrical connections P.79
- **Cable exit:** Variable
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan – RadiCal

for railway applications, Ø 280

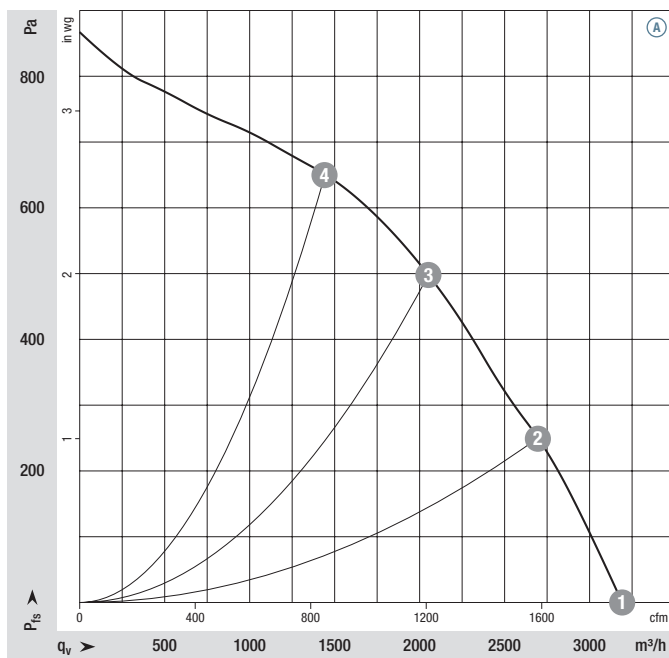


- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor-side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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. 82

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

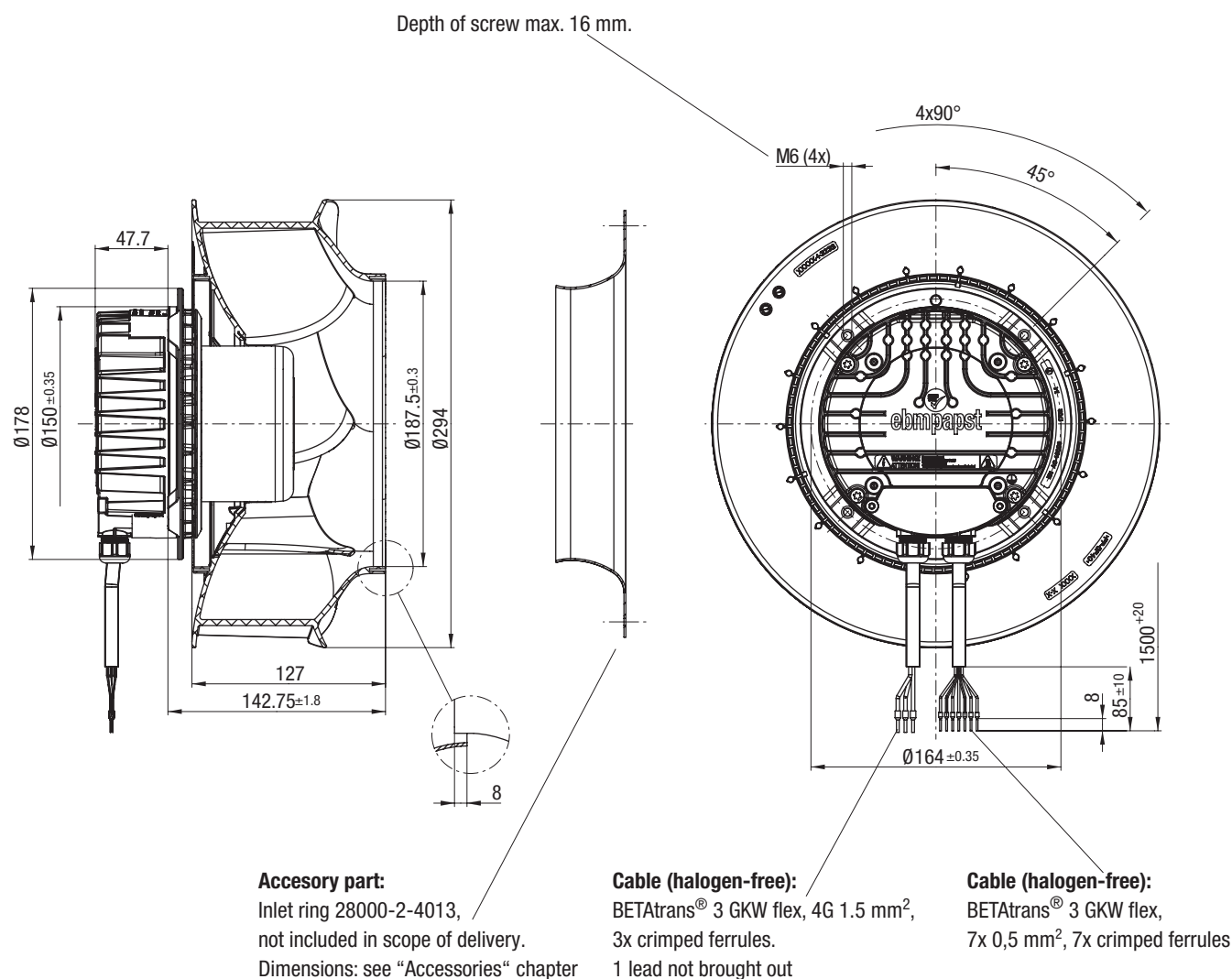
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ 1	2670	377	3,42	83
Ⓐ 2	2625	439	3,98	78
Ⓐ 3	2600	475	4,30	73
Ⓐ 4	2625	453	4,11	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 P. 86 ff.

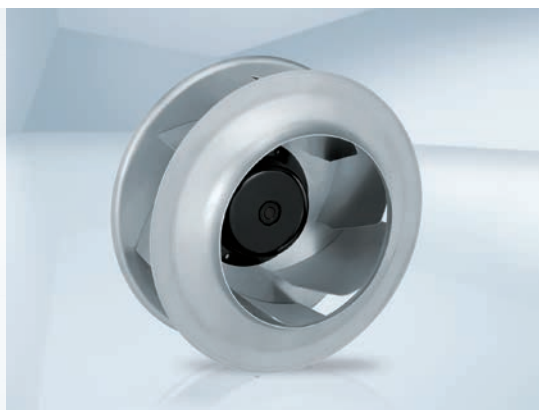
- **Technical features:** See electrical connections P. 82
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan

for railway applications, Ø 280

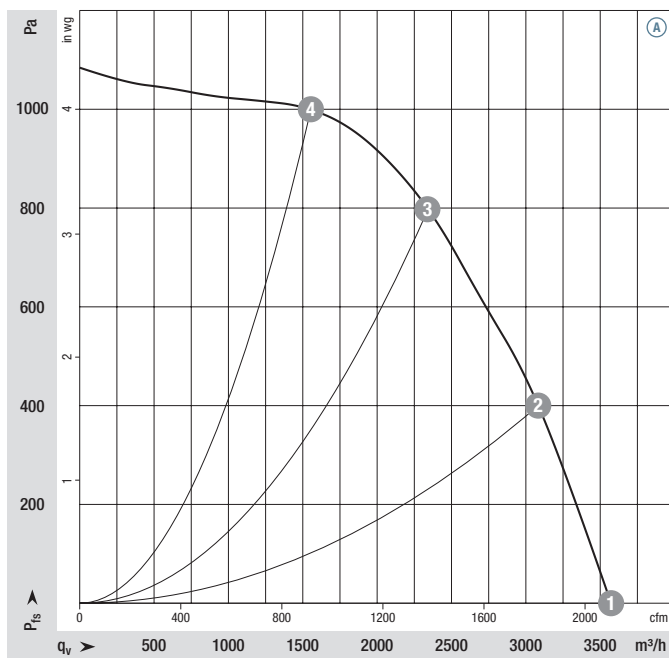


- **Material:** Impeller: Sheet aluminium
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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-BD13 -S1	M3G 084-GF	Ⓐ	110	77-138	3575	3140	1000	9,00	88	-40..+60	8,0	P. 82

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

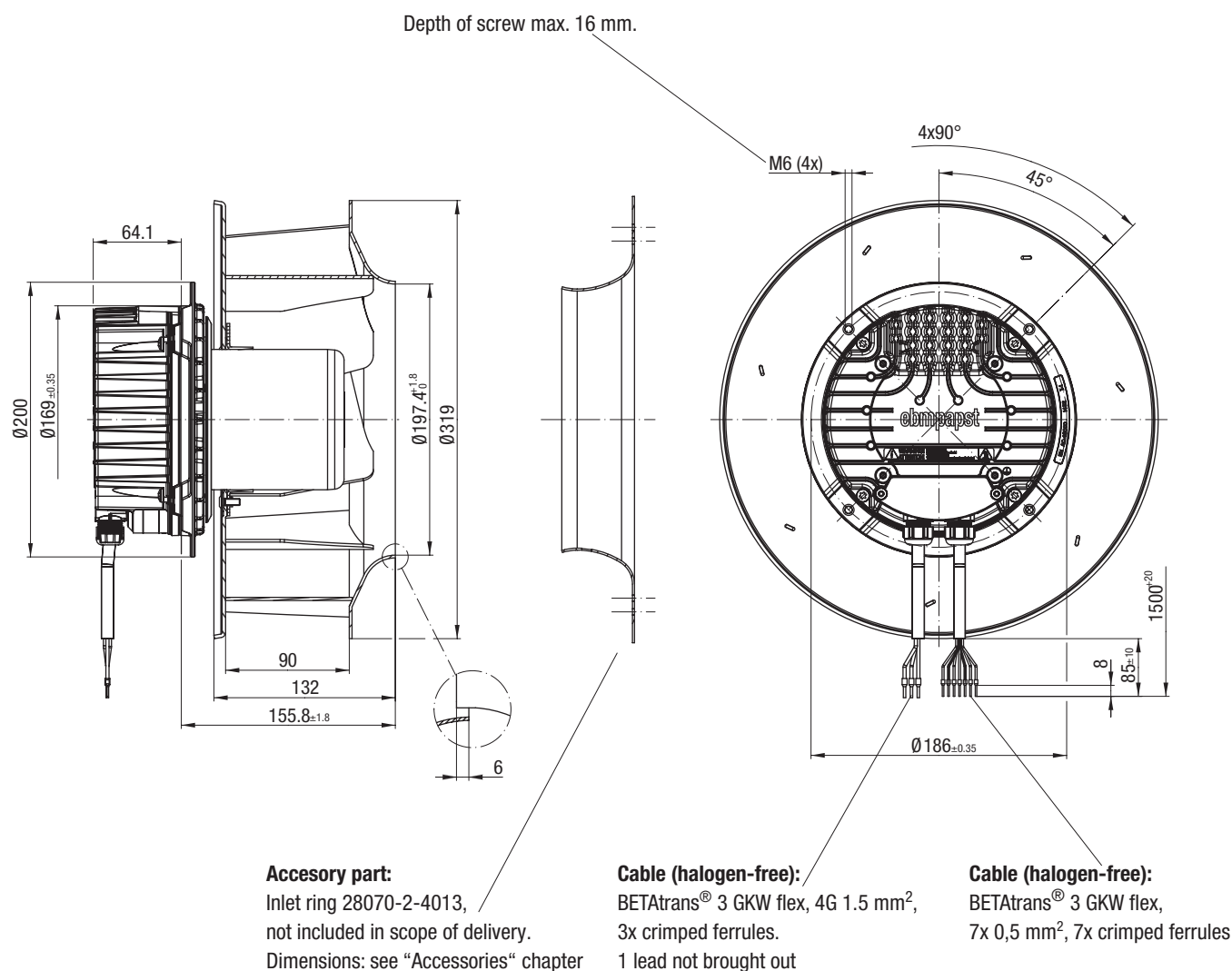
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ ①	3140	783	7,10	88
Ⓐ ②	3140	944	8,58	85
Ⓐ ③	3140	1000	9,00	82
Ⓐ ④	3140	894	8,12	82

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 P. 86 ff.

- **Technical features:** See electrical connections P. 82
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC






EC centrifugal fan – RadiCal

for railway applications, Ø 310



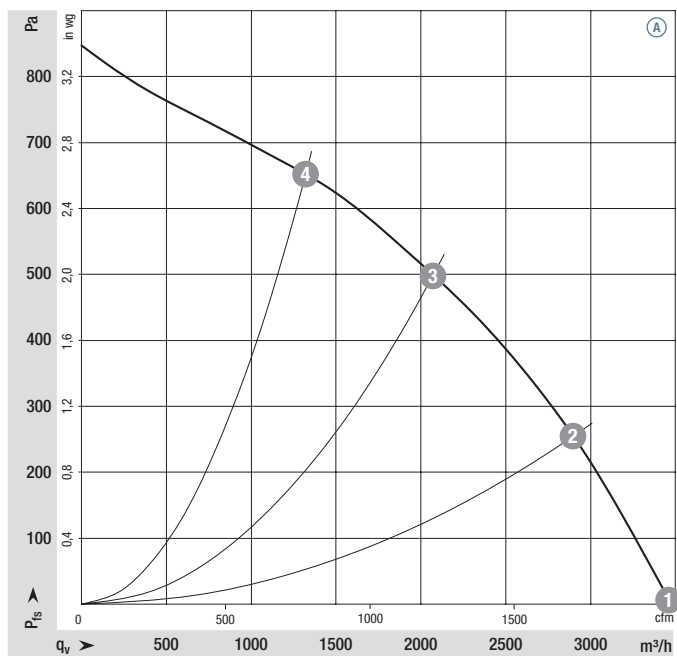
- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor-side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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. 82	

subject to change

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

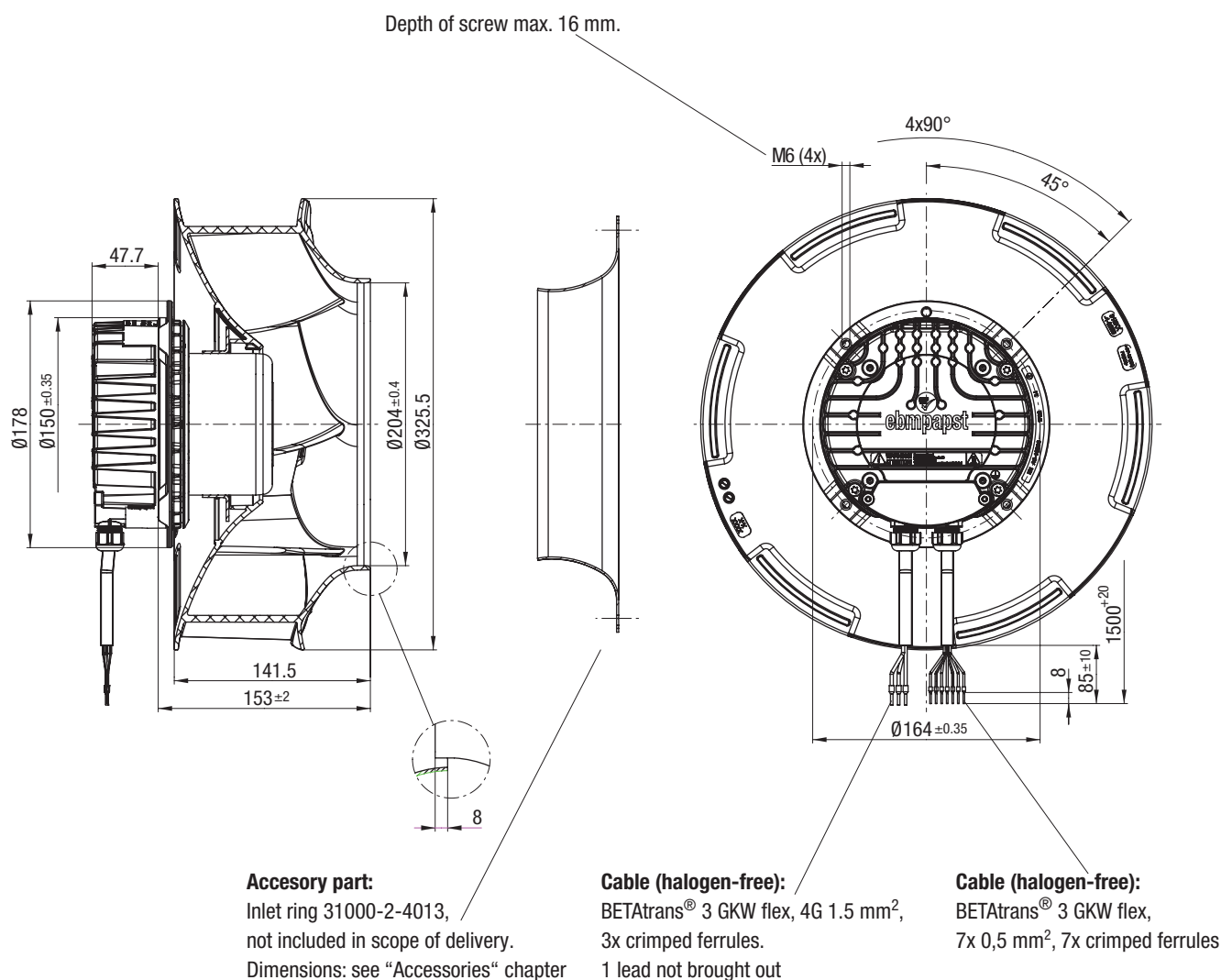
Curves:



	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 P. 86 ff.

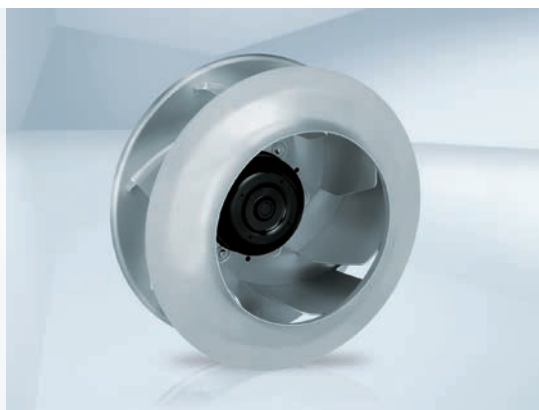
- **Technical features:** See electrical connections P. 82
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan

for railway applications, Ø 310



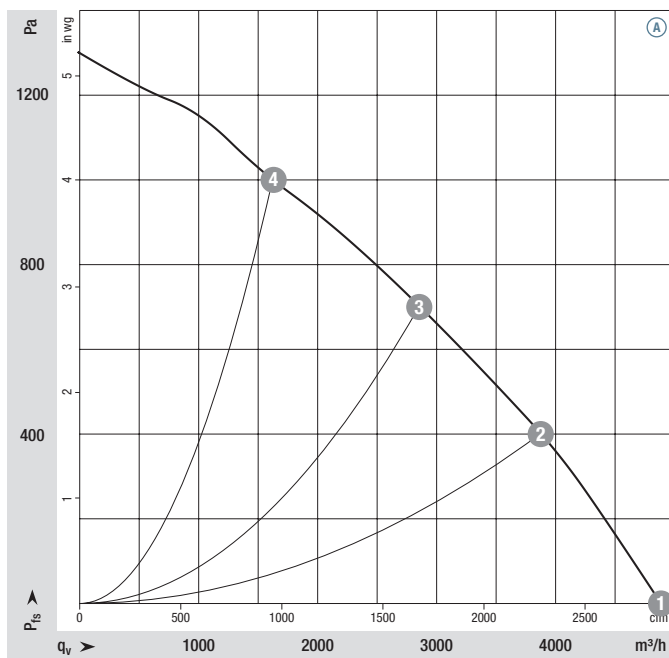
- **Material:** Impeller: Sheet aluminium
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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-BE84 -S1	M3G 112-EA	Ⓐ	110	77-138	4885	2650	1000	9,00	88	-40..+60	8,5	P. 82

subject to change

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

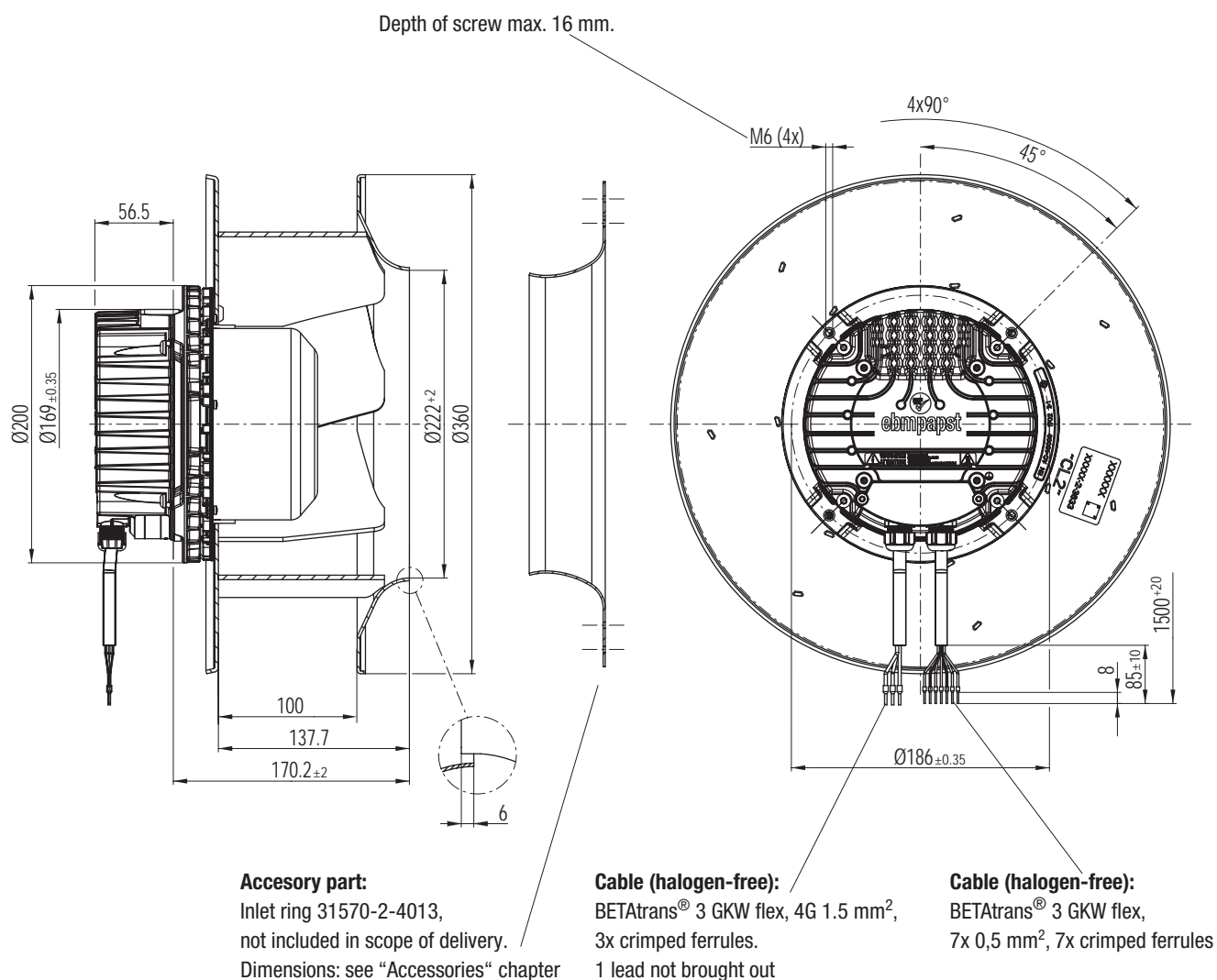
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ 1	2915	1000	9,00	88
Ⓐ 2	2730	1000	9,00	82
Ⓐ 3	2650	1000	9,00	77
Ⓐ 4	2765	1000	9,00	84

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 P. 86 ff.

- **Technical features:** See electrical connections P. 82
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan – RadiCal

for railway applications, Ø 355

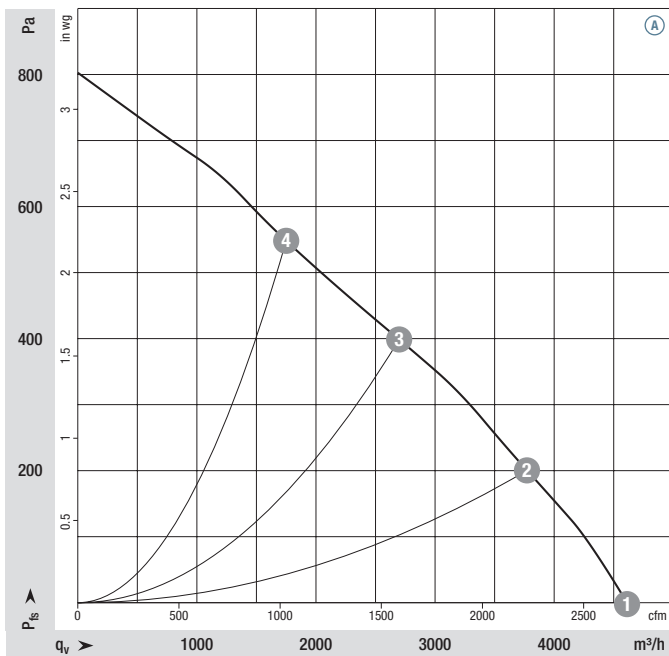


- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor-side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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-RS13 -P1	M3G 084-FA	Ⓐ	110	77-138	4610	1830	500	4,70	81	-40..+60	5,5	P. 82

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

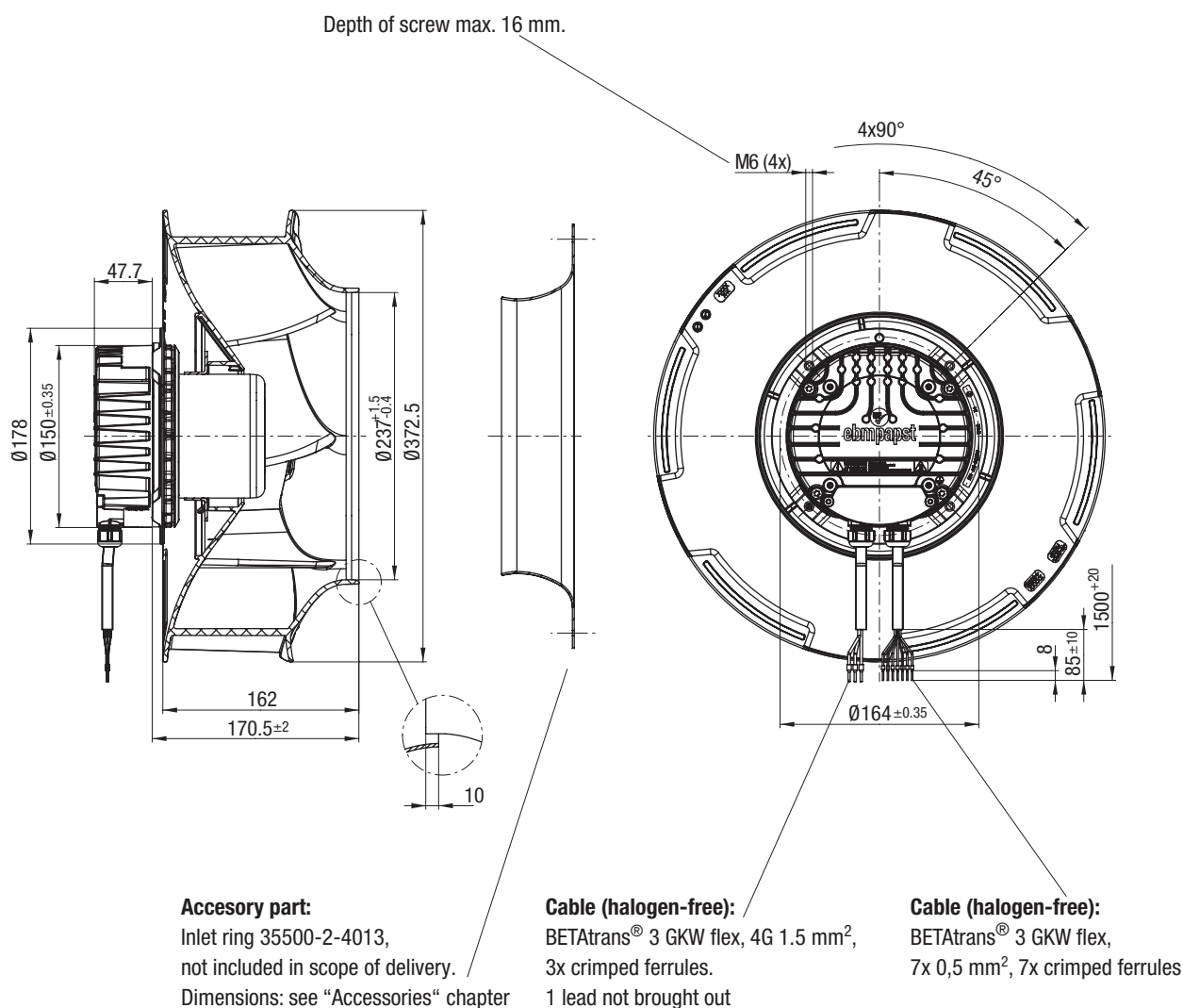
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ ①	2035	475	4,32	81
Ⓐ ②	1905	500	4,70	76
Ⓐ ③	1830	500	4,70	70
Ⓐ ④	1885	500	4,70	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 P. 86 ff.

- **Technical features:** See electrical connections P. 82
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan – RadiCal

for railway applications, Ø 355

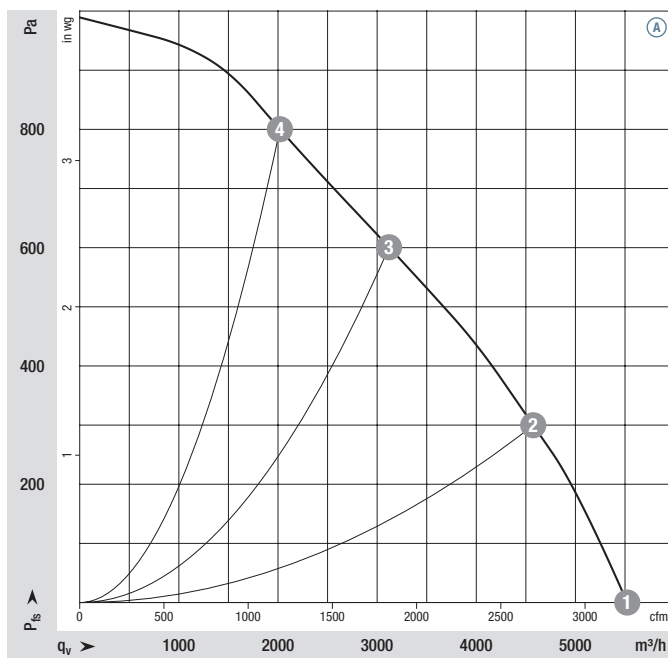


- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium, coated in black
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Any
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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-RJ85 -S1	M3G 112-EA	Ⓐ	110	77-138	5525	2200	880	8,00	93	-40..+60	8,4	P. 82

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

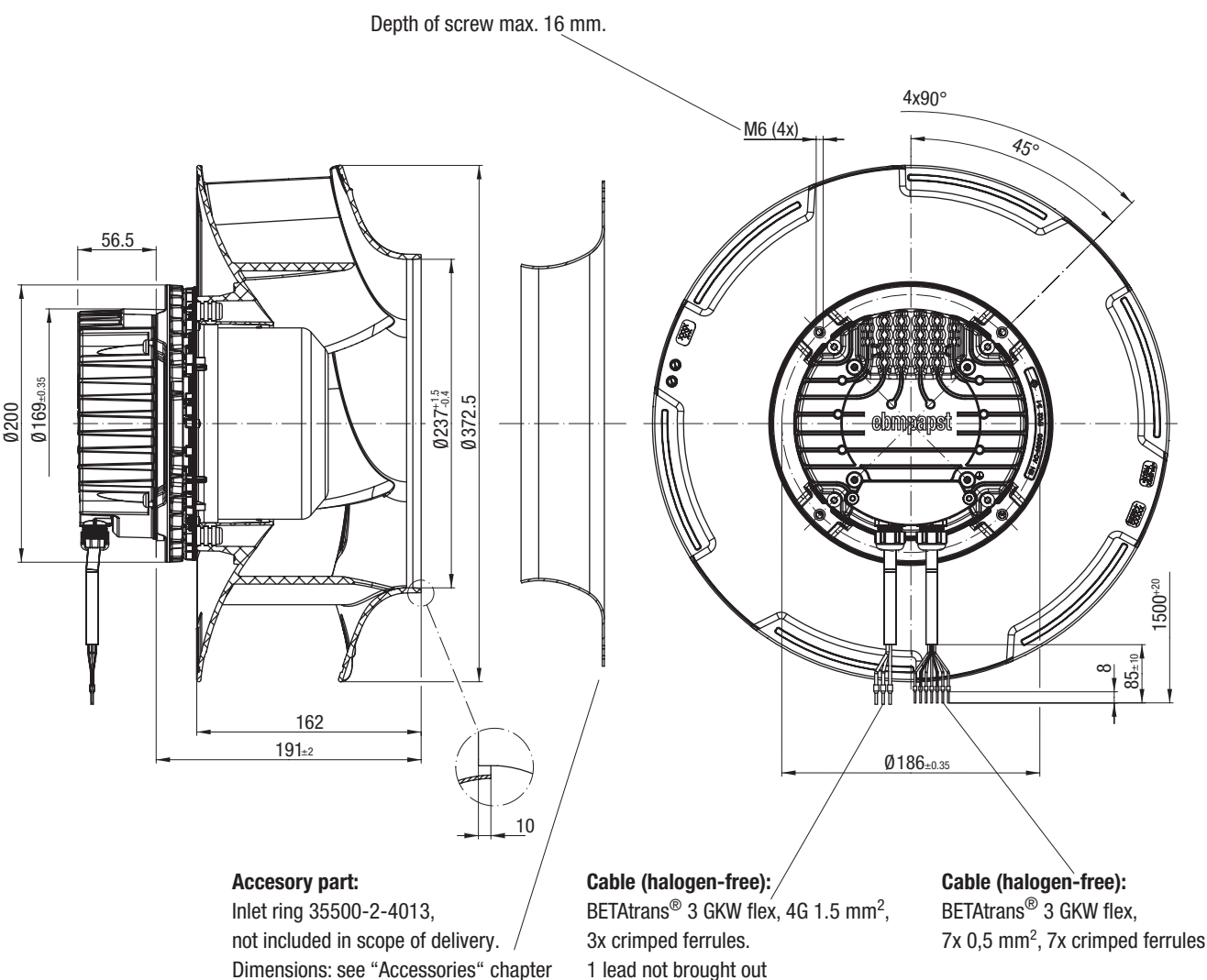
Curves:



	n rpm	P _{ed} W	I A	L _{wA} dB(A)
Ⓐ 1	2400	759	6,89	93
Ⓐ 2	2285	880	8,00	85
Ⓐ 3	2200	880	8,00	75
Ⓐ 4	2270	880	8,00	78

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 P. 86 ff.

- **Technical features:** See electrical connections P. 82
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC



Tractionized fans for railway applications - 400 VAC





EC axial fan

for railway applications, Ø 450



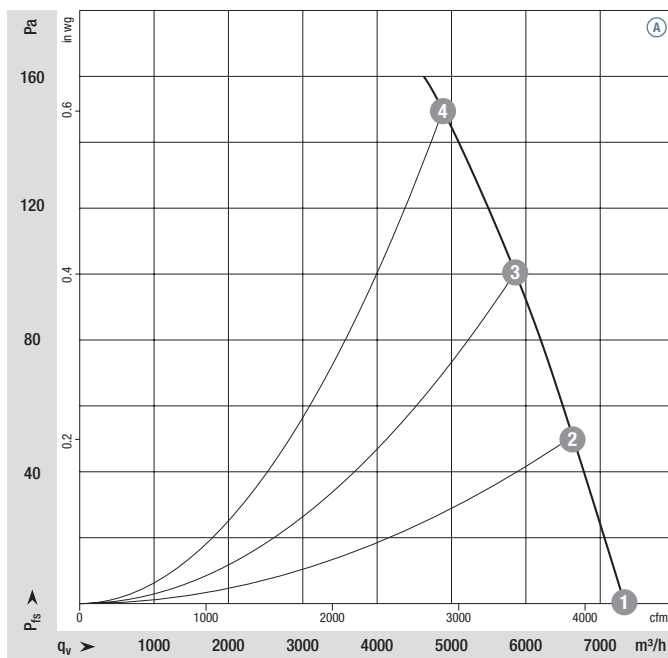
- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 5
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Any
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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	VAC	VAC	m³/h	rpm	W	A	dB(A)	°C	kg		
A3G 450-BL12 -N1	M3G 084-FA	Ⓐ	400	380-480	4890	1500	500	0,83	76	-40..+60	5,3	P. 85

subject to change

(1) Nominal data in operating point with maximum load and 400 VAC

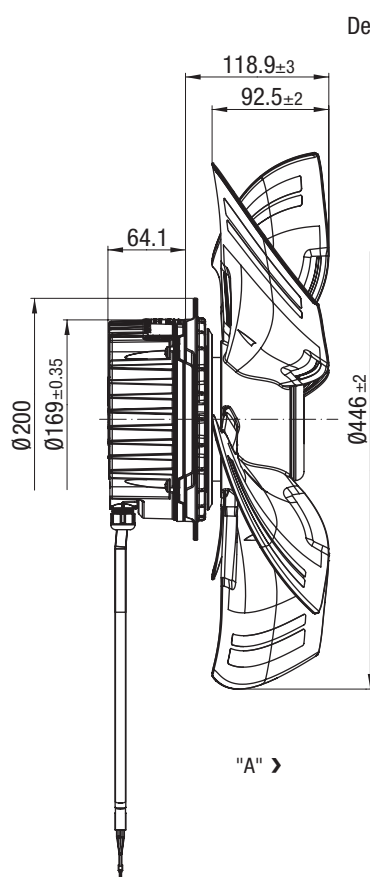
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ 1	1500	387	0,67	76
Ⓐ 2	1500	435	0,74	72
Ⓐ 3	1500	474	0,79	69
Ⓐ 4	1500	500	0,83	70

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 P. 82 ff.

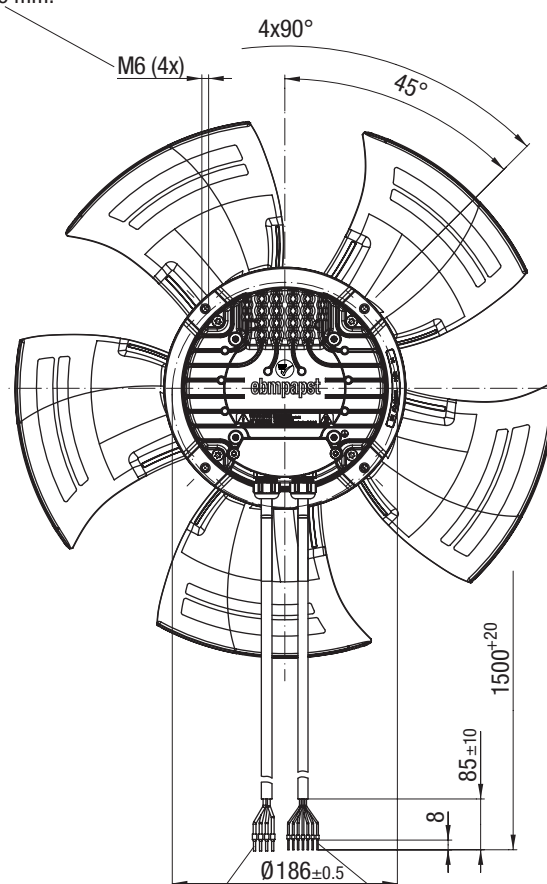
- **Technical features:** See electrical connections P. 85
- **Touch current:** $\leq 3,5$ mA
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC



Attention!

Use the axial fan only with a suitable fan housing (not a standard housing). Consult ebm-papst for information.

Depth of screw max. 16 mm.



Cable (halogen-free):
BETAtans® 3 GKW flex,
4G 1,5 mm², 4x crimped ferrules

Cable (halogen-free):
BETAtans® 3 GKW flex,
7x 0,5 mm², 7x crimped ferrules



EC axial fan

for railway applications, Ø 500



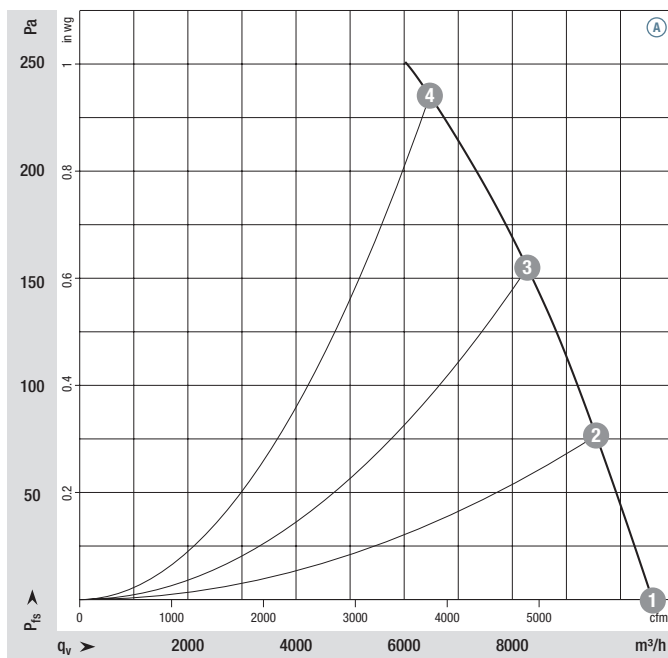
- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 5
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Any
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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	VAC	VAC	m³/h	rpm	W	A	dB(A)	°C	kg		
A3G 500-BA74 -N1	M3G 112-EA	A	400	380-480	6470	1600	1000	1,60	81	-40..+60	7,4	P. 85

subject to change

(1) Nominal data in operating point with maximum load and 400 VAC

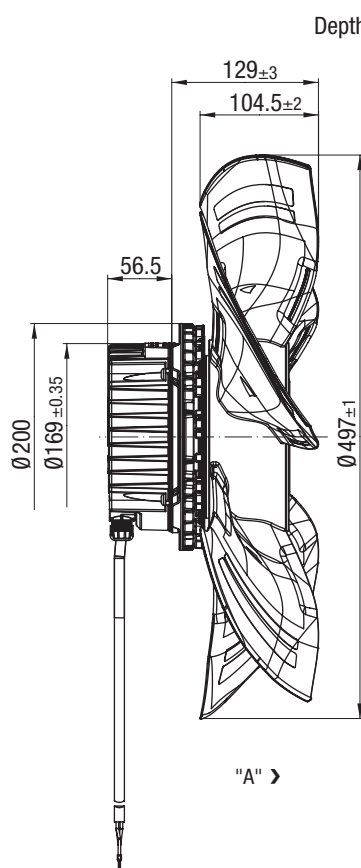
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ ①	1600	713	1,14	81
Ⓐ ②	1600	827	1,31	78
Ⓐ ③	1600	929	1,45	76
Ⓐ ④	1600	1000	1,60	77

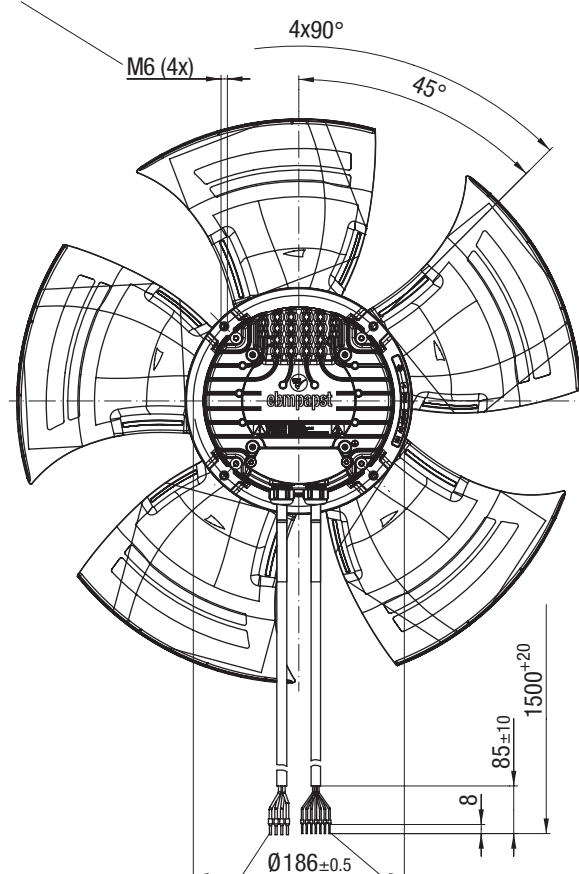
Air performance measured as per: ISO 5801, Installation category A, without protection against accidental contact. Suction-side noise levels: L_{WA} as per ISO 13347, L_{pA} measured at 1 m distance to fan axis. The acoustic values given are only valid under the measurement conditions listed and may 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 P. 82 ff.

- **Technical features:** See electrical connections P. 85
- **Touch current:** $\leq 3,5 \text{ mA}$
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC



Attention!

Use the axial fan only with a suitable fan housing (not a standard housing). Consult ebm-papst for information.



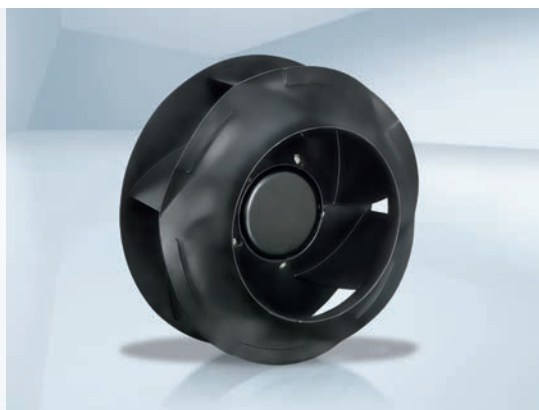
Cable (halogen-free):
BETrans® 3 GKW flex,
4G 1,5 mm², 4x crimped ferrules

Cable (halogen-free):
BETrans® 3 GKW flex,
7x 0,5 mm², 7x crimped ferrules



EC centrifugal fan – RadiCal

for railway applications, Ø 250

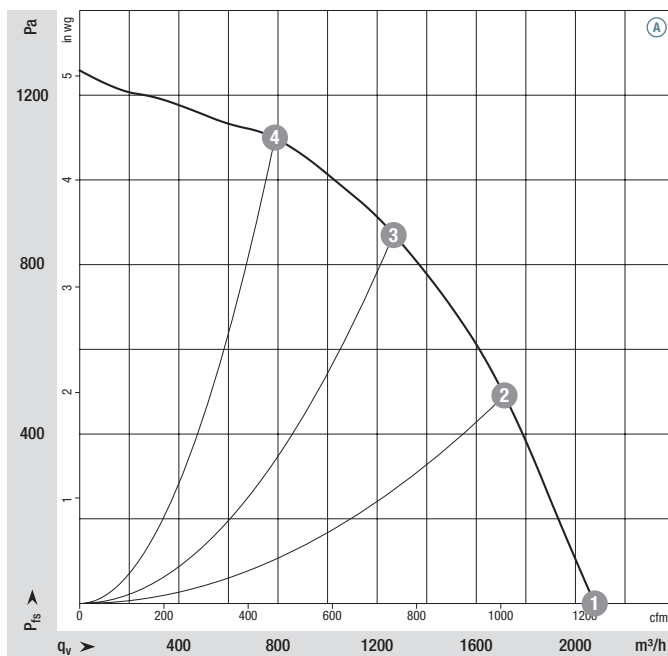


- **Material:** Impeller: plastic PA UL94 V0, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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	VAC	VAC	m³/h	rpm	W	A	dB(A)	°C	kg		
R3G 250-RR04 -N1	M3G 084-DF	Ⓐ	400	380-480	2080	4000	615	0,85	87	-40..+70	4,6	P. 85

subject to change (1) Nominal data in operating point with maximum load and 400 VAC

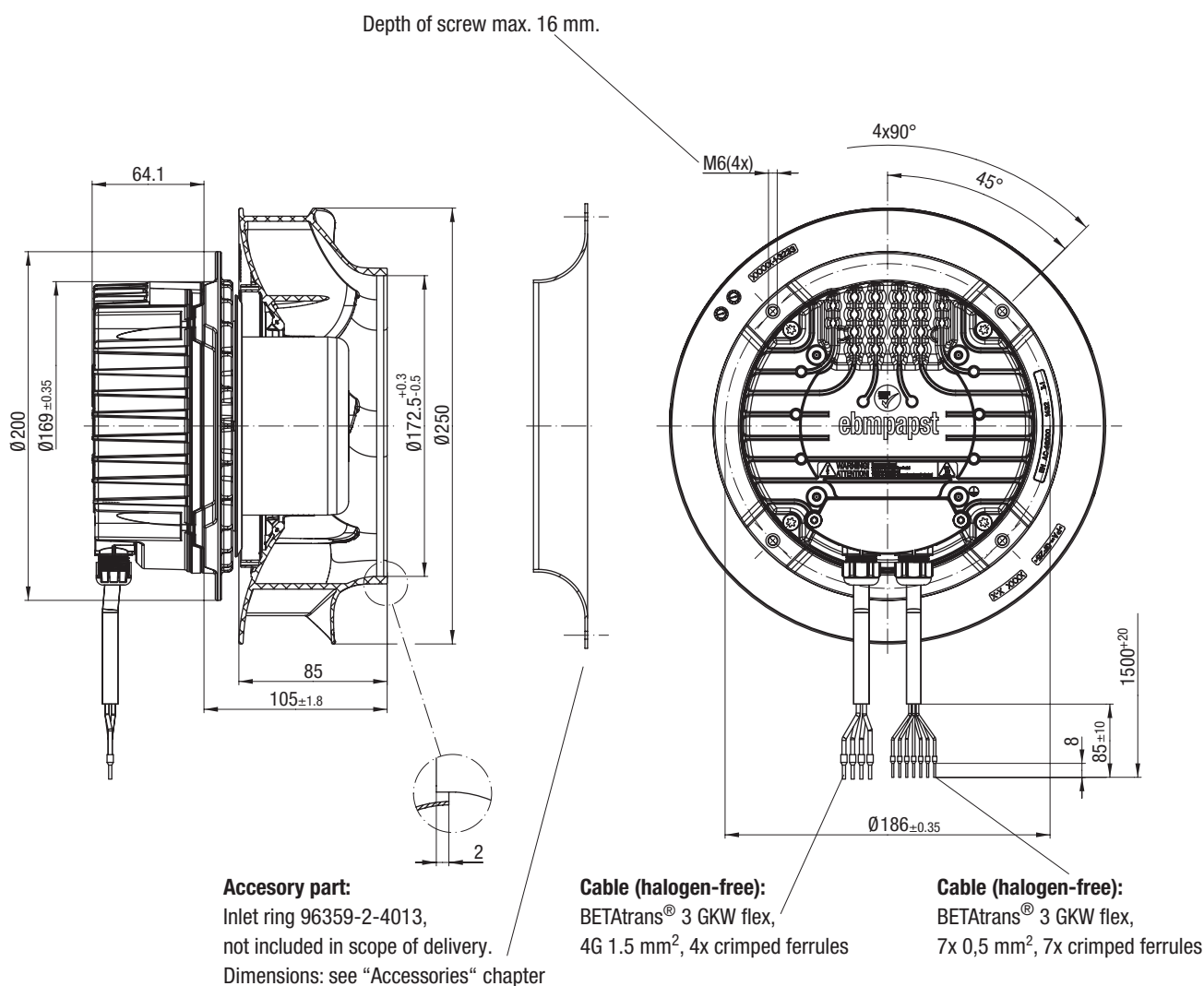
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ ①	4000	484	0,70	87
Ⓐ ②	4000	562	0,79	84
Ⓐ ③	4000	615	0,85	82
Ⓐ ④	4000	552	0,78	85

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 P. 86 ff.

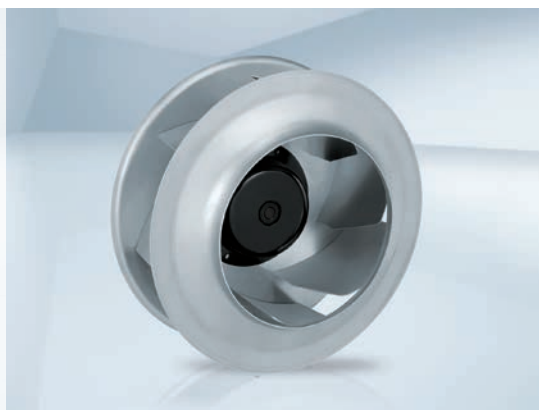
- **Technical features:** See electrical connections P. 85
- **Touch current:** $\leq 3,5$ mA
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan

for railway applications, Ø 250



- **Material:** Impeller: Sheet aluminium
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

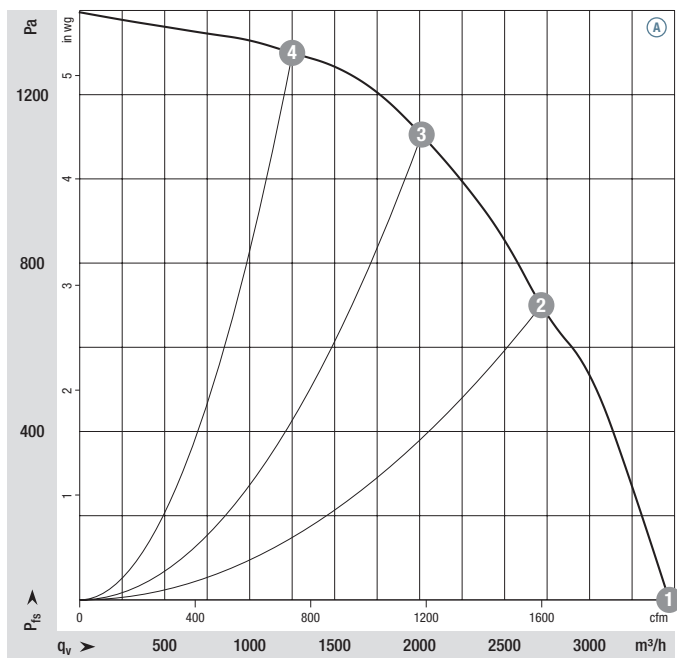
Nominal data

Type	Motor	VAC	VAC	m³/h	rpm	W	A	dB(A)	°C	kg		
R3G 250-BB01 -N1	M3G 084-DF	Ⓐ	400	380-480	3470	4000	1050	1,60	87	-40..+60	5,1	P. 85

subject to change

(1) Nominal data in operating point with maximum load and 400 VAC

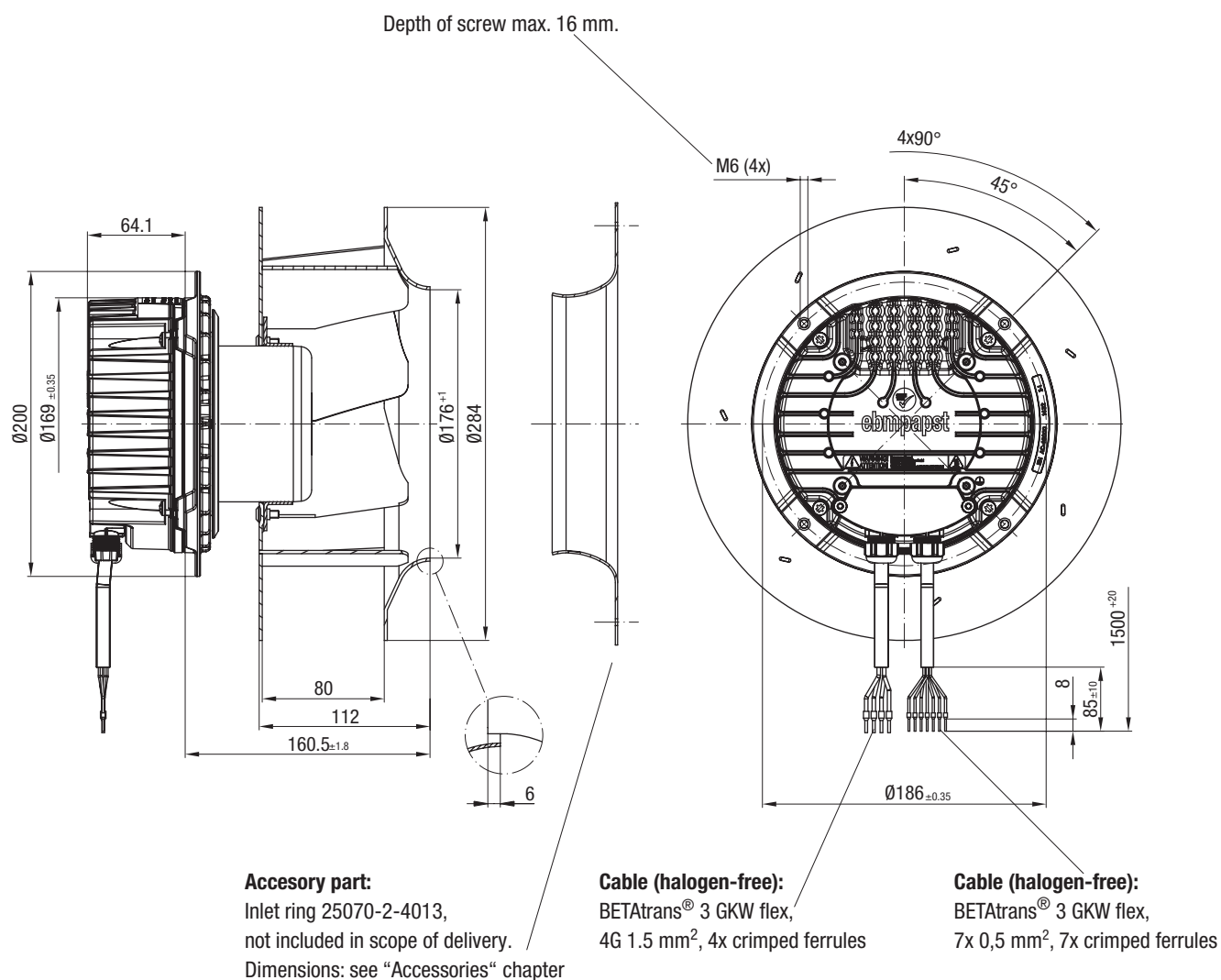
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ 1	4000	781	1,26	87
Ⓐ 2	4000	981	1,55	82
Ⓐ 3	4000	1050	1,60	81
Ⓐ 4	4000	953	1,52	89

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 P. 86 ff.

- **Technical features:** See electrical connections P. 85
- **Touch current:** $\leq 3,5 \text{ mA}$
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC






EC centrifugal fan – RadiCal

for railway applications, Ø 280



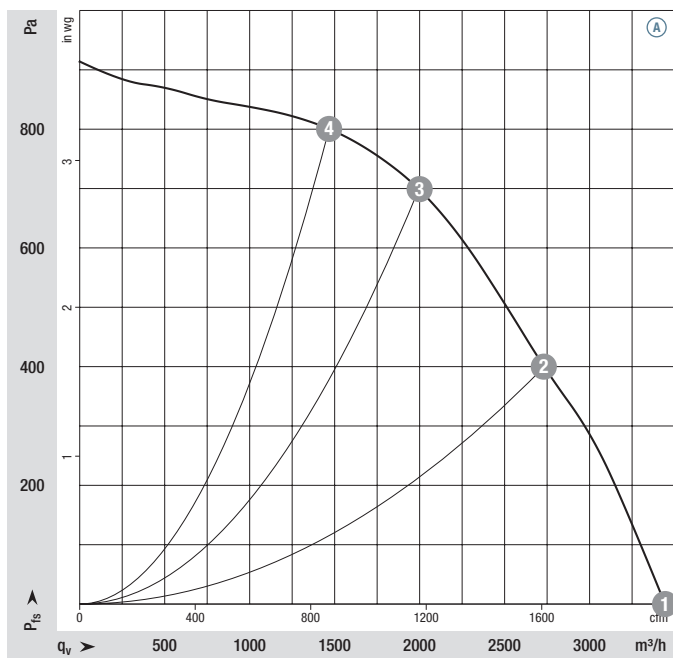
- **Material:** Impeller: plastic PA, black
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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	VAC	VAC	m³/h	rpm	W	A	dB(A)	°C	kg		
R3G 280-RR05 -N1	M3G 084-DF	 400	380-480	3445	2900	640	1,05	86	-40..+60	4,9	P. 85	

subject to change

(1) Nominal data in operating point with maximum load and 400 VAC

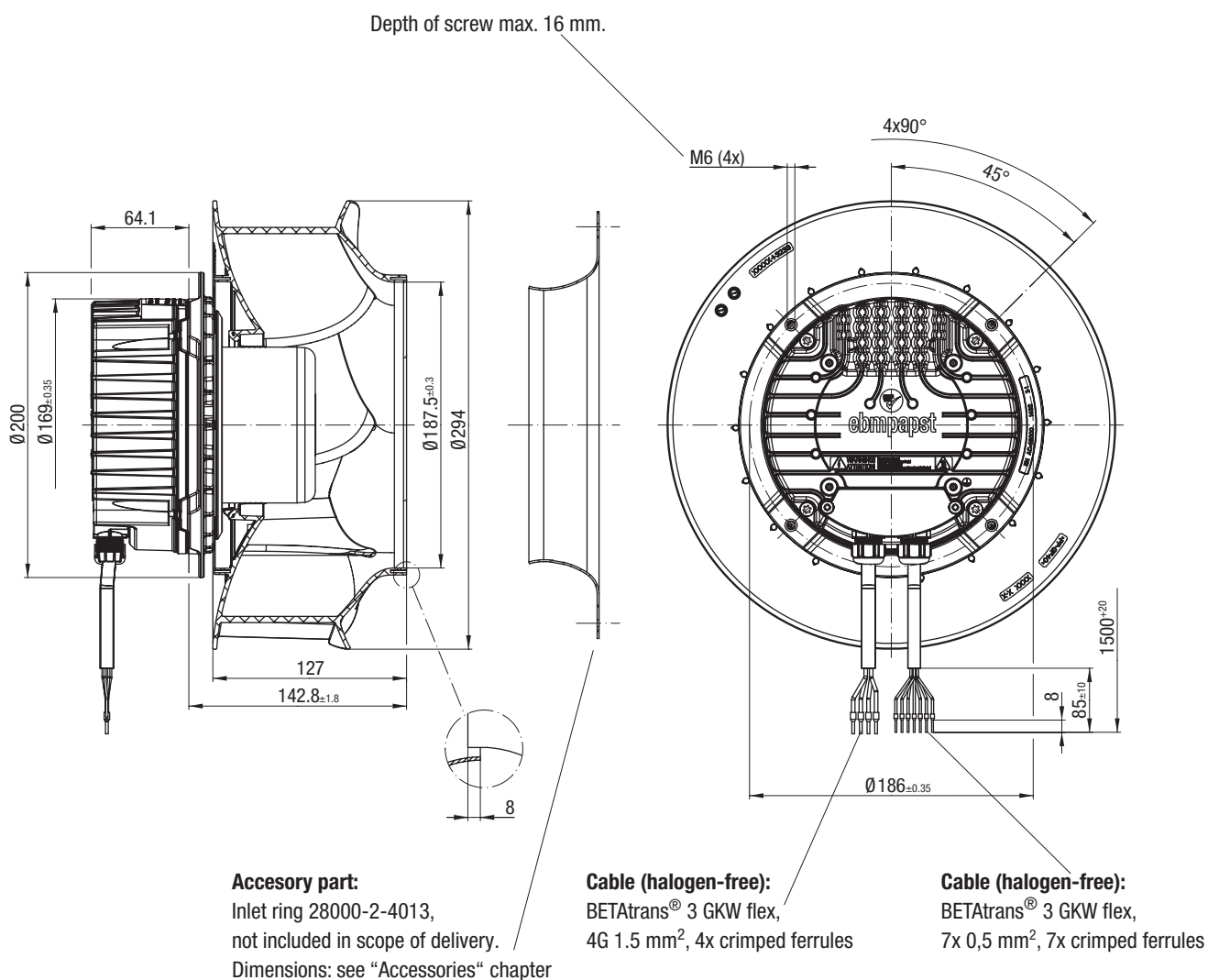
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ 1	2900	473	0,81	86
Ⓐ 2	2900	599	1,01	80
Ⓐ 3	2900	640	1,05	76
Ⓐ 4	2900	587	0,97	77

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 P. 86 ff.

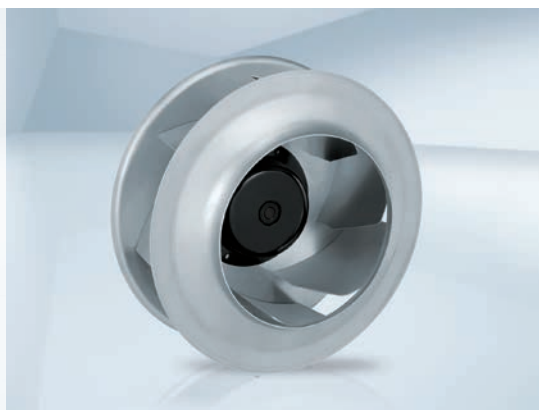
- **Technical features:** See electrical connections P. 85
- **Touch current:** $\leq 3,5$ mA
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC






EC centrifugal fan

for railway applications, Ø 280



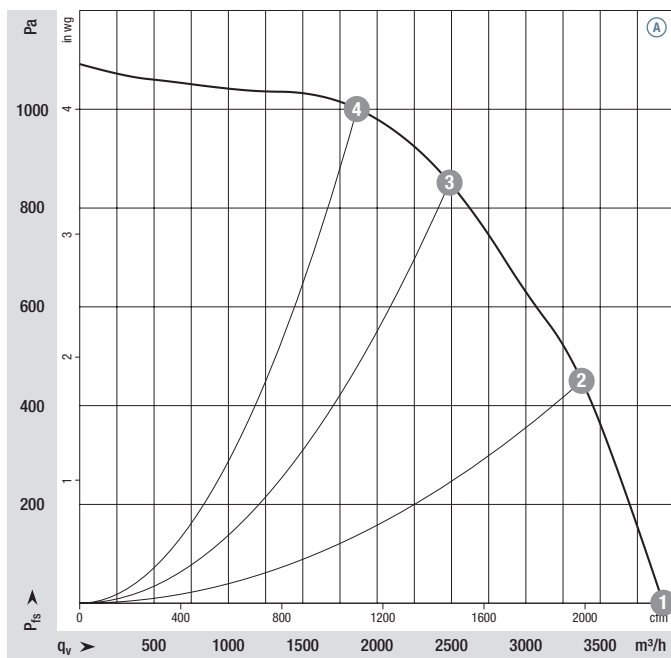
- **Material:** Impeller: Sheet aluminium
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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	VAC	VAC	m³/h	rpm	W	A	dB(A)	°C	kg		
R3G 280-BC01 -N1	M3G 084-FA	 400	380-480	3925	3140	975	1,50	87	-40..+60	6,9	P. 85	

subject to change

(1) Nominal data in operating point with maximum load and 400 VAC

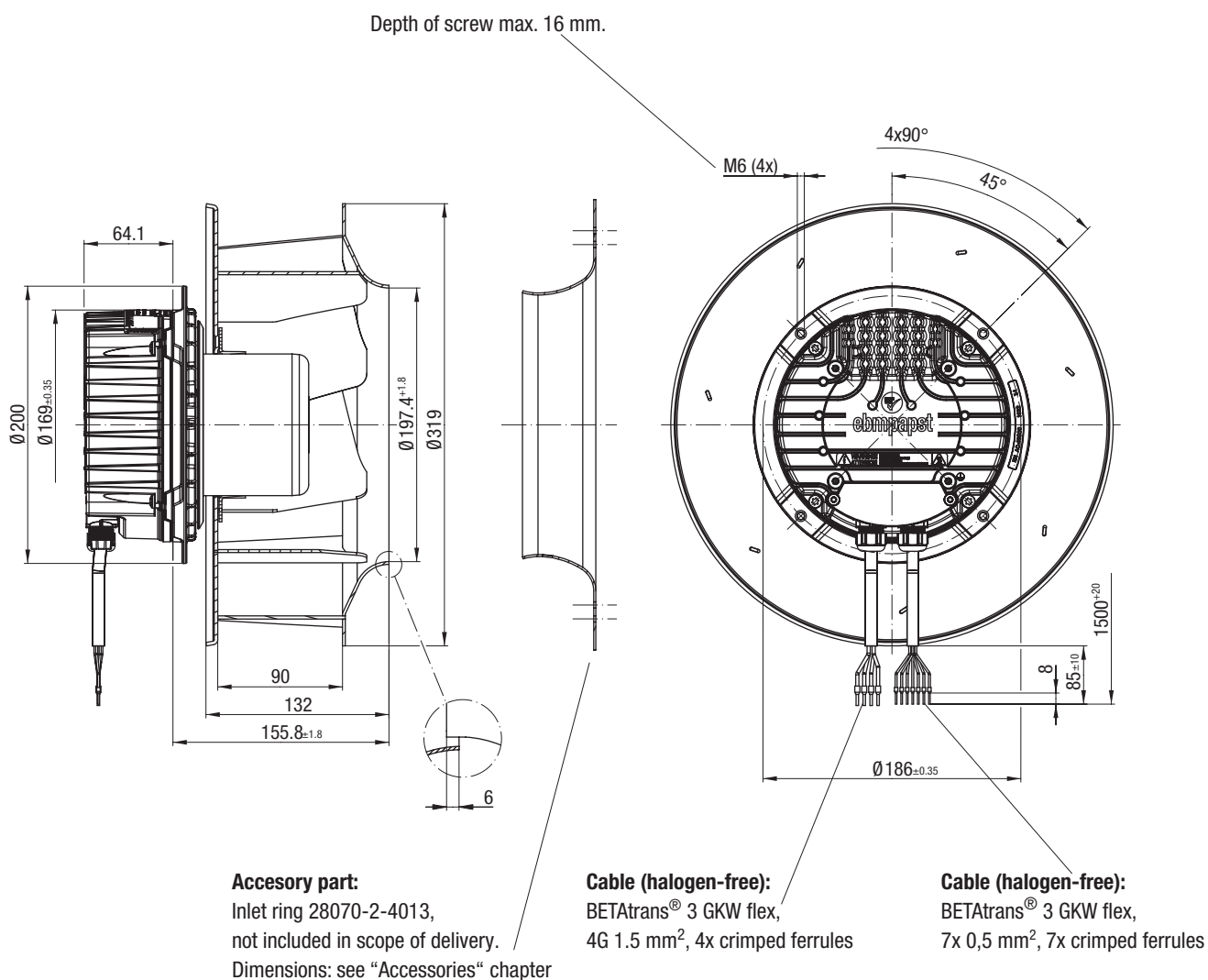
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ ①	3140	743	1,21	87
Ⓐ ②	3140	922	1,47	83
Ⓐ ③	3140	975	1,50	80
Ⓐ ④	3140	931	1,48	82

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 P. 86 ff.

- **Technical features:** See electrical connections P. 85
- **Touch current:** $\leq 3,5$ mA
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC






EC centrifugal fan – RadiCal

for railway applications, Ø 310



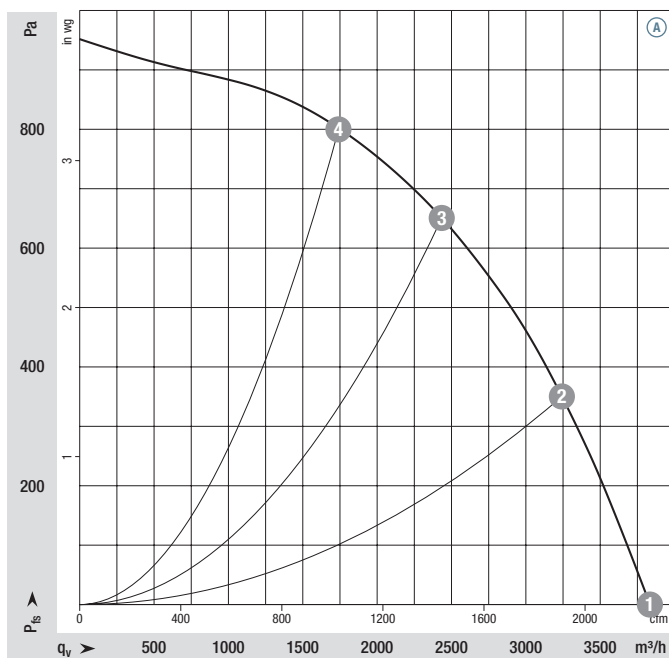
- **Material:** Impeller: plastic PA
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Rotor on top
- **Condensation drainage holes:** None
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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	VAC	VAC	m³/h	rpm	W	A	dB(A)	°C	kg		
R3G 310-RR05 -N1	M3G 084-DF	 400	380-480	3835	2650	750	1,20	83	-40..+60	5,2	P. 85	

subject to change

(1) Nominal data in operating point with maximum load and 400 VAC

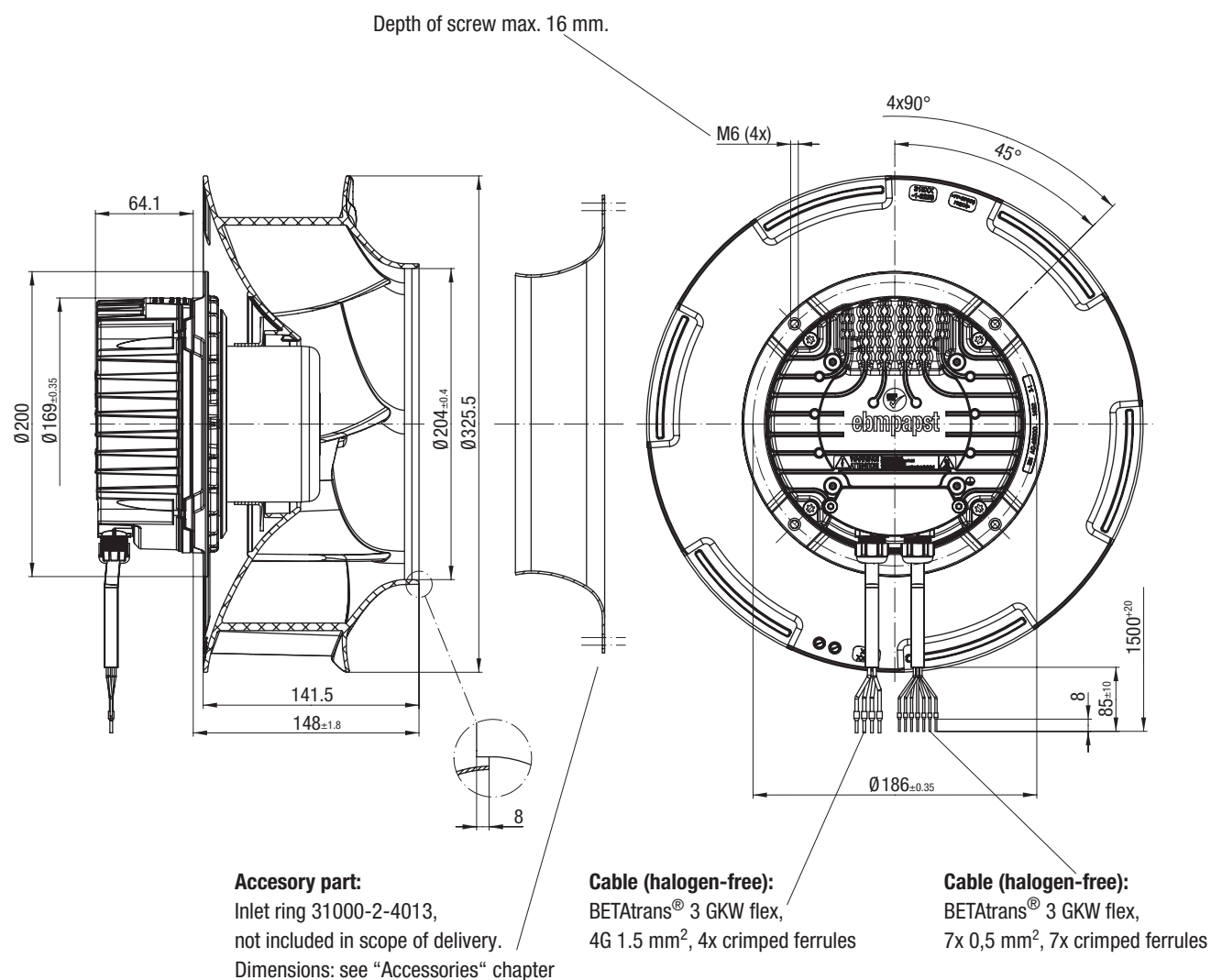
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ ①	2650	538	0,88	83
Ⓐ ②	2650	683	1,11	79
Ⓐ ③	2650	750	1,20	75
Ⓐ ④	2650	721	1,17	78

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 P. 86 ff.

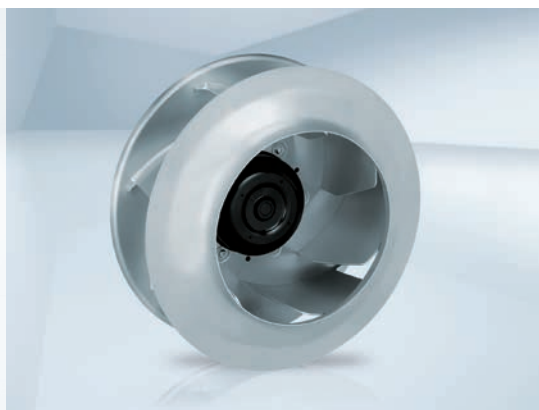
- **Technical features:** See electrical connections P. 85
- **Touch current:** $\leq 3,5$ mA
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan

for railway applications, Ø 310



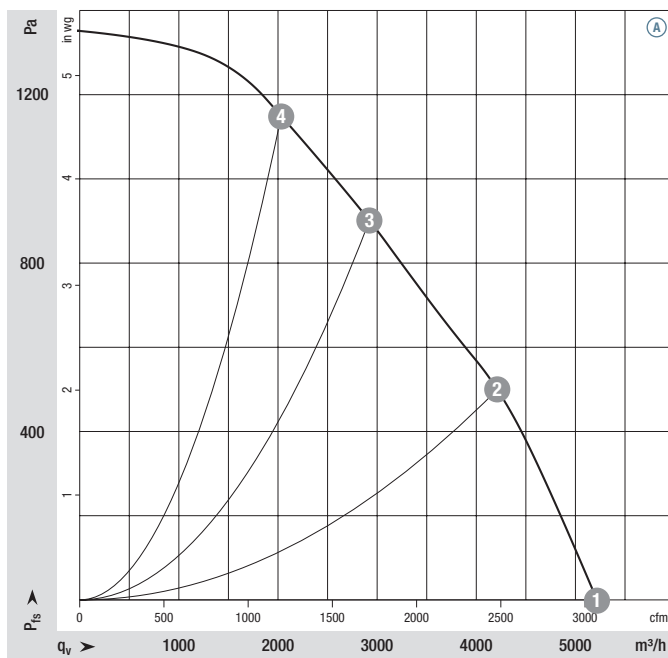
- **Material:** Impeller: Sheet aluminium
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 7
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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	VAC	VAC	m³/h	rpm	W	A	dB(A)	°C	kg		
R3G 310-BE90 -N1	M3G 112-EA	Ⓐ	400	380-480	5215	2900	1300	2,00	90	-40..+60	8,5	P. 85

subject to change

(1) Nominal data in operating point with maximum load and 400 VAC

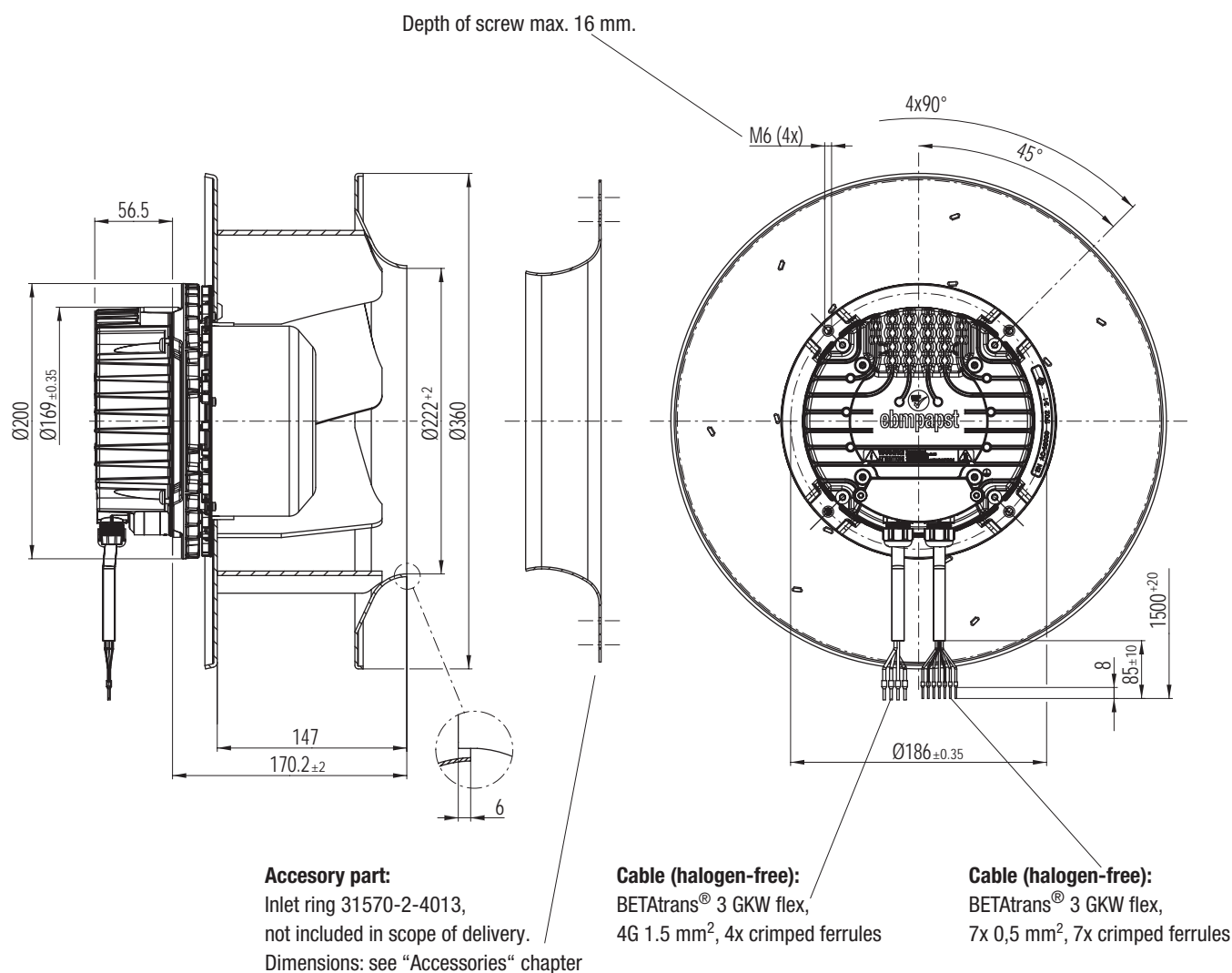
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ 1	3135	1229	1,89	90
Ⓐ 2	3005	1300	2,00	85
Ⓐ 3	2900	1300	2,00	80
Ⓐ 4	2970	1300	2,00	85

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 P. 86 ff.

- **Technical features:** See electrical connections P. 85
- **Touch current:** $\leq 3,5$ mA
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC





EC centrifugal fan – RadiCal

for railway applications, Ø 355



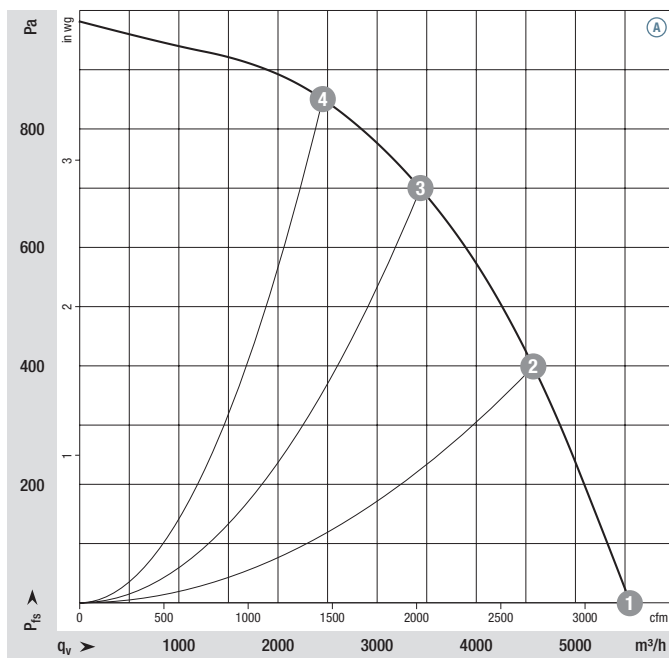
- **Material:** Impeller: plastic PA
Rotor: coated in black
Electronics housing: Die-cast aluminium
- **Number of blades:** 6
- **Direction of rotation:** Clockwise, seen on rotor
- **Degree of protection:** IP 55 according to EN 60529
- **Insulation class:** "F"
- **Installation position:** Shaft horizontal or rotor on bottom, rotor on top on request
- **Condensation drainage holes:** Rotor side
- **Mode:** Continuous operation (S1)
- **Bearings:** Maintenance-free ball bearings

Nominal data		Curve	Nominal voltage	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	VAC	VAC	m³/h	rpm	W	A	dB(A)	°C	kg		
R3G 355-RJ76 -N1	M3G 112-EA	Ⓐ	400	380-480	5555	2400	1100	1,70	90	-40..+60	8,4	P. 85

subject to change

(1) Nominal data in operating point with maximum load and 400 VAC

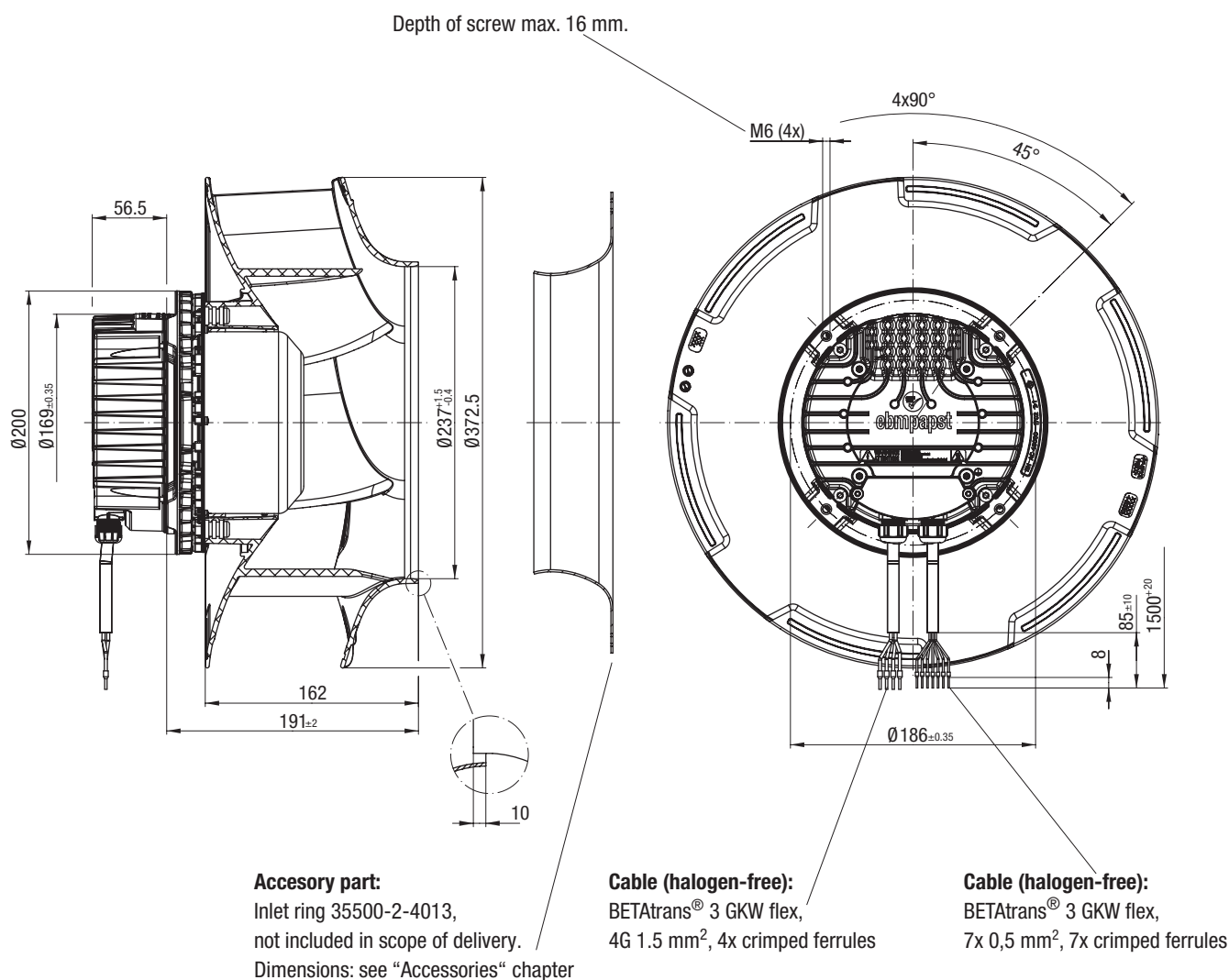
Curves:



	n rpm	P _{ed} W	I A	L _{WA} dB(A)
Ⓐ 1	2400	777	1,20	90
Ⓐ 2	2400	1037	1,59	83
Ⓐ 3	2400	1100	1,70	75
Ⓐ 4	2400	1056	1,62	77

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 P. 86 ff.

- **Technical features:** See electrical connections P. 85
- **Touch current:** $\leq 3,5$ mA
- **Cable exit:** Lateral
- **Protection class:** I (if customer has provided connection for protective earth)
- **Conformity with standards:** See P. 4
- **Approvals:** EAC



it's time for tomorrow

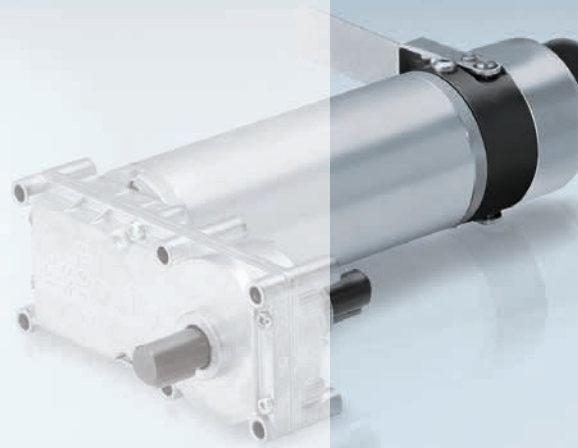
We extend the limits of what's feasible every day. Our longstanding engineering expertise gives us the capability to lead the way in technological development.

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:

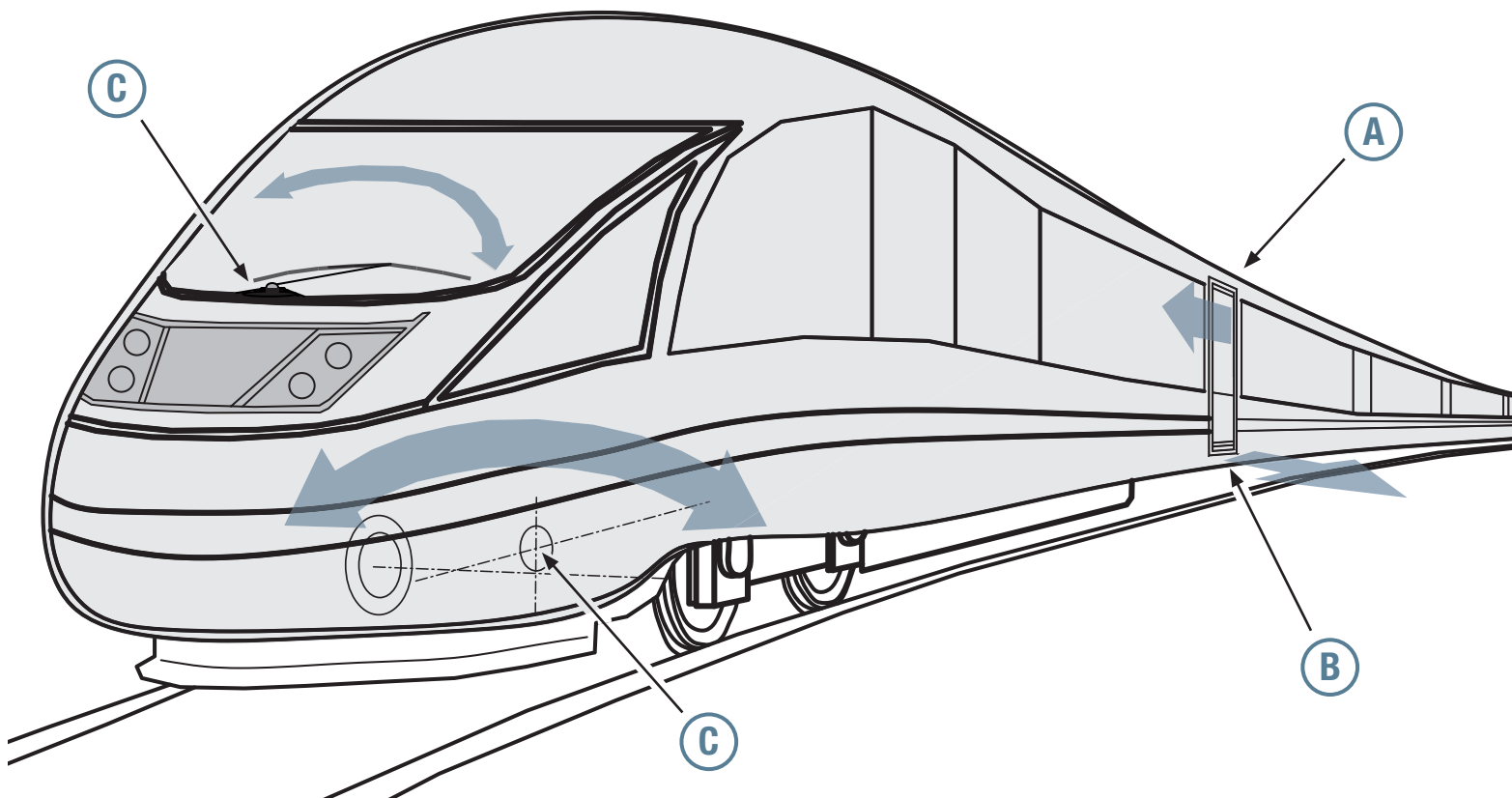
- **Target-oriented implementation of demanding market requirements in view of performance density and durability**
- **Compliance with specifications and technical requirements by legislation and standards**
- **High corrosion-resistance and functional safety even in extreme weather conditions**
- **Vibration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



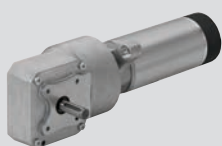
A Door drives:



One-stage planetary gearhead for train doors.



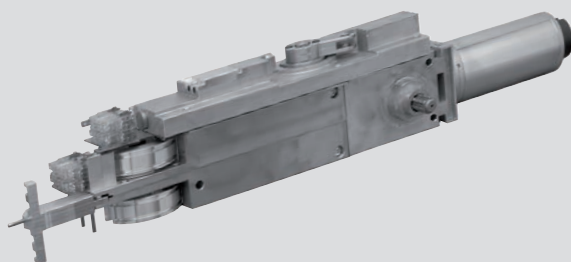
Planetary gearhead motor Performax 63 for sliding and locking.



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.



FlowGrid air inlet grill

Efficient noise reduction



The air performance of ebm-papst fans is not the only thing measured on the state-of-the-art, in-house test stand. The acoustic behavior of the fans is also examined and the measuring results are included in the technical documentation. Please note that the measurements are taken under ideal conditions with undisturbed inflow and outflow. If the fans are later installed in applications where limited space is available, the noise information listed in the documentation will probably not be applicable. In order to minimize the negative impact of the installation situation, ebm-papst offers the FlowGrid air inlet guard shown here. It is mounted on the fan's intake side and effectively reduces the noise in the fan's overall frequency range; especially the disturbing tonal noise in the low frequency range. The result is a far lower sound pressure level and pleasant running noise. Since the level of noise reduction is dependent on the installation circumstances, it is not possible to provide generally applicable information here.

FlowGrid air inlet grill

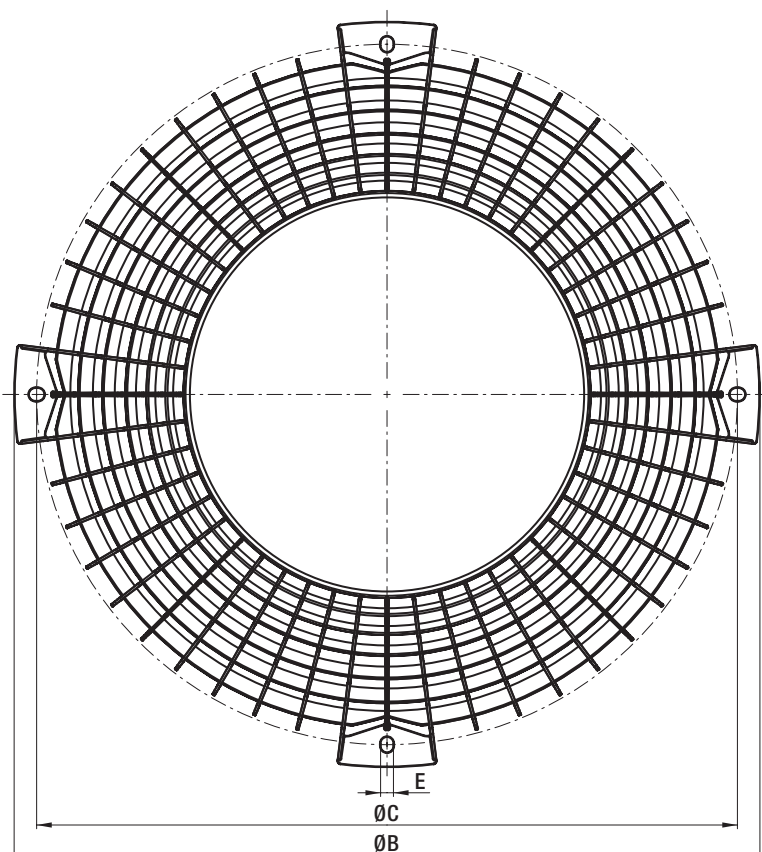
Dimensions (mm)

Mass

Part number	Fan size	ØB	ØC	ØE	S	H	N*	g
20282-2-2957	250, 280	280	245-261	4,5	3,5	40	2 ± 0,5 Nm	144
25312-2-2957	310	315	288-292	5,5	3,5	49	2 ± 0,5 Nm	232

Subject to change

* Recommended tightening torque for fastening screws



Would you like
to find out more?

If you need an
installation guide
or more information
about the dimensions,
go to:

www.ebmpapst.com/flowgrid-manual

or scan the
QR code below:



Cube design

for centrifugal modules in railway applications



ebm-papst centrifugal fans can be integrated into a highly resistant, weight optimized aluminum module that was specially designed for railway technology.

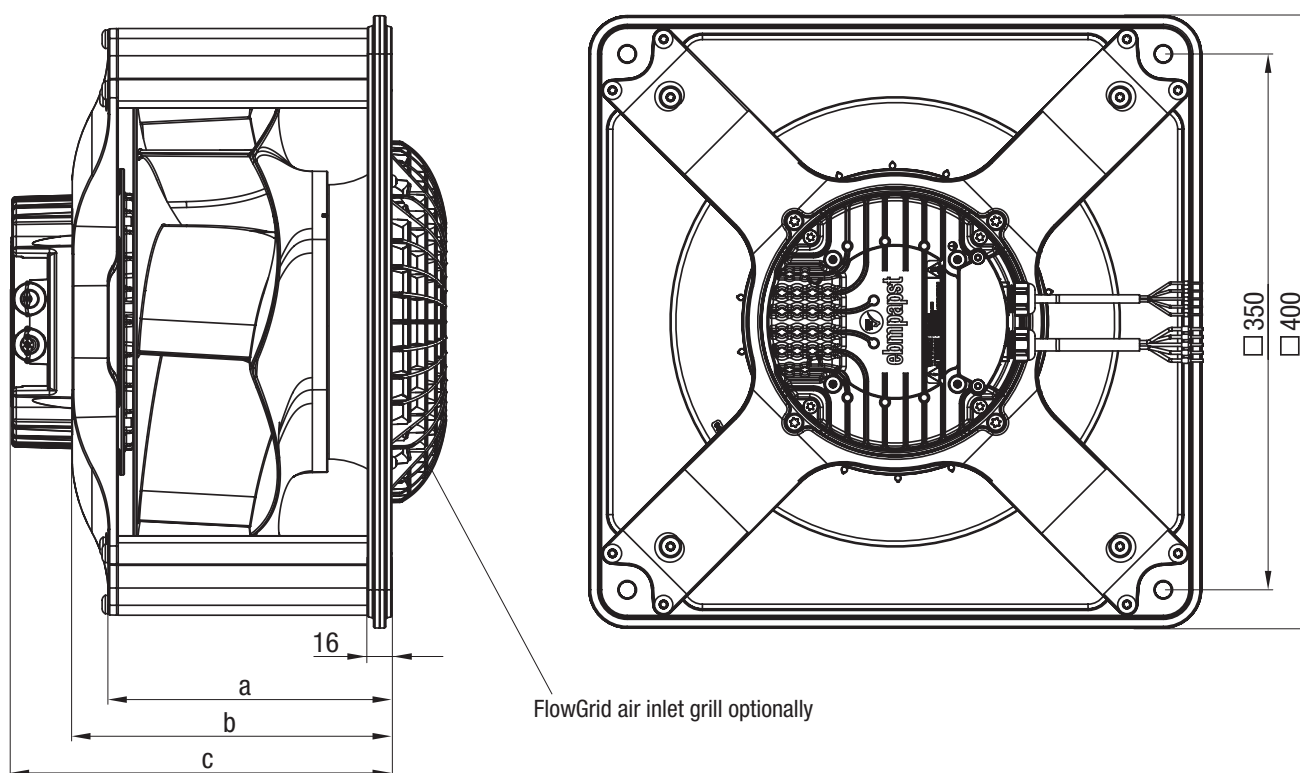
The new modular design is compact and easy to install. The easy cable routing and the option to use different plug systems add to user convenience.

This provides a mechanical interface for devices with a range of sizes and performance classes.

- Modular design
- Weight-optimized aluminum design
- Exceeds all mechanical requirements
- Simple installation
- Available in combination with FlowGrid
- Easy cable routing

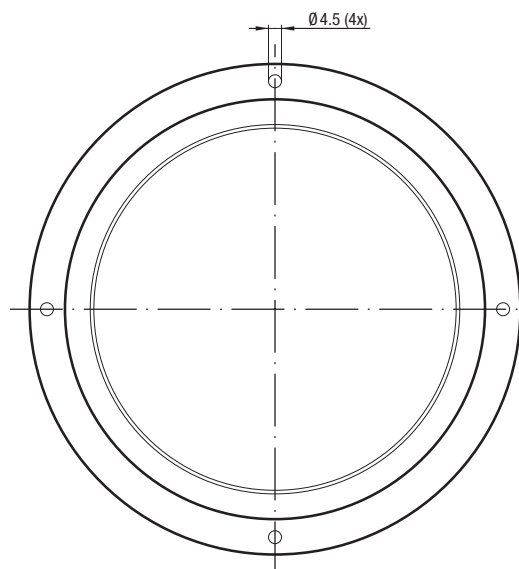
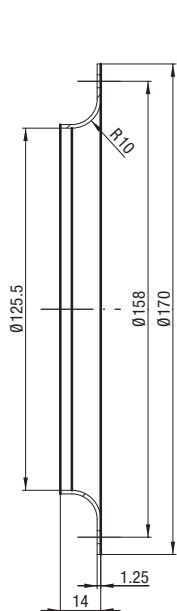
Cube design		Dimensions (mm)			Mass
Suitable for Type	Nominal voltage	a	b	c	kg
R3G 250-RR09 -P1	110 VDC	140,5	164,0	187,7	4,9
R3G 280-RR10 -P1	110 VDC	186,0	209,5	233,2	5,3
R3G 280-BD13 -S1	110 VDC	207,7	231,2	271,3	5,8
R3G 310-RR12 -P1	110 VDC	208,5	232,0	255,7	5,7
R3G 310-BE84 -S1	110 VDC	205,5	229,0	269,1	5,9
R3G 250-RR04 -N1	400 VAC	139,0	162,5	202,6	4,9
R3G 250-BB01 -N1	400 VAC	202,4	225,9	266,0	5,6
R3G 280-RR05 -N1	400 VAC	186,1	209,6	249,7	5,3
R3G 280-BC01 -N1	400 VAC	207,7	231,2	271,3	5,8
R3G 310-RR05 -N1	400 VAC	203,5	227,0	267,1	5,7
R3G 310-BE90 -N1	400 VAC	205,5	229,0	269,1	5,9

Subject to change

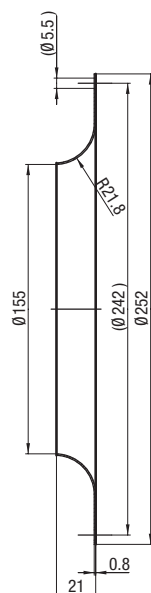


Inlet rings

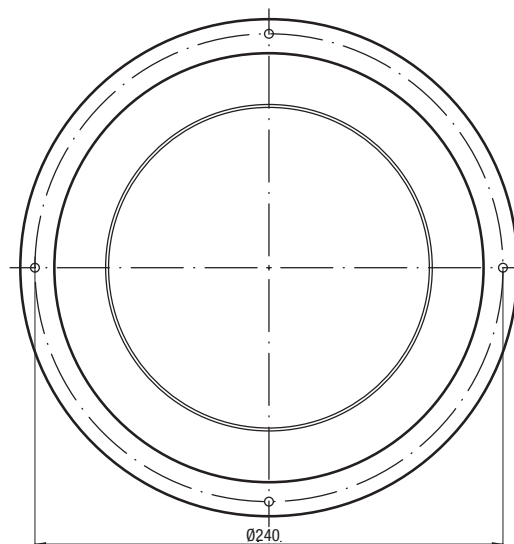
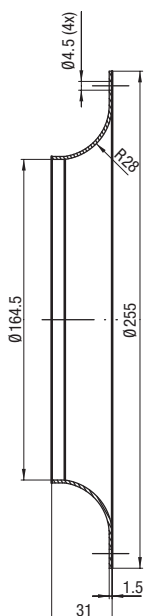
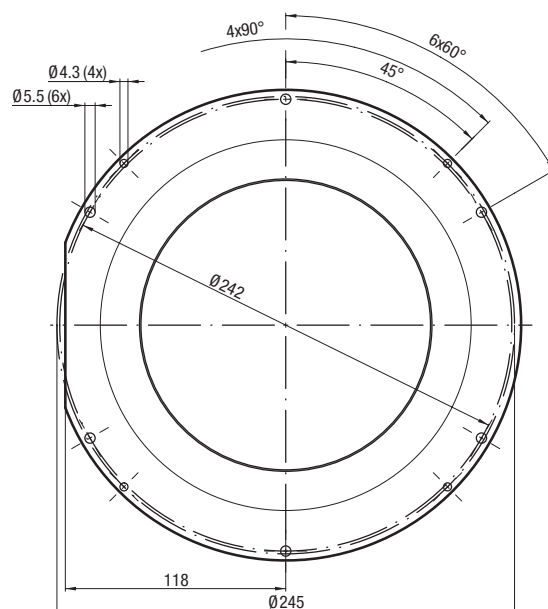
for centrifugal fans



Fan size 190:
Part number 09576-2-4013



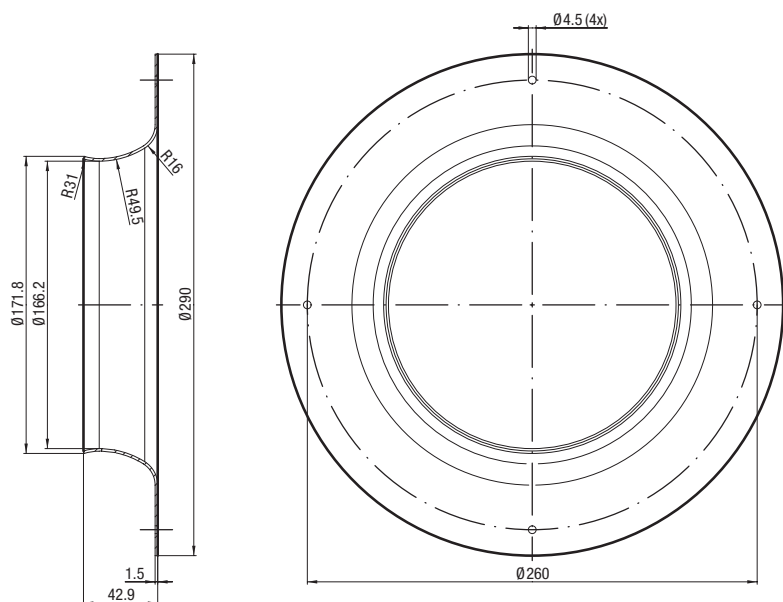
Fan size 220:
Part number 09609-2-4013



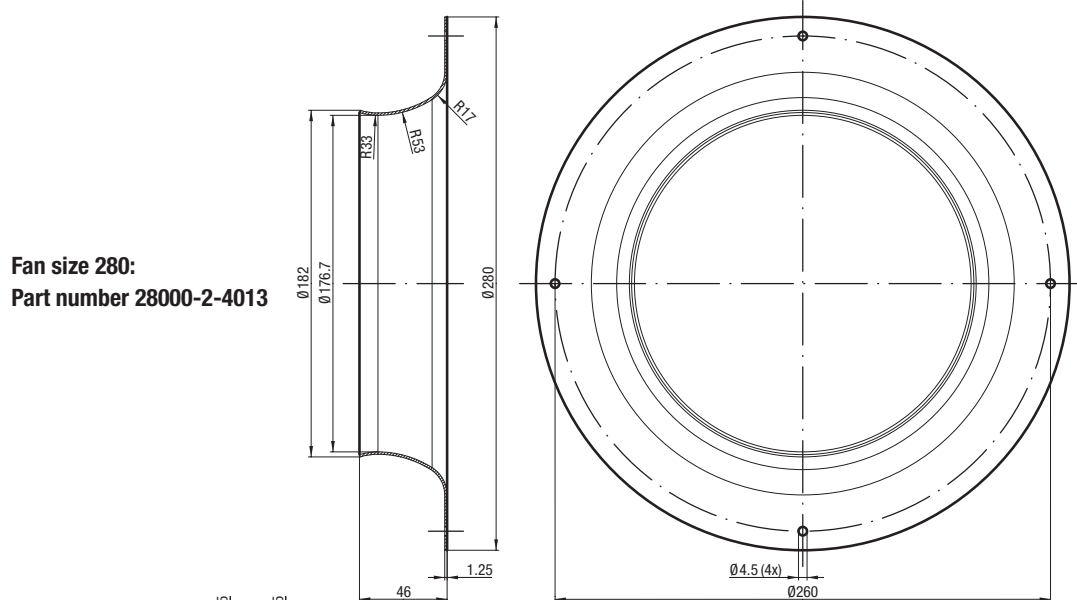
Fan size 250:
Part number 96359-2-4013

Inlet rings

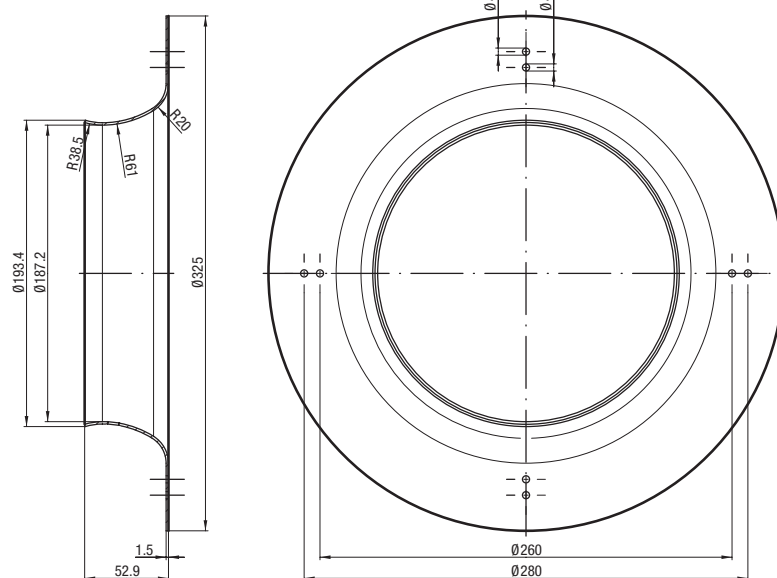
for centrifugal fans



Fan size 250:
Part number 25070-2-4013



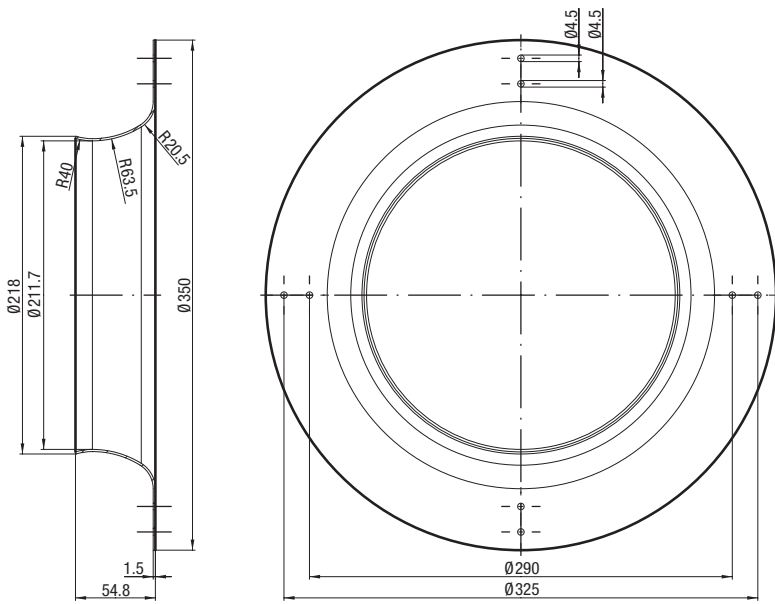
Fan size 280:
Part number 28000-2-4013



Fan size 280:
Part number 28070-2-4013

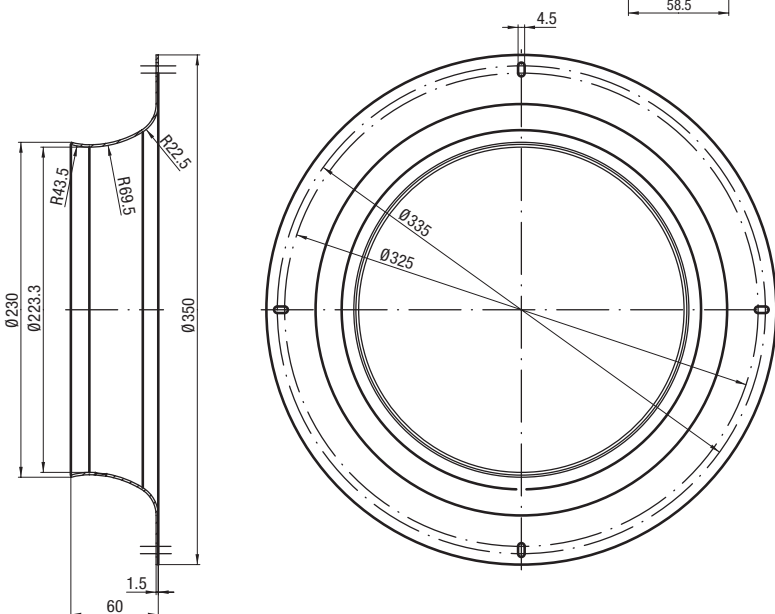
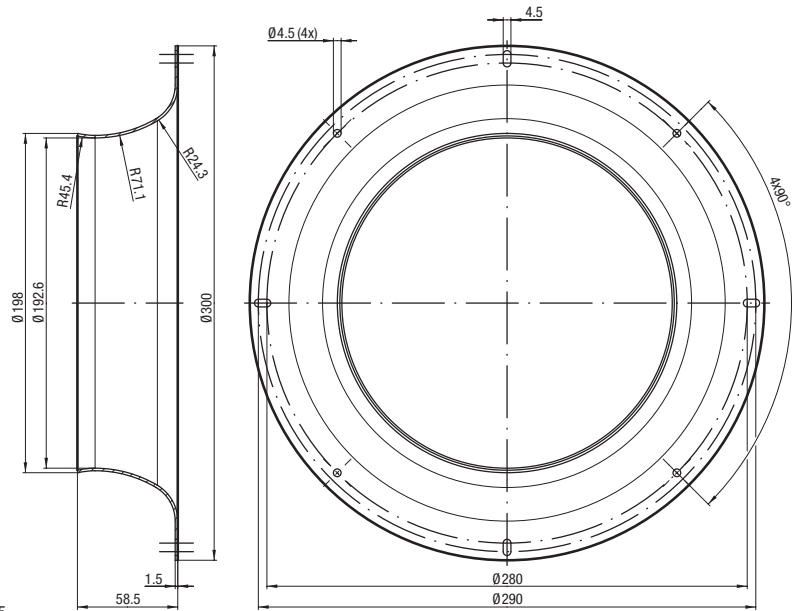
Inlet rings

for centrifugal fans



Fan size 310:
Part number 31570-2-4013

Fan size 310:
Part number 31000-2-4013



Fan size 355:
Part number 35500-2-4013

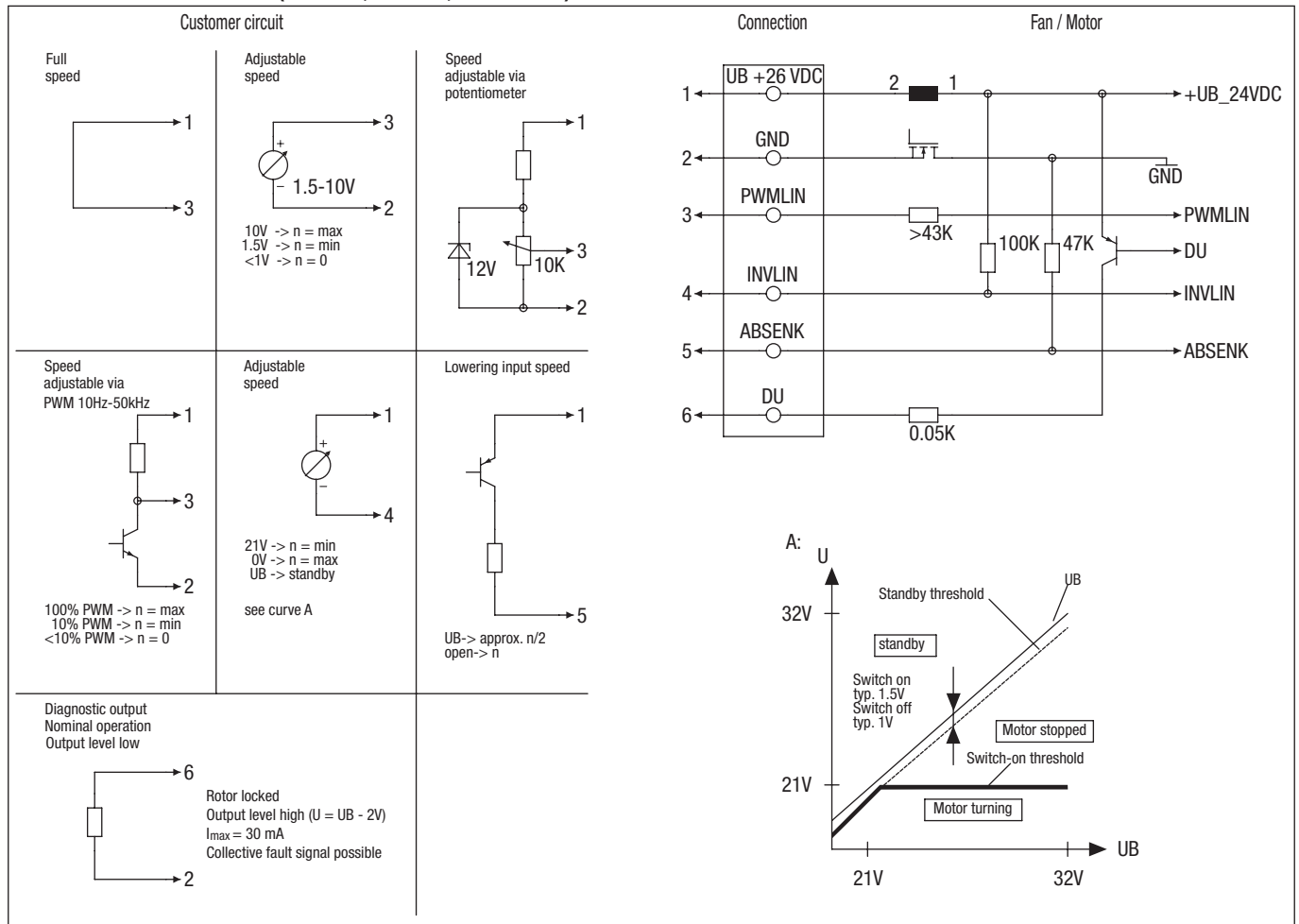
Agents	Technical parameters & scope	Conn. diagrams	Accessories	Drive concepts ebm-papst ZEITLAUF	Tractionized fans for railway applications 400 VAC	Tractionized fans for railway applications 110 VDC	Tractionized fans for railway applications 24 VDC	Information
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Electrical connections rail technology

Technical features:

- Control input 0-10 VDC / PWM
- Lowering input
- INVLIN (control input, inverse linear)
- Fault output (high-side switch max. 30 mA)
- 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 (58 V)

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



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

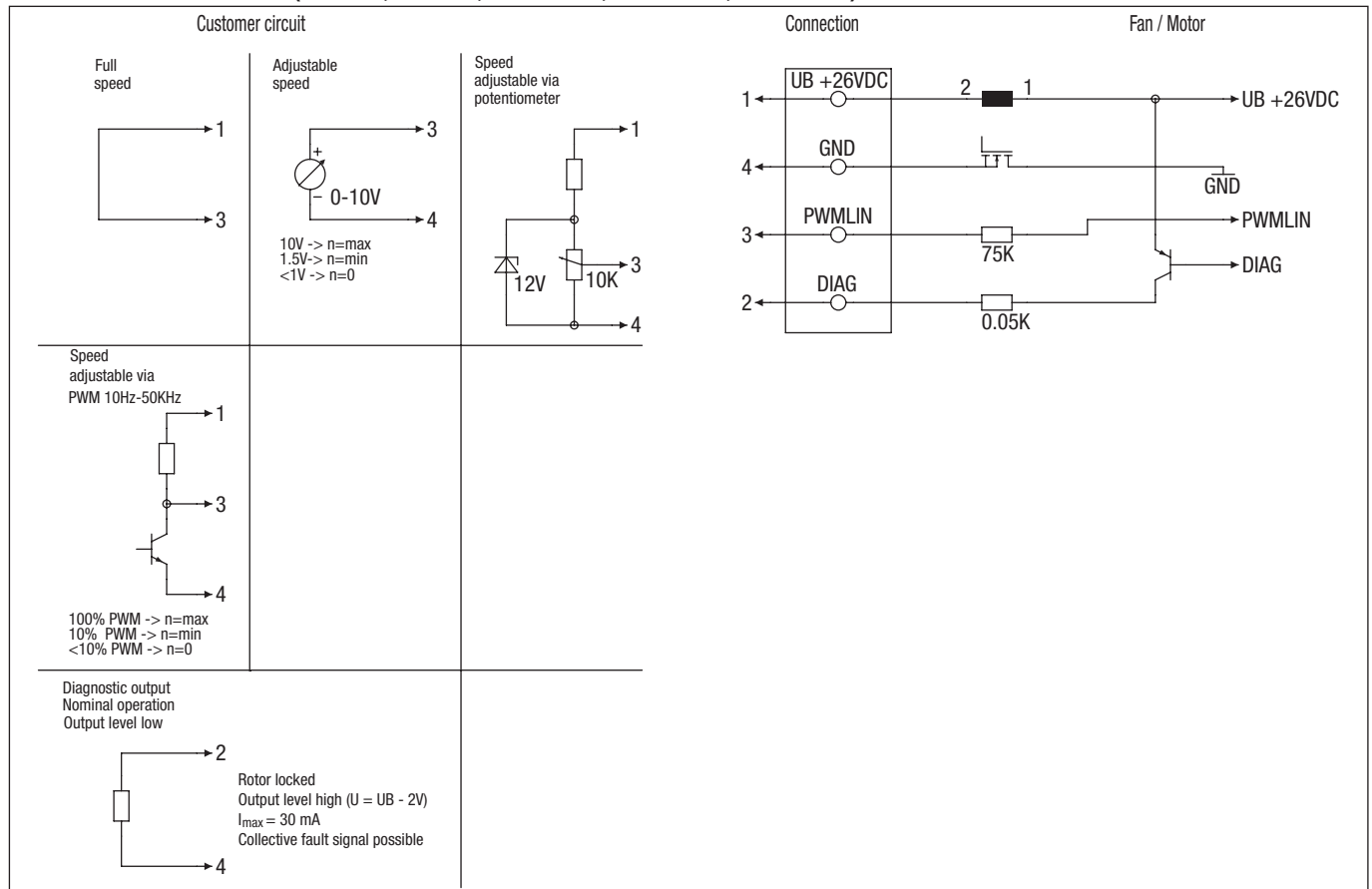
Electrical connections rail technology

Technical features:

- Control input 0-10 VDC / PWM
- Fault output (high-side switch max. 30 mA)
- 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 (58 V)

Electrical connection: 26 VDC (W3G 300, W3G 385, R3G 250-RU, R3G 280-RU, R3G 310-RU)



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:

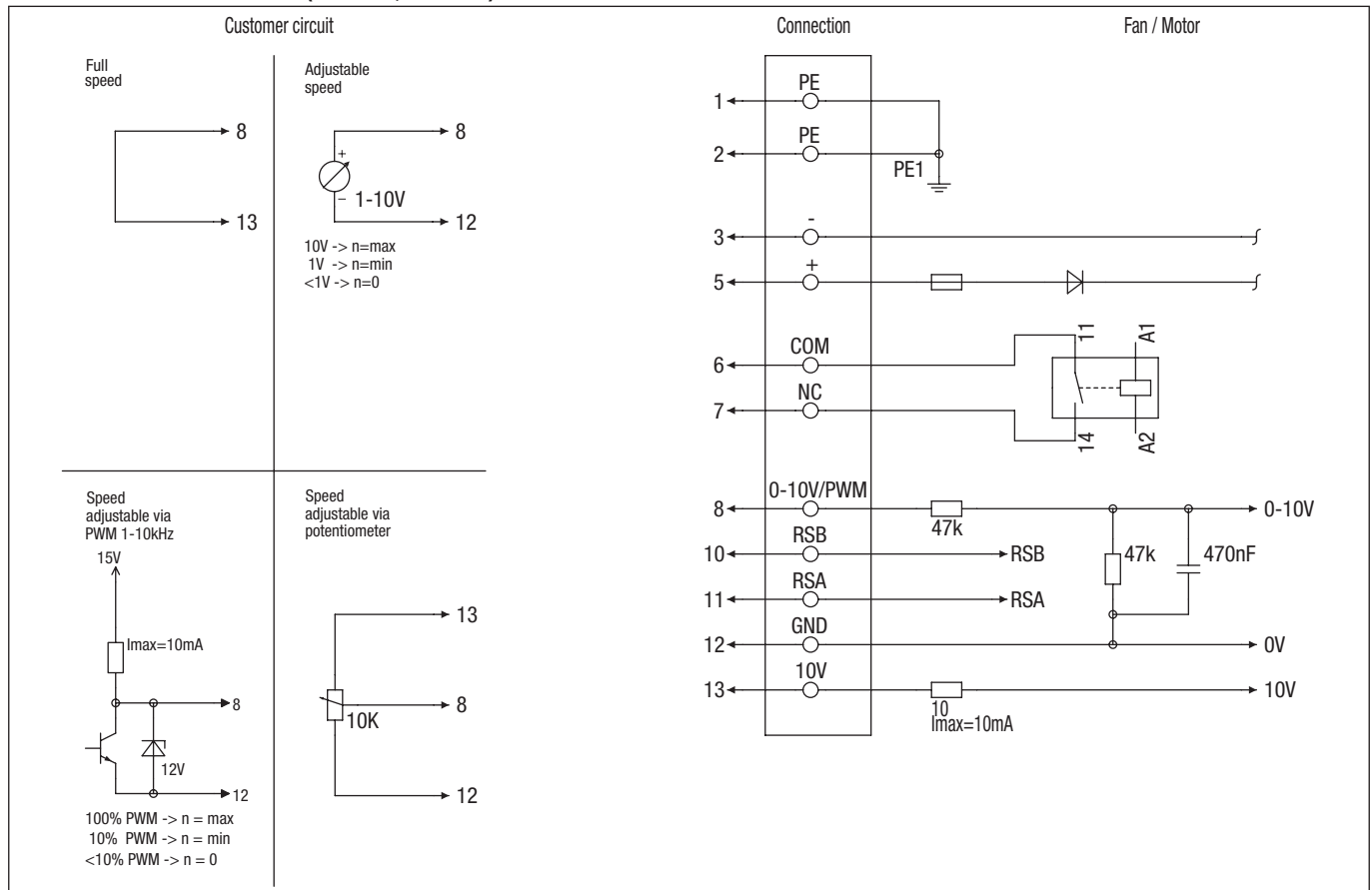
- Control input 0-10 VDC / PWM
- Output 10 VDC, max. 10 mA
- Operation and alarm display
- Integrated PID controller
- Line undervoltage detection
- Output limit
- Run monitoring
- Soft start
- Over-temperature protected electronics / Motor
- Motor current limit
- Overvoltage detection
- RS485 MODBUS-RTU
- 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, M3G 112)



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, $R_i = 100\text{ k}\Omega$, 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 $\pm 3\%$, 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

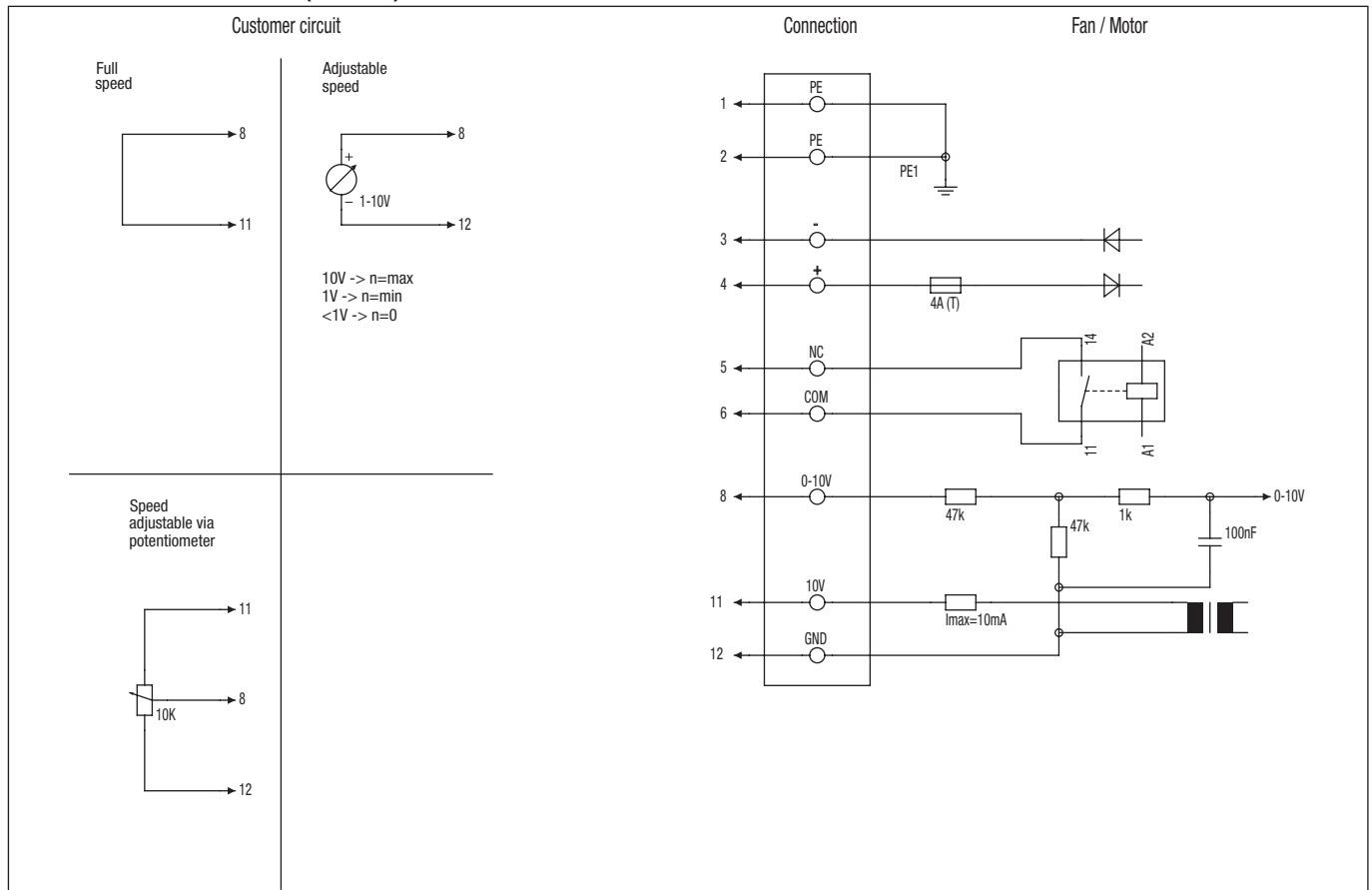
- Thermal overload protector (TOP) wired internally

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)



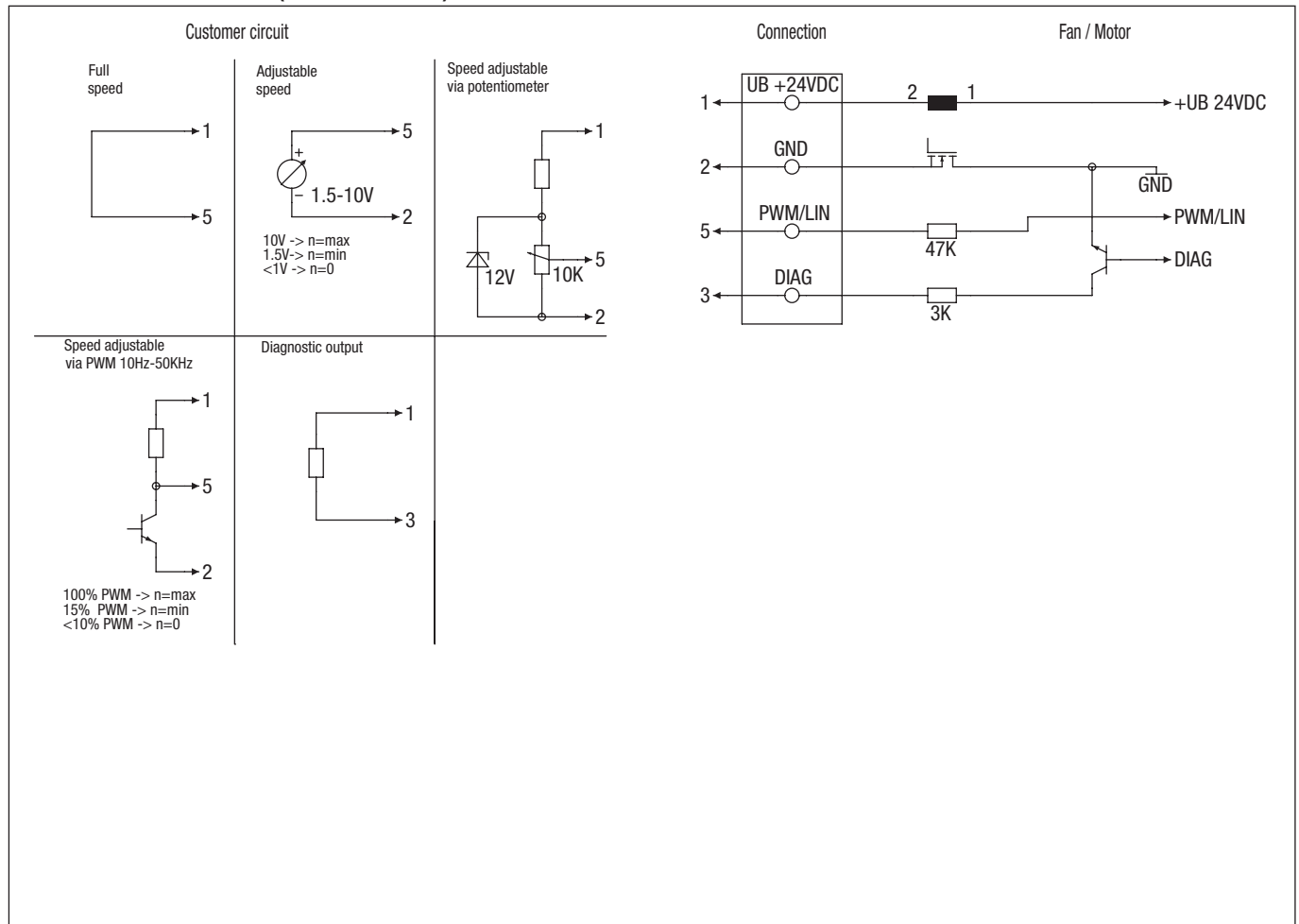
Connection	Designation	Colour	Assignment / function
1, 2	PE	green/yellow	Protective earth
3	-	blue	Supply voltage, GND (110 VDC)
4	+	red	Supply voltage, 110 VDC
5	NC	white 2	Floating status contact (0,3 A - 110 VDC, 1 A - 60 VDC, 3 A - 30 VDC) closed at n ≥ 100 rpm, break for failure
6	COM	white 1	Floating status contact, closed at n ≥ 100 rpm, break for failure
8	0-10 V	yellow	Control input, set value 0-10 VDC or PWM, impedance 100 kΩ, 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 (58 V)

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



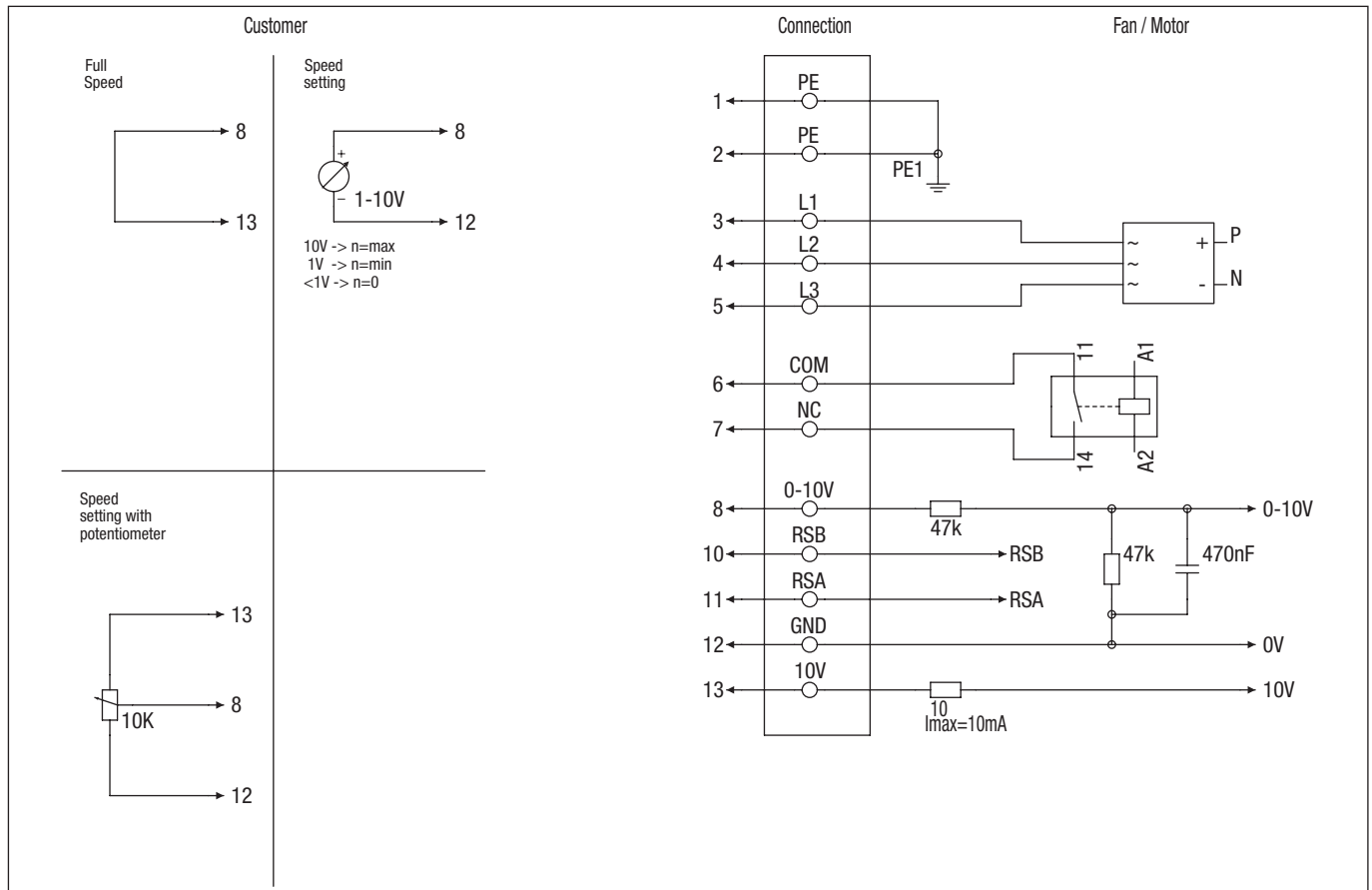
Connection	Designation	Color	Assignment/function
1	+ UB 24 VDC	black	Power supply 24 VDC, voltage range see nameplate
2	GND	brown	Power supply GND, reference ground
5	PWM/LIN	yellow	Analog voltage control input 0-10V or PWM
3	DIAG	white	Fan OK: high, fan error: low, Isink max = 10 mA

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
- Undervoltage/phase failure detection
- Power limit / Run monitoring
- PFC, passive / Emergency operation
- Soft start / Alarm relay
- 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

Electrical connection: 400 VAC



Connection	Designation	Colour	Assignment / function
1, 2	PE	green/yellow	Protective earth
3	L1	black	Power supply, phase, 50/60 Hz
4	L2	blue	Power supply, phase, 50/60 Hz
5	L3	brown	Power supply, phase, 50/60 Hz
6	COM	grey	Status relay, floating status contact, common connection, contact rating 250 VAC / 30 VDC 5 A minimum contact separation 1 mA / 5 VDC, reinforced insulation on supply side, basic insulation on control interface side
7	NC	orange	Status relay, floating status contact, break for failure, contact rating 250 VAC / 30 VDC 5 A minimum contact separation 1 mA / 5 VDC, reinforced insulation on supply side, basic insulation on control interface side
8	0-10 V	yellow	Analogue input 1, set value: 0-10 V, $R_i = 100\text{ k}\Omega$, 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 $\pm 3\%$, max. 10 mA, short-circuit-proof, power supply for external devices (e.g. potentiometer), SELV

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.

Degree 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.

Installation 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 1.15 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 grill
- 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 grill.

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.

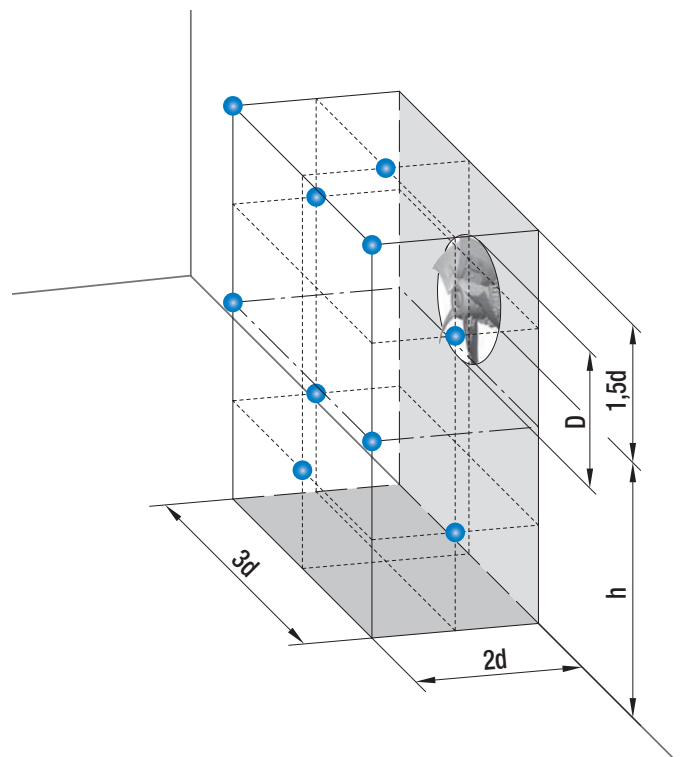
Measuring configuration as per ISO 13347-3 respectively DIN 45635-38:

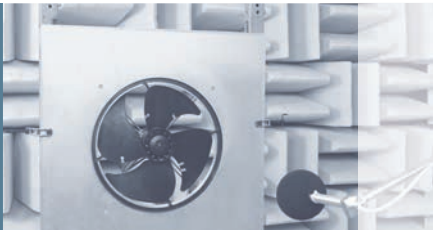
- 10 measuring points

$$d \geq D$$

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

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



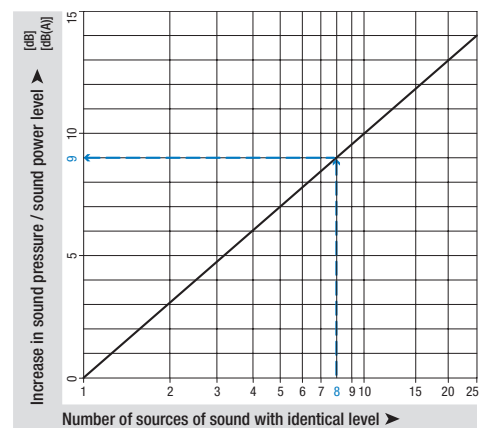


Combined level of multiple same-level sound sources

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.

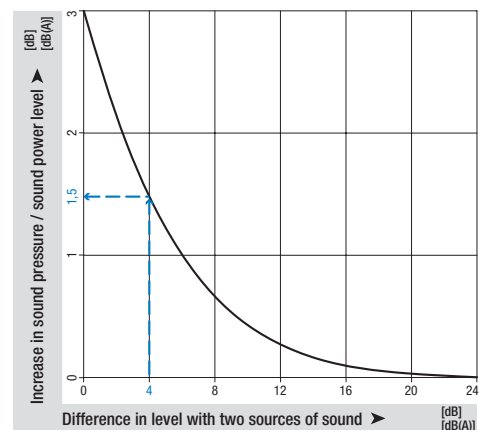
Example: 8 A3G800 axial fans are on a condenser. According to the data sheet, the sound pressure level of a fan is approximately 75 dB(A). The level increase measured from the diagram is 9 dB. Thus the overall sound level of the installation can be expected to be 84 dB(A).



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.

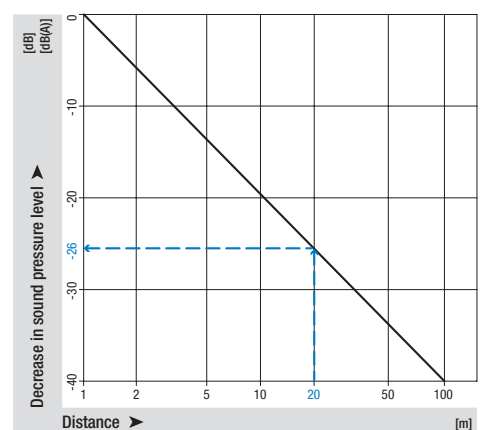
Example: There is an axial fan A3G800 with a sound pressure level of 75 dB(A) at the operating point and an axial fan A3G710 with 71 dB(A) in a ventilation unit. The level difference is 4 dB. The level increase can now be read in the diagram as approx. 1.5 dB. This means that the overall sound level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



Aerodynamics fundamentals:

Axial fan operating range:

To the right of the saddle point (right section of the air performance curve):

- Maximum efficiency
- Minimum noise

To the left of the saddle point (left section of the air performance curve):

- Stall
- Irruptive efficiency
- Noise suddenly increases

The fan's optimal range of use is highlighted in green in the adjoining performance curve.

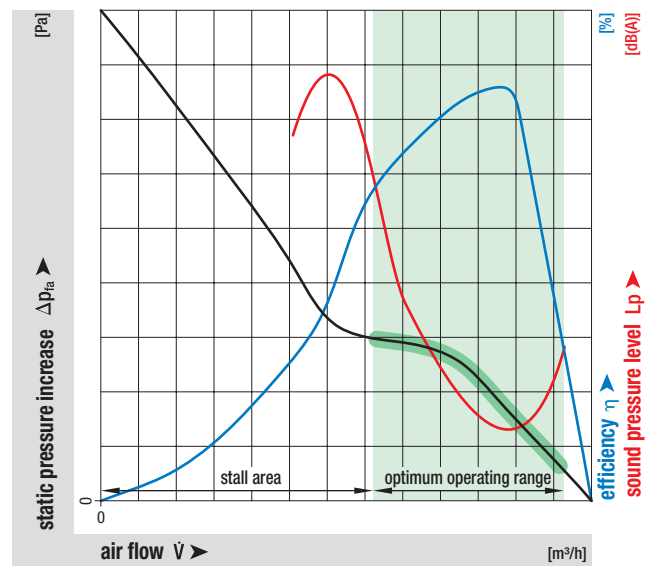
Effects of guard grill:

Installing a guard grill reduces the axial fan's air performance.

The pressure loss in Pa can be roughly calculated using the following equation:

$$\Delta p_{SG} = \epsilon_{SG} \cdot 10^{-8} \cdot \dot{V}^2 \quad \dot{V} \text{ in } [\text{m}^3/\text{h}]$$

For the guard grill that ebm-papst used, the correction factor ϵ_{SG} dependent on impeller diameter D can be found in the adjoining table.



Diameter D	Correction factor ϵ_{SG}
400	90
450	55
500	35

Centrifugal fan operating range:

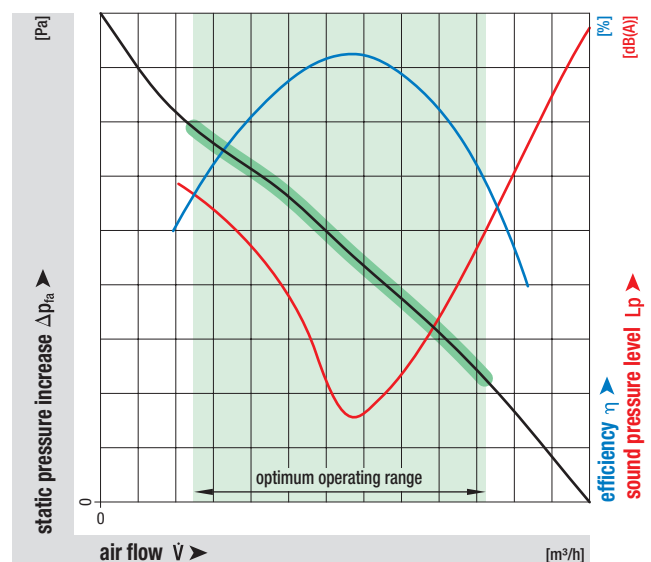
Middle section of the air performance curve:

- Maximum efficiency
- Minimum noise

To the left and right of the middle section of the air performance curve:

- Reduced efficiency
- Increasing noise

The fan's optimal range of use is highlighted in green in the adjoining performance curve.



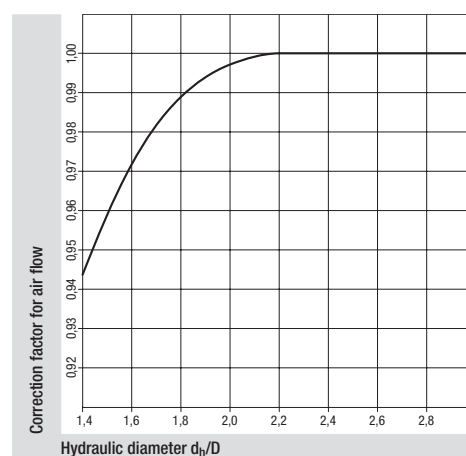
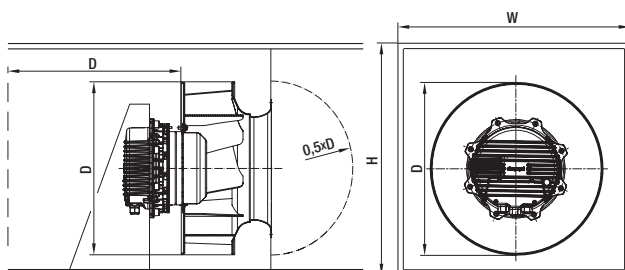
Aerodynamics fundamentals:



Effects of installation space

Installation in a square box may cause a reduction of the air performance.

d_h = hydraulic diameter
Formula: $d_h = 2 \times W \times H / (W + H)$
 W = Width of the box
 H = Height of the box
 D = Outside diameter of the fan



Airflow determination for inlet rings with pressure tap:

The differential pressure method compares the static pressure upstream of the inlet ring with the static pressure in the inlet ring.

The airflow can be calculated from the differential pressure (between the static pressures) according to the following equation:

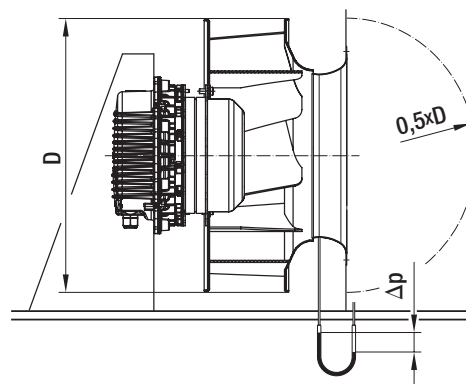
$$q_V = k \cdot \sqrt{\Delta p} \quad q_V \text{ in [m}^3/\text{h] und } \Delta p \text{ in [Pa]}$$

If the airflow is to be regulated to remain constant, the inlet pressure must be kept constant:

$$\Delta p = q_V^2 : k^2$$

k takes the specific properties of the inlet ring into account.

The pressure is tapped at 1 (4) point(s) on the circumference of the inlet ring. The customer connection consists of a built-in T-shaped hose fitting. The hose fitting is suitable for pneumatic hoses with an inside diameter of 4 mm.

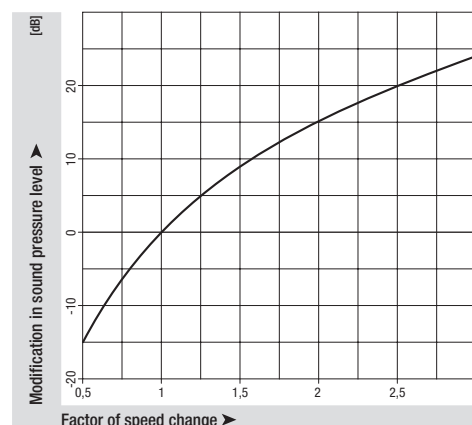


Influence of speed n on the sound power level L_w :

The sound power level for changes in speed can be approximately determined based on the adjoining diagram and the following formula:

$$L_{w_2} - L_{w_1} = 50 \text{ dB} \cdot \log(n_2 : n_1)$$

L_{w_1} = sound power level after speed change
 L_{w_2} = sound power level before speed change
 n_1 = changed speed
 n_2 = initial speed



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