

Product Data Sheet 4412 FN/2HP-195

ebmpapst

The engineer's choice



4412 FN/2HP-195

INDEX

1	General	3
2	Mechanics	3
2.1	General.....	3
2.2	Connections.....	3
3	Operating Data	4
3.1	Electrical Interface - Input.....	4
3.2	Electrical Operating Data	5
3.3	Electrical Interface - Output.....	6
3.4	Electrical Features	6
3.5	Aerodynamics.....	8
3.6	Sound Data.....	9
4	Environment	9
4.1	General.....	9
4.2	Climatic Requirements	9
5	Safety	10
5.1	Electrical Safety	10
5.2	Approval Tests.....	10
6	Reliability	10
6.1	General.....	10

1 General

Fan type	Fan	
Rotating direction looking at rotor	Counterclockwise	
Airflow direction	Air outlet over struts	
Bearing system	Ball bearing	
Mounting position - shaft	Any	

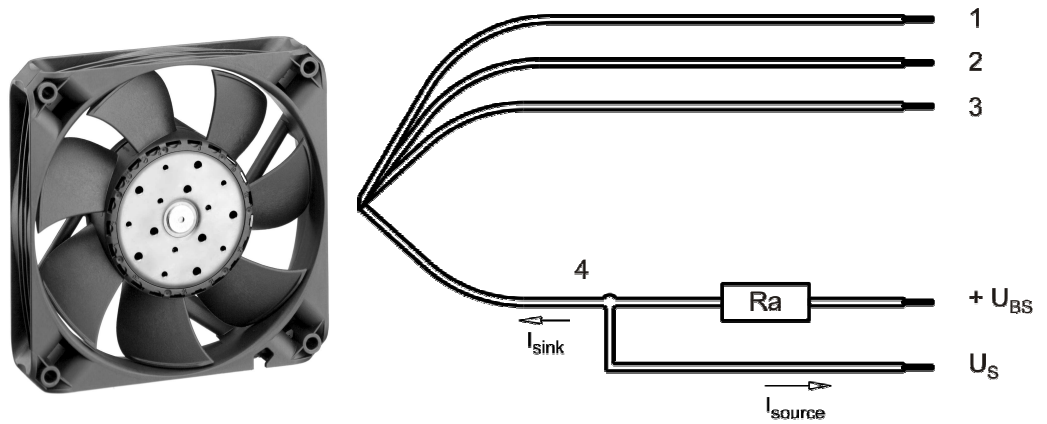
2 Mechanics

2.1 General

Width	119,0 mm	
Height	119,0 mm	
Depth	25,4 mm	
Mass	0,245 kg	
Housing material	Plastic	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	Wire outlet corner: 110 Ncm Remaining corners: 110 Ncm	
Screw size	ISO 4762 - M4 degreased, without an additional brace and without washer	

2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 310 mm	
Tolerance	+/- 10 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 22	1,70 mm
2	blue	- GND	AWG 22	1,70 mm
3	violet	PWM	AWG 22	1,70 mm
4	white	Tacho	AWG 22	1,70 mm

The auxiliaries shown on the schematic diagram (which are required for the intended use) are not part of our delivery.

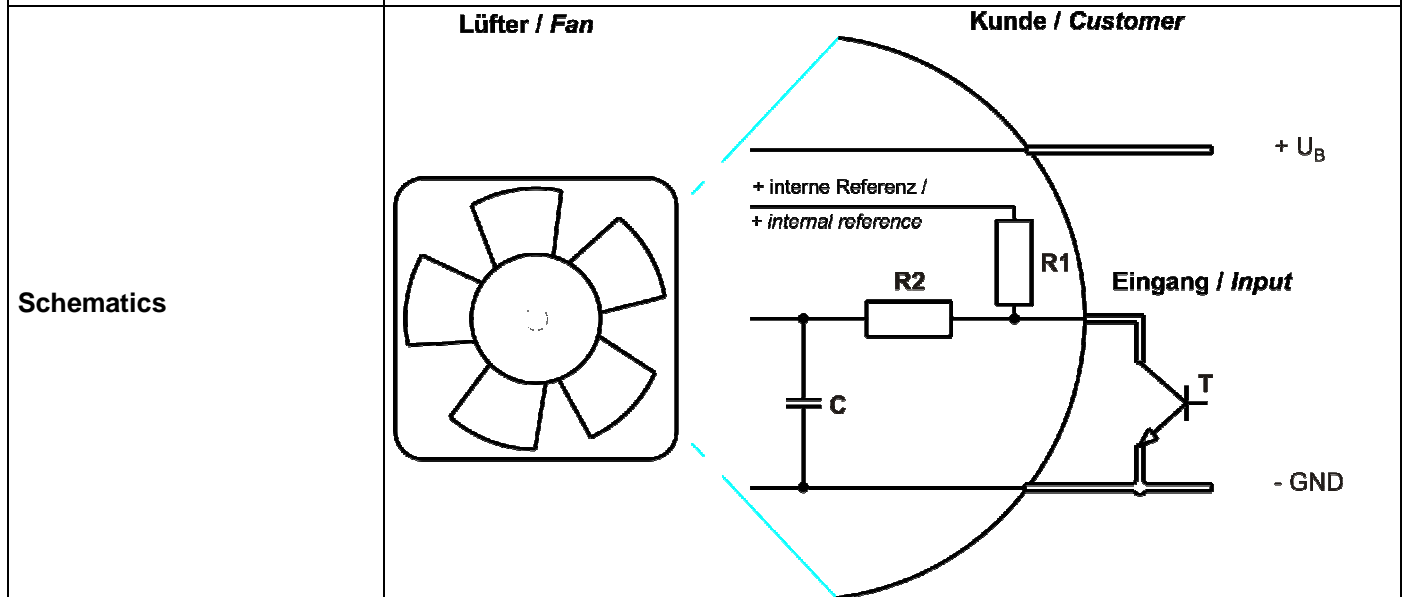
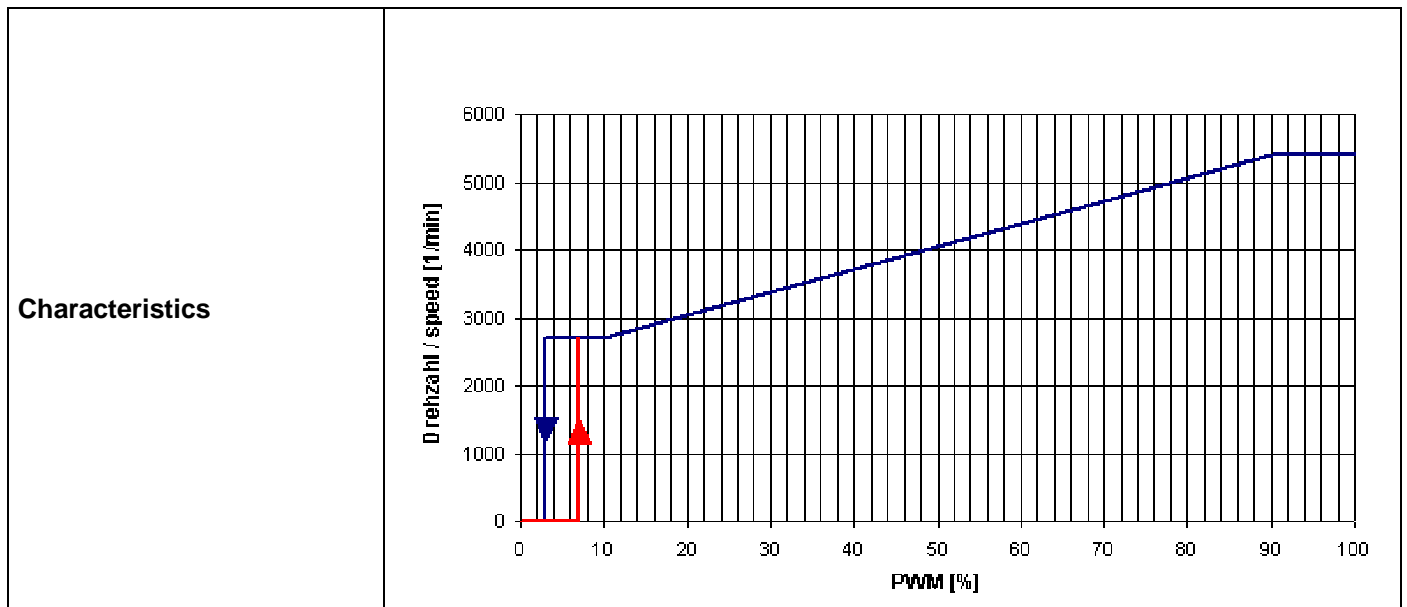
3 Operating Data

3.1 Electrical Interface - Input

Control input	PWM
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Features

Input type	Open collector	
PWM - Frequency		2 kHz - 5 kHz



Speed control: 0... 100 % PWM; f: 2... 5 kHz; open collector

3.2 Electrical Operating Data

Measurement conditions: Normal air density = 1,2 kg/m³; Temperature 23°C +/- 3°C; Motor axis horizontal; warm-up time before measuring 5 minutes (unless otherwise specified). In the intake and outlet area should not be any solid obstruction within 0,5 m.

$\Delta p = 0$: corresp. to free air flow (see chapter aerodynamics)

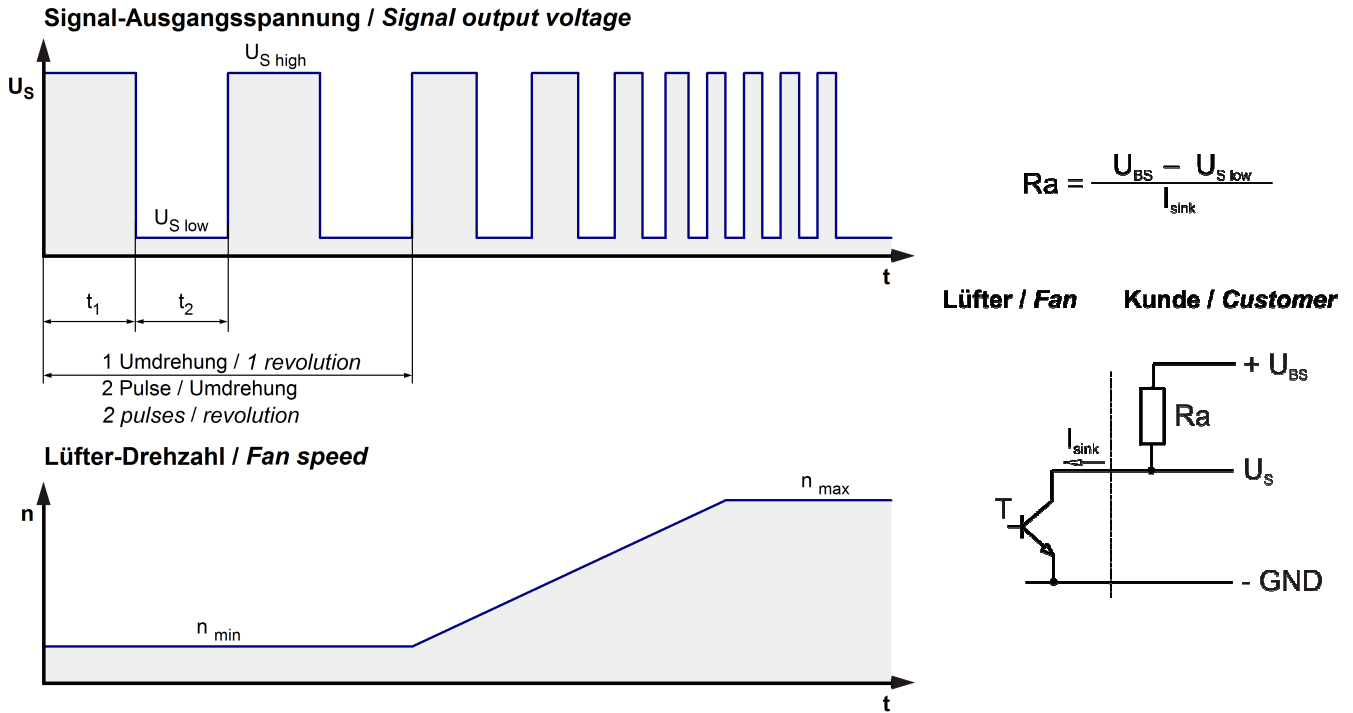
I: corresp. to arithm. mean current value

Name	Condition		
PWM 0001	PWM: 90 %;	f: 2 kHz	f: 5 kHz

Features	Condition	Symbol	Values		
Voltage range		U	9,0 V		13,2 V
Nominal voltage		U_N		12,0 V	
Power consumption	$\Delta p = 0$	P	6,6 W	12,0 W	13,7 W
Tolerance	PWM 0010		+/- 17,5 %	+/- 25,0 %	+/- 25,0 %
Current consumption	$\Delta p = 0$	I	730 mA	1.000 mA	1.040 mA
Tolerance	PWM 0010		+/- 17,5 %	+/- 25,0 %	+/- 25,0 %
Speed	$\Delta p = 0$	n	4.150 1/min	5.400 1/min	5.400 1/min
Tolerance	PWM 0010		+/- 12,5 %	+/- 5,0 %	+/- 25,0 %
Starting current consumption				5.200 mA	

3.3 Electrical Interface - Output

Tacho type	/2 (open collector)
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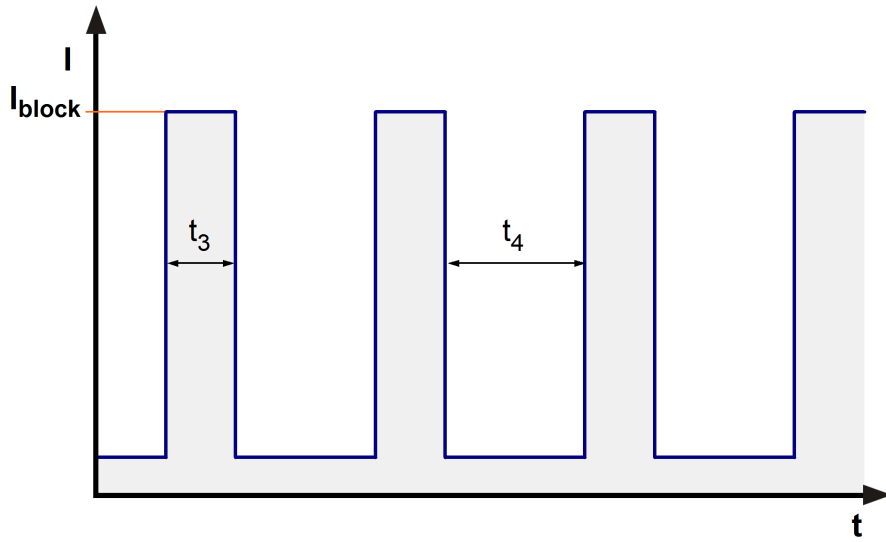


Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 30,0\ V$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\ V$
Tacho signal High	$U_{S\ high}$	$30,0\ V$
Maximum sink current	I_{sink}	$\leq 4\ mA$
External resistor	External resistor Ra from UBS to US required. All voltages measured to GND.	
Tacho frequency	$(2 \times n) / 60$	
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\ V/\mu s$

n = revolutions per minute (1/min)

3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	Rectifying diode	
Max. residual current at U_N	$I_F \leq 100\ \mu A$	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	I_{block}	
Clock signal at locked rotor	t_3 / t_4 typical: $0,4\ s / 20,0\ s$	



3.5 Aerodynamics

Measurement conditions:

Measured with a double chamber intake rig acc. to DIN EN ISO 5801.

Normal air density = 1,2 kg/m³; Temperature 23°C +/- 3°C;

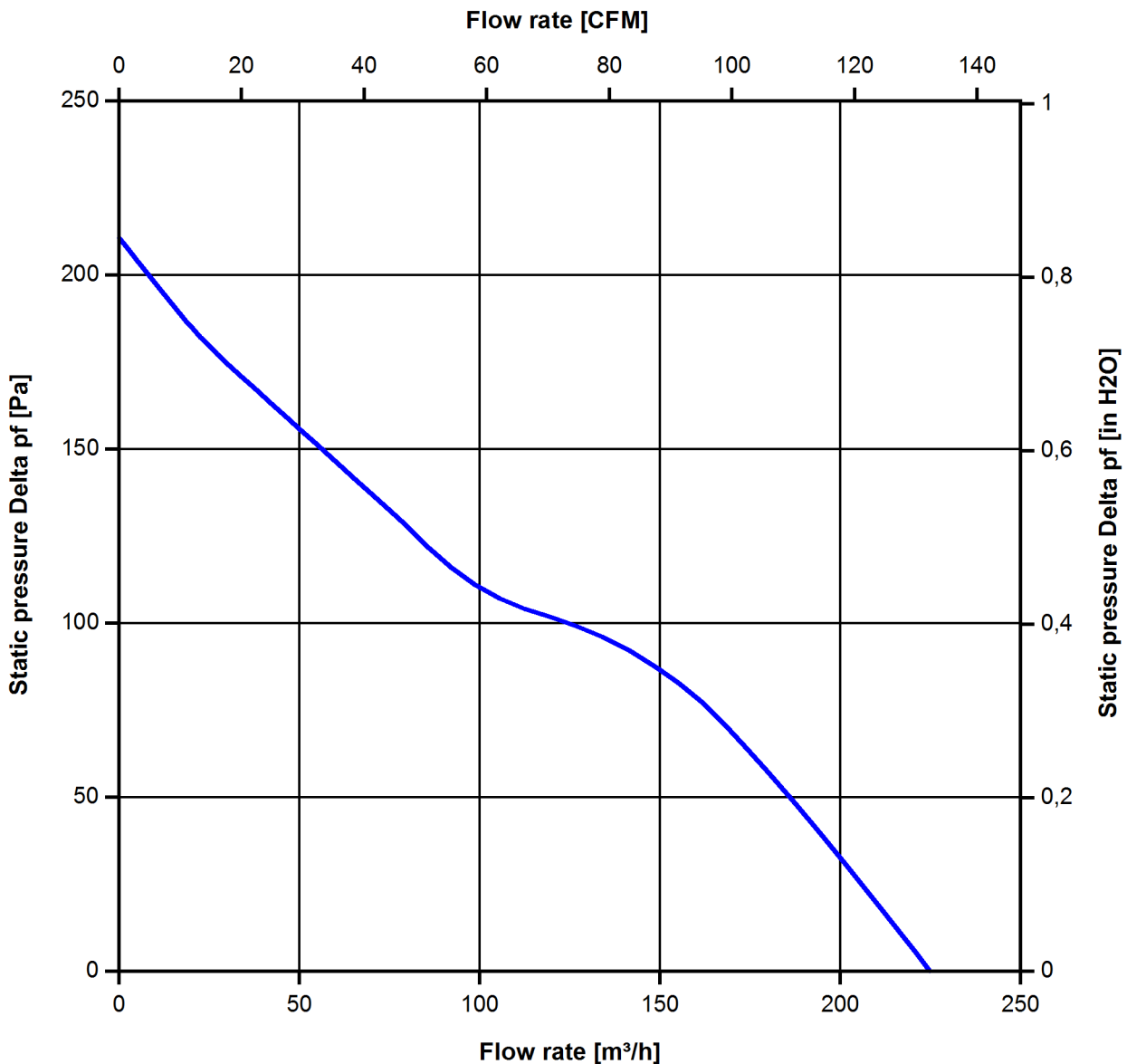
In the intake and outlet area should not be any solid obstruction within 0,5 m. Motor shaft horizontal.

The information is only valid under the specified test conditions and may be changed by the installation conditions. If there are deviations from the standard test conditions, the characteristic values must be checked under the installed conditions.

a.) Operation condition:

5.400 1/min at free air flow	PWM 90 %;	f: 2 kHz	f: 5 kHz
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Max. free-air flow ($\Delta p = 0 / \dot{V} = \text{max.}$)	225,0 m ³ /h
Max. static pressure ($\Delta p = \text{max.} / \dot{V} = 0$)	210 Pa



3.6 Sound Data

Measurement conditions: Sound pressure level: 1 meter distance between microphone and the air intake.
 Sound power level: Acc. to DIN 45635 part 38 (ISO 10302)
 Measured in a semianchoic chamber with a background noise level of $L_p(A) < 5 \text{ dB(A)}$
 For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

5.400 1/min at free air flow	PWM 90 %;	f: 2 kHz	f: 5 kHz
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Optimal operating point	162,0 m ³ /h @ 71 Pa	
Sound power level at the optimal operating point	6,4 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	55,0 dB(A)	

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-20 °C	
Max. permitted ambient temperature TU max.	70 °C	
Min. permitted storage temperature TL min.	-40 °C	
Max. permitted storage temperature TL max.	80 °C	

4.2 Climatic Requirements

Humidity requirements	humid heat, constant; according to DIN EN 60068-2-78, 14 days	
Water exposure	None	
Dust requirements	None	
Salt fog requirements	None	

Permitted application area:

The product is intended for use in sheltered rooms with controlled temperature and controlled humidity. Directly exposure to water must be avoided.

Pollution degree 1 (according DIN EN 60664-1)

There is either no pollution or it occurs only dry, non-conductive pollution. The pollution has no negative impact.

Please require severity levels and specification parameters from the responsible development departments.

5 Safety

5.1 Electrical Safety

Dielectric strength DIN EN 60950 (VDE 0805) and DIN EN 60335 (VDE 0700) A.) Type test Measuring conditions: After 48h of storage at 95% R.H. and 25°C. No arcing or breakdown is allowed! All connections together to ground.	500 VAC / 1 Min.	
B.) Routine test Measuring conditions: At indoor climate. No arcing or breakdown is allowed! All connections together to ground.	850 VDC / 1 Sec.	
Isolation resistance Measuring conditions: After 48h of storage at 95% R.H. and 25°C measured with U=500 VDC for 1 min.	RI > 10 MOhm	
Clearance / creepage distance	1,0 mm / 1,2 mm	
Protection class	III	

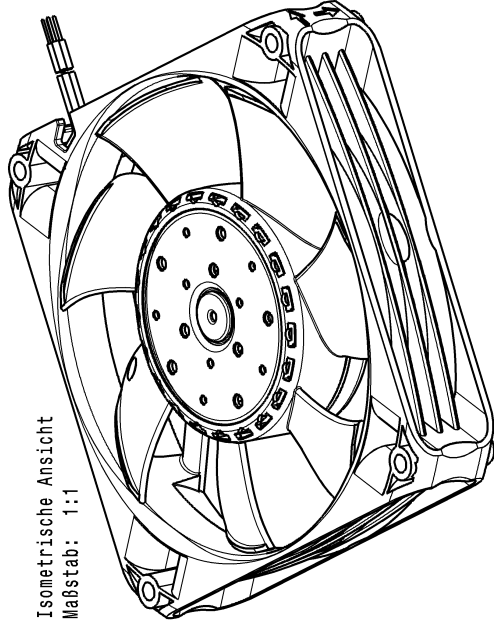
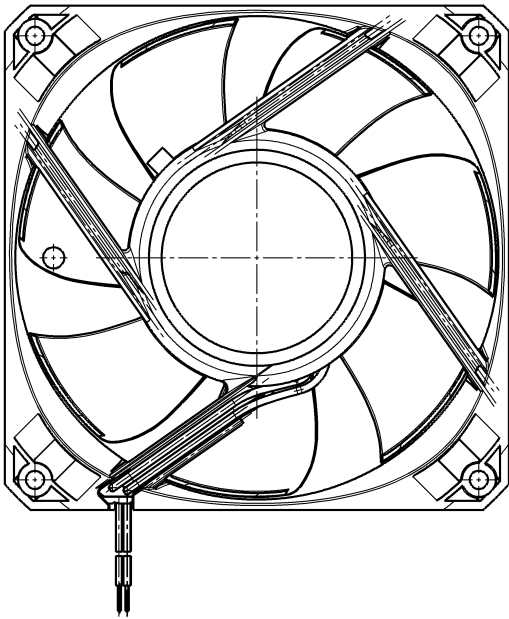
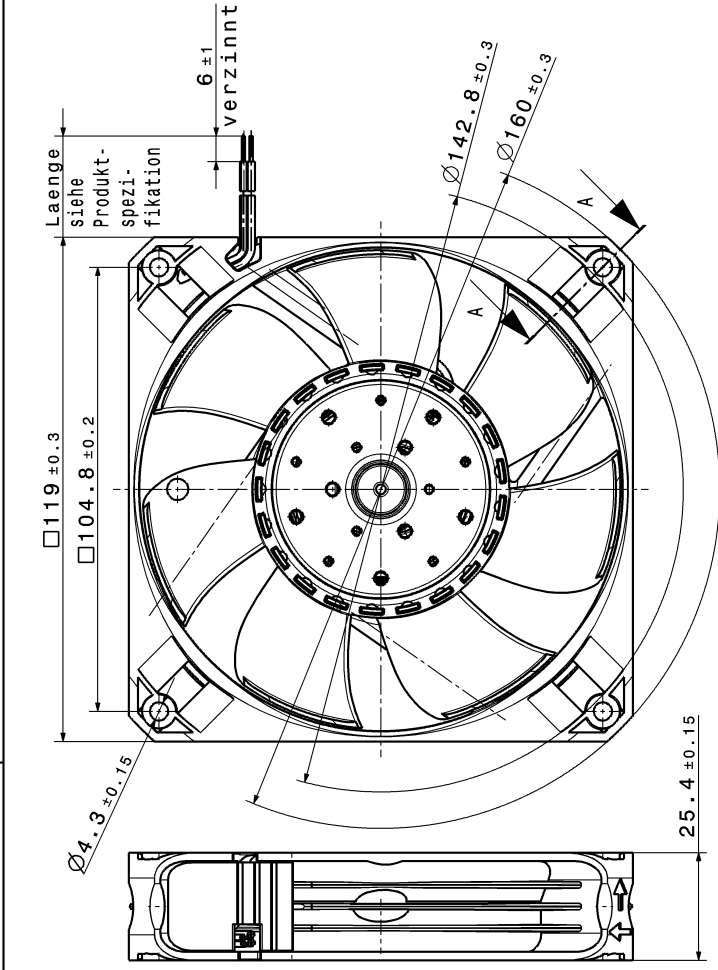
5.2 Approval Tests

CE	EC Declaration of Conformity	Yes
EAC	Eurasian Conformity	Yes
UL	Underwriters Laboratories	Yes / UL507, Electric Fans
VDE	Association for Electrical, Electronic and Information Technologies	Yes / Approval acc. to EN 60950 (VDE 0805) - Information technology equipment
CSA	Canadian Standards Association	Yes / C22.2 No. 113 Fans and Ventilators
CCC	China Compulsory Certification	Not applicable

6 Reliability

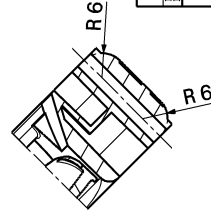
6.1 General

Life expectancy L10 at TU = 40 °C	60.000 h	
Life expectancy L10 at TU max.	30.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	102.500 h	



Isometrische Ansicht
Maßstab: 1:1

Schnitt-A
Maßstab: 1:1



Typ / Art. Nr. / Code No.	.....	Serial No.	.....	SP-Status	FR	Hersteller / Hersteller / Volume	.....	Maßstab	1:1
Freigegeben / Released	25.08.2005	Name	Walter Bernd	Produktionszeichnung / Name of Equipment	.....	.....	.....	TS-Dokument	(- / -)
Freigegeben / Released	02.11.2005	Datum	Kolezki	Arbeitszeichnung / Name of Equipment	.....	.....	.....	.....	002
ebmpapst ebmpapst St. Georgen a. d. Donau & Co KG					Zeich.-Nr. / Drawing No.: 9694390181 Blatt / Sheet: C2D Gesamt / Total: A3				
Tabularung / Tolerances: DIN 7167 Aluminiumarbeiten / Sm. Tolerances: DIN ISO 2768 M-E								

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