

Product Data Sheet **9693500197**
VWS0113FUGAZ
4412FGMPR-197

ebmpapst

The engineer's choice



4412FGMPR-197

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1 General

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

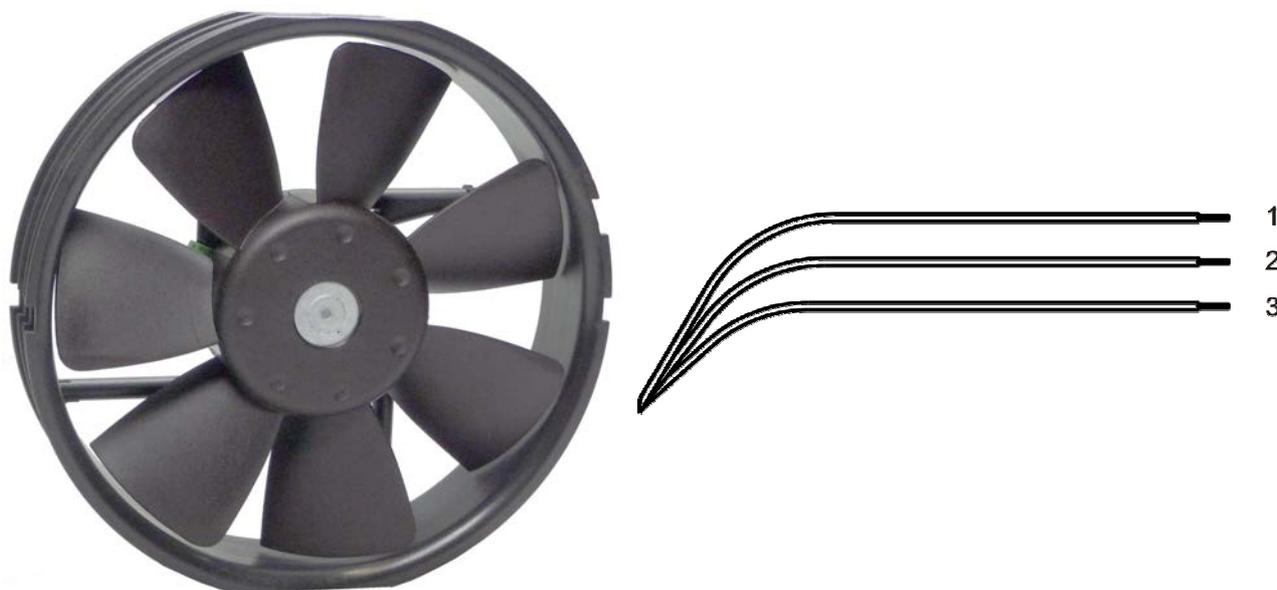
2 Mechanics

2.1 General

Depth	26,4 mm	
Diameter	127 mm	
Mass	0,160 kg	
Housing material	Plastic	
Impeller material	Plastic	

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 24	1,35 mm
2	blue	- GND	AWG 24	1,35 mm
3	violet	PWM		

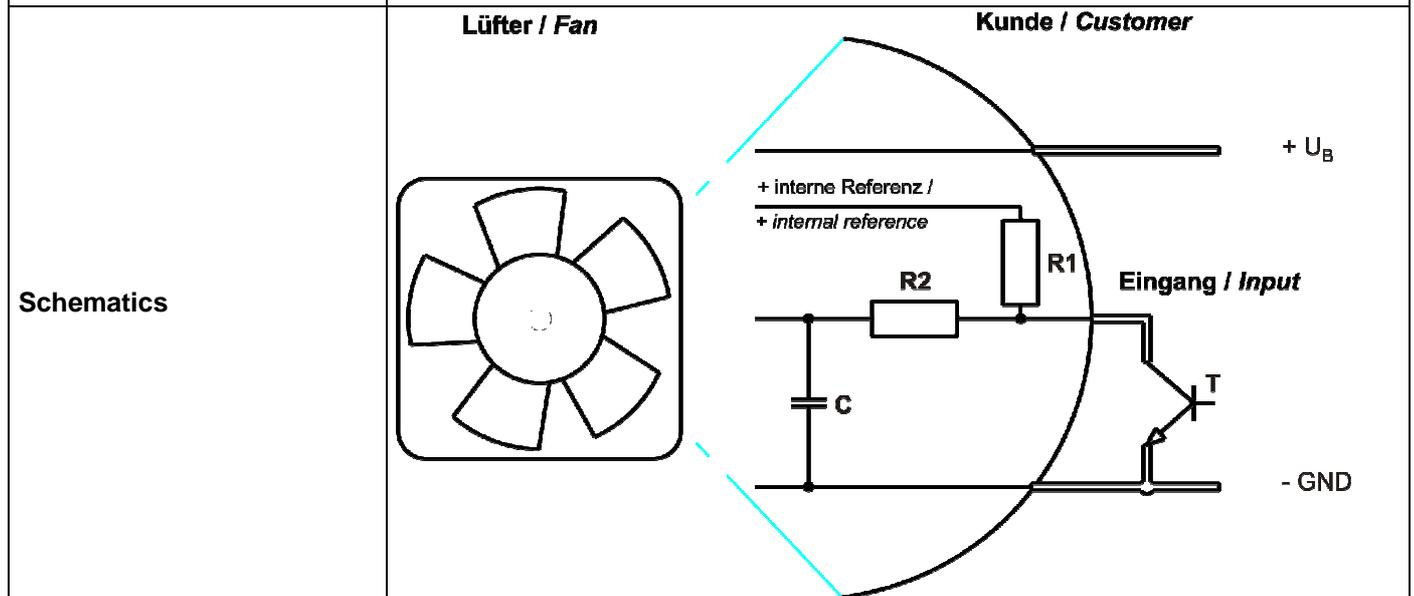
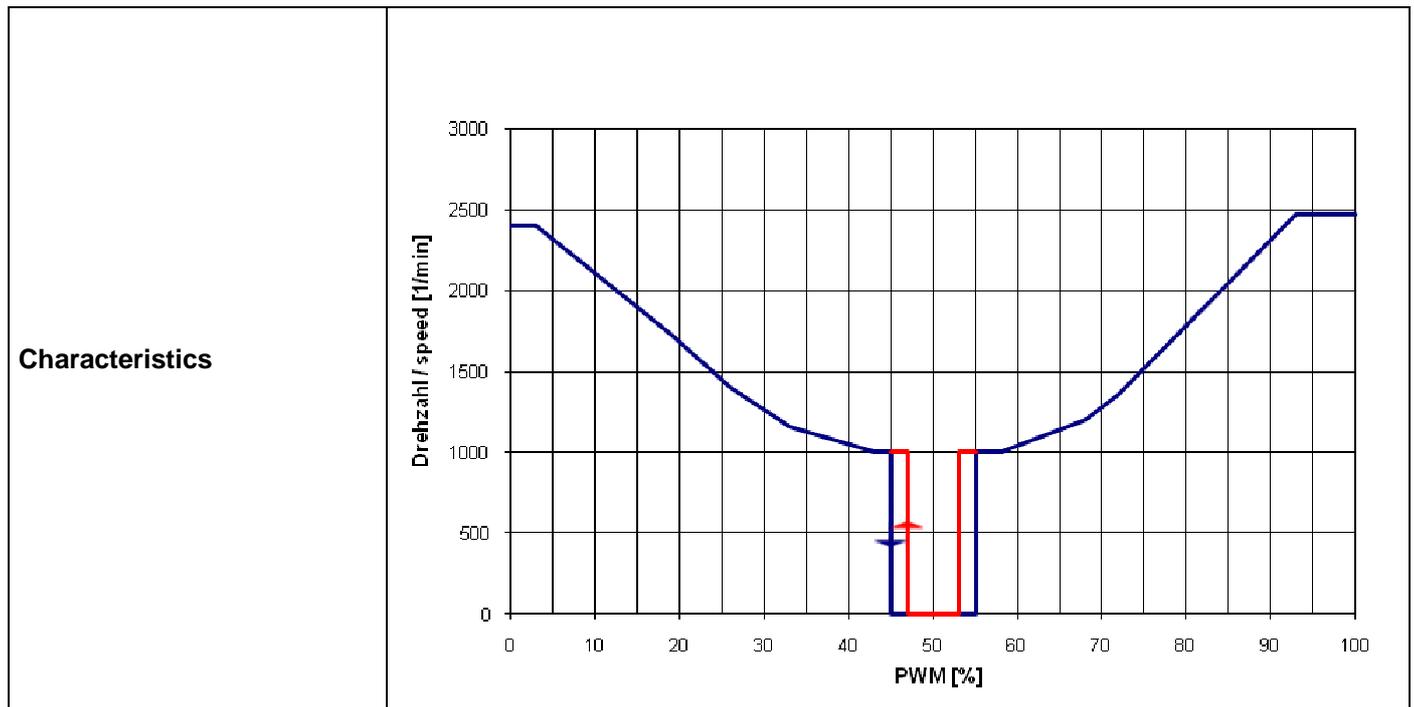
3 Operating Data

3.1 Electrical Interface - Input

Control input	PWM
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Features

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



Fan with reversed rotating direction Setpoint: 0% - 50% air outlet over struts / Setpoint: 50% - 100% air intake over struts

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: <= 3 %; f: 2 kHz f: 5 kHz

Rotational direction, looking at Rotor: left (air outlet over struts)

Rotational direction, looking at Rotor: left (air outlet over struts)

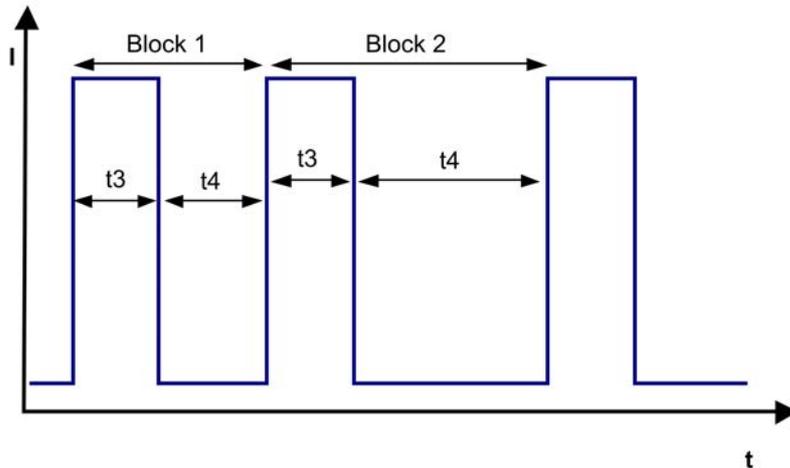
Rotational direction, looking at Rotor: right (air intake over struts)

Rotational direction, looking at Rotor: right (air intake over struts)

Features	Condition	Symbol	Values		
Voltage range		U	9,5 V		12,6 V
Nominal voltage		U _N		12,0 V	
Power consumption	$\Delta p = 0$	P	2,3 W	2,95 W	2,9 W
Tolerance	PWM 0010		+/- 25,0 %	+/- 25,0 %	+/- 25,0 %
Current consumption	$\Delta p = 0$	I	245 mA	245 mA	230 mA
Tolerance	PWM 0010		+/- 25,0 %	+/- 25,0 %	+/- 25,0 %
Speed	$\Delta p = 0$	n	2.250 1/min	2.400 1/min	2.400 1/min
Tolerance	PWM 0010		+/- 12,5 %	+/- 4,0 %	+/- 4,0 %
Starting current consumption				920 mA	

3.3 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	Rectifying diode	
Max. residual current at U_N	$I_F < 50 \mu A$	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	I_{block} approx. 920 mA	



Special locked rotor protection: Block1: $t3 / t4 = 0,6 \text{ s} / 0,3 \text{ s}$; Block2: locked rotor protection $t3 / t4 = 0,6 \text{ s} / 10 \text{ s}$

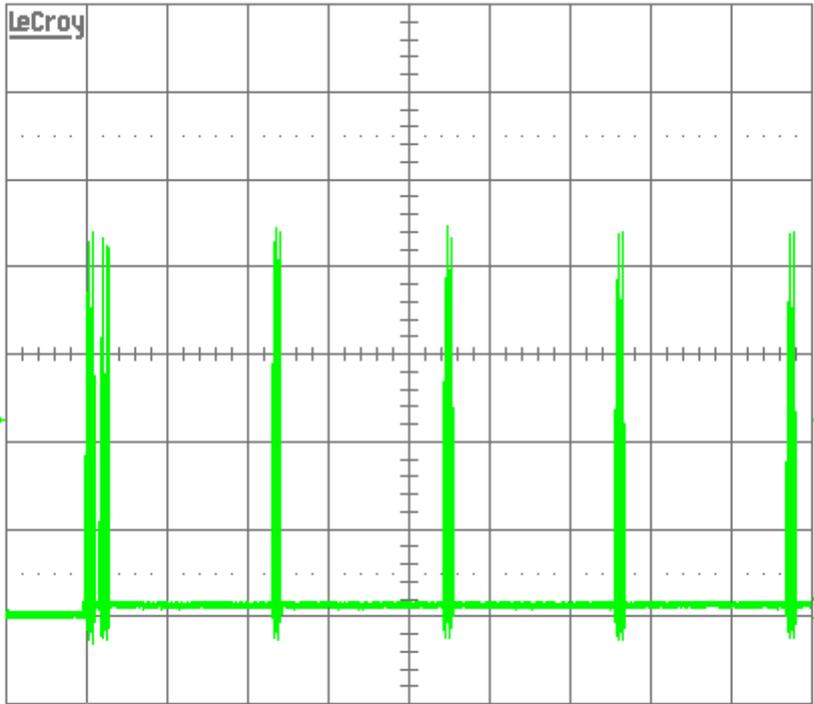
The fan has a two constant blocking cycle. The behavior of this cycle differs marginally between a blocked rotor when the fan gets started and a blocked rotor during the running operation of the fan. The following figures describe this characteristic.

1. Blocked rotor at the start of the fan

5-Apr-12
14:27:45

REMOTE ENABLE

5 s
100 mA



GO TO
LOCAL

	5 s		BWL
1	5	V	DC $\times \frac{10}{10}$
2	5	V	DC $\times \frac{10}{10}$
3	1	V	DC $\times \frac{10}{10}$
4	.1	V	DC



4 DC 226 mA

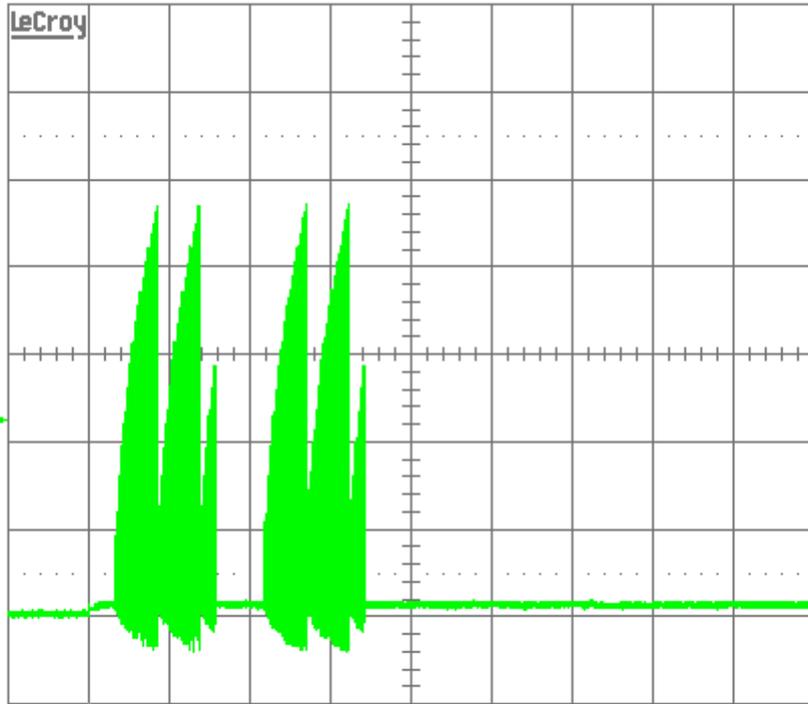
1 kS/s

STOPPED

5-Apr-12
14:28:45

REMOTE ENABLE

4
.5 s
100 mA



GO TO
LOCAL

.5 s BWL

- 1 5 V DC $\times \frac{10}{10}$
- 2 5 V DC $\times \frac{10}{10}$
- 3 1 V DC $\times \frac{10}{10}$
- 4 .1 V DC



4 DC 226 mA

10 kS/s

STOPPED

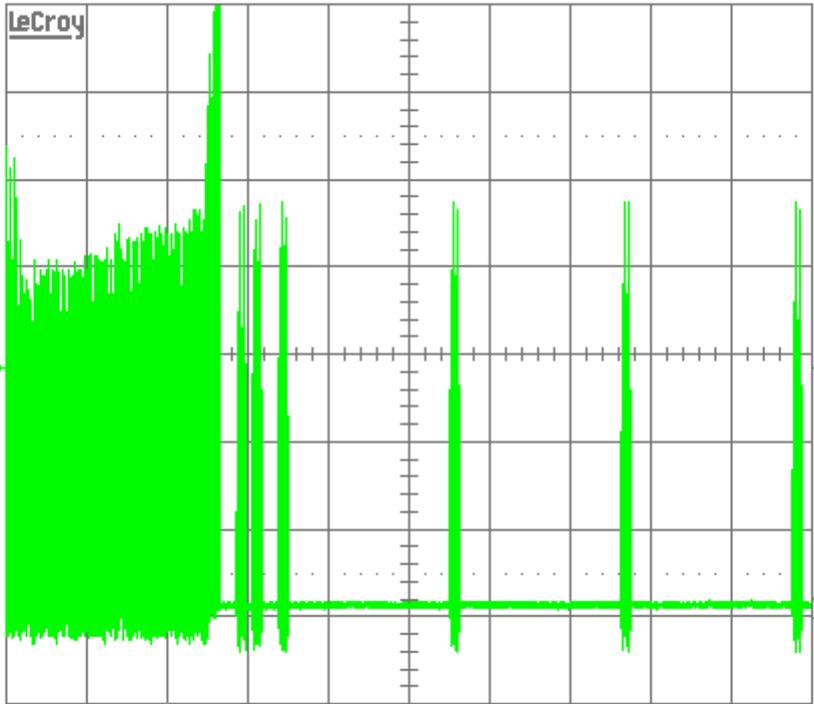
2. Blocked rotor after the normal operation of the fan

The internal software measures if the fan has been blocked. In this case the second current pulse starts 1 sec later then in case 1.

5-Apr-12
14:32:49

REMOTE ENABLE

5 s
100 mA



GO TO
LOCAL

	5	s	BWL
1	5	V	DC $\times \frac{10}{10}$
2	5	V	DC $\times \frac{10}{10}$
3	1	V	DC $\times \frac{10}{10}$
4	.1	V	DC



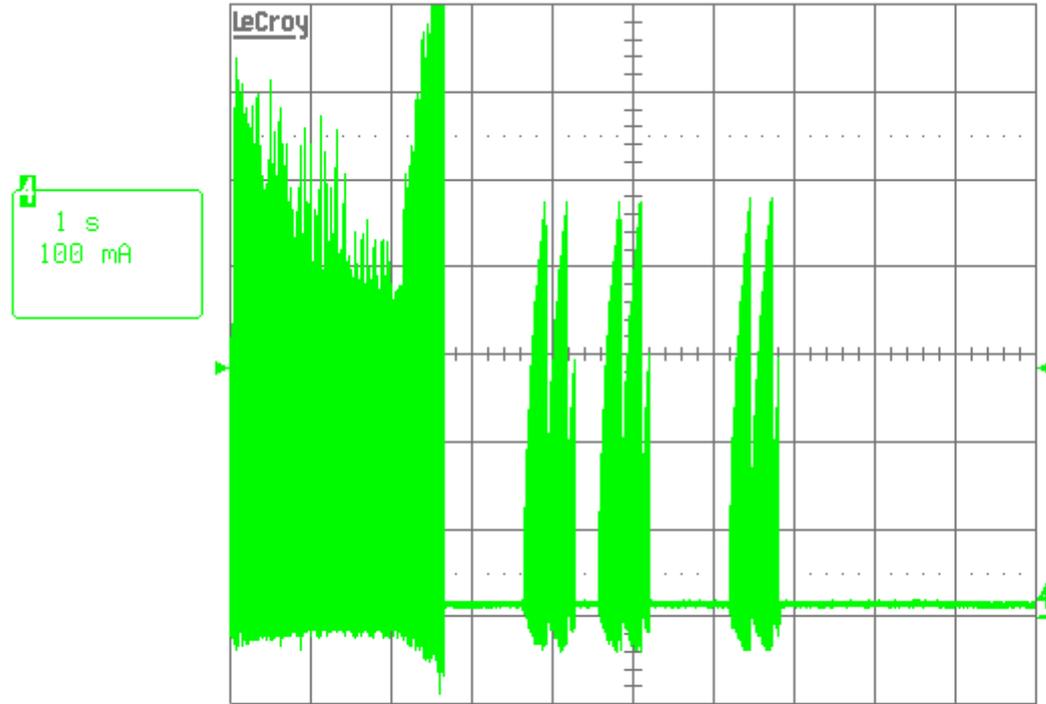
4 DC 286 mA

1 kS/s

STOPPED

5-Apr-12
14:34:45

REMOTE ENABLE



GO TO LOCAL

	1	s	BWL
1	5	V	DC $\times \frac{10}{10}$
2	5	V	DC $\times \frac{10}{10}$
3	1	V	DC $\times \frac{10}{10}$
4	.1	V	DC



4 DC 286 mA

5 kS/s

STOPPED

3.4 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:

2.400 1/min at free air flow	PWM <= 3 %;	f: 2 kHz	f: 5 kHz
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Max. free-air flow ($\Delta p = 0 / \dot{V} = \max.$)	138 m ³ /h	
Max. static pressure ($\Delta p = \max. / \dot{V} = 0$)	55 Pa	

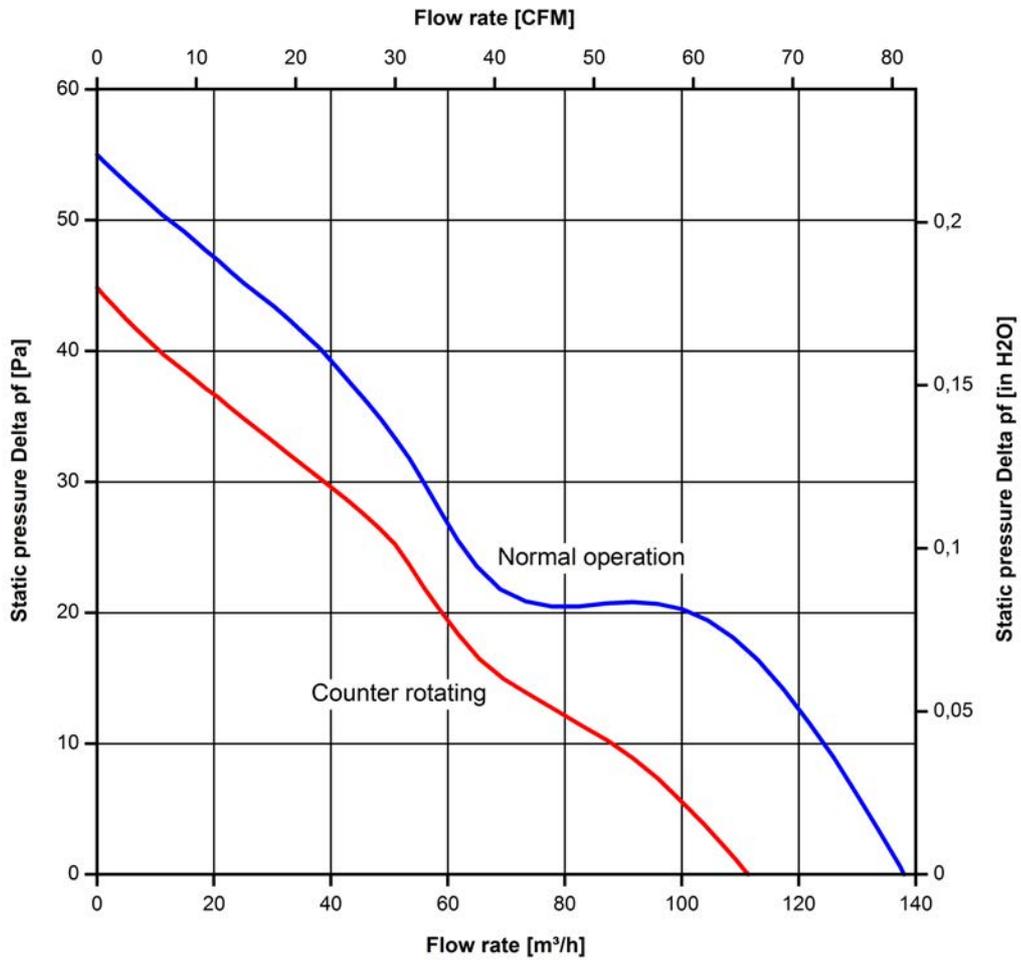
Rotation in normal direction.

b.) Operation condition:

2.470 1/min at free air flow	PWM >= 93 %;	f: 2 kHz	f: 5 kHz
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Max. free-air flow ($\Delta p = 0 / \dot{V} = \max.$)	111,0 m ³ /h	
Max. static pressure ($\Delta p = \max. / \dot{V} = 0$)	45 Pa	

Counter rotation.



3.5 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) 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:

2.400 1/min at free air flow	PWM $\leq 3 \%$;	f: 2 kHz	f: 5 kHz
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Optimal operating point	122,0 m ³ /h @ 10 Pa	
Sound power level at the optimal operating point	4,6 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	36 dB(A)	

b.) Operation condition:

2.470 1/min at free air flow	PWM $\geq 93 \%$;	f: 2 kHz	f: 5 kHz
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Optimal operating point	22,0 m ³ /h @ 32 Pa	
Sound power level at the optimal operating point	5,6 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	44 dB(A)	

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-20 °C	
Max. permitted ambient temperature TU max.	65 °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, cyclic; according to DIN EN 60068-2-30, 6 cycle	
Water exposure	None	
Dust requirements	Dust check; according to DIN EN 60068-2-68, 6g/m2d, 1 day	
Salt fog requirements	None	

Permitted application area:

The product is for the use in sheltered rooms with limited controlled temperature. Occasionally condensed water is allowed. Direct exposure to water must be avoided. Saline ambient conditions must be avoided.

Pollution degree 2 (according DIN EN 60664-1)

It occurs only non-conductive pollution. Occasionally, temporary conductivity caused by condensation occurs.

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 E38324
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**

