

KARTA KATALOGOWA

2214 F/2TDHOU-700

Wentylator osiowy kompaktowy DC

Producent: ebm-papst



Dane znamionowe

Napięcie znamionowe	24 V DC (16...30 V DC)
Prędkość obrotowa	4250 obr/min
Pobór mocy	36 W
Pobór prądu	1450 mA
Wydajność	800 m³/h
Maks. ciśnienie statyczne	430 Pa
Poziom ciśnienia akustycznego	62 dB(A)
Poziom mocy akustycznej	7,1 B
Temperatura otoczenia	-20...+70 °C

Budowa

Wymiary	200 × 200 × 51 mm
Materiał wirnika	tworzywo sztuczne
Obudowa	metal
Kierunek przepływu	wydmuch przez żebra
Łożyskowanie	kulkowe
Podłączenie	przewody
Trwałość L10 (40 °C)	90000 h

Dane na okładce odczytane z karty produktu ebm-papst (oryginał na kolejnych stronach).
Producent zastrzega możliwość zmian.

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The engineer's choice



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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	

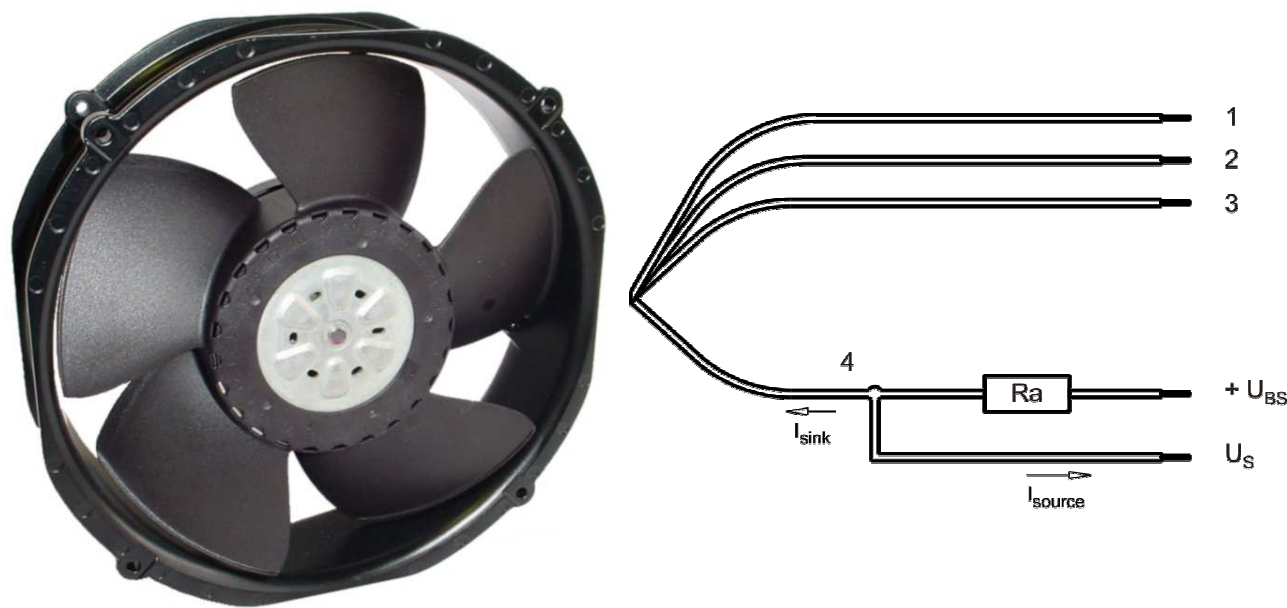
2 Mechanics
2.1 General

Width	200 mm	
Height	200 mm	
Depth	51,0 mm	
Diameter	220 mm	
Mass	1,0 kg	
Housing material	Metal	
Impeller material	Plastic	

2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 340 mm	
Tolerance	+ - 10 mm	
Tube length	S = 10 mm	
Tolerance	+ - 2 mm	

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Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 20	2,05 mm
2	blue	- GND	AWG 20	2,05 mm
3	violet	PWM	AWG 22	1,3 mm
4	white	Tacho	AWG 22	1,3 mm

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

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3 Operating Data

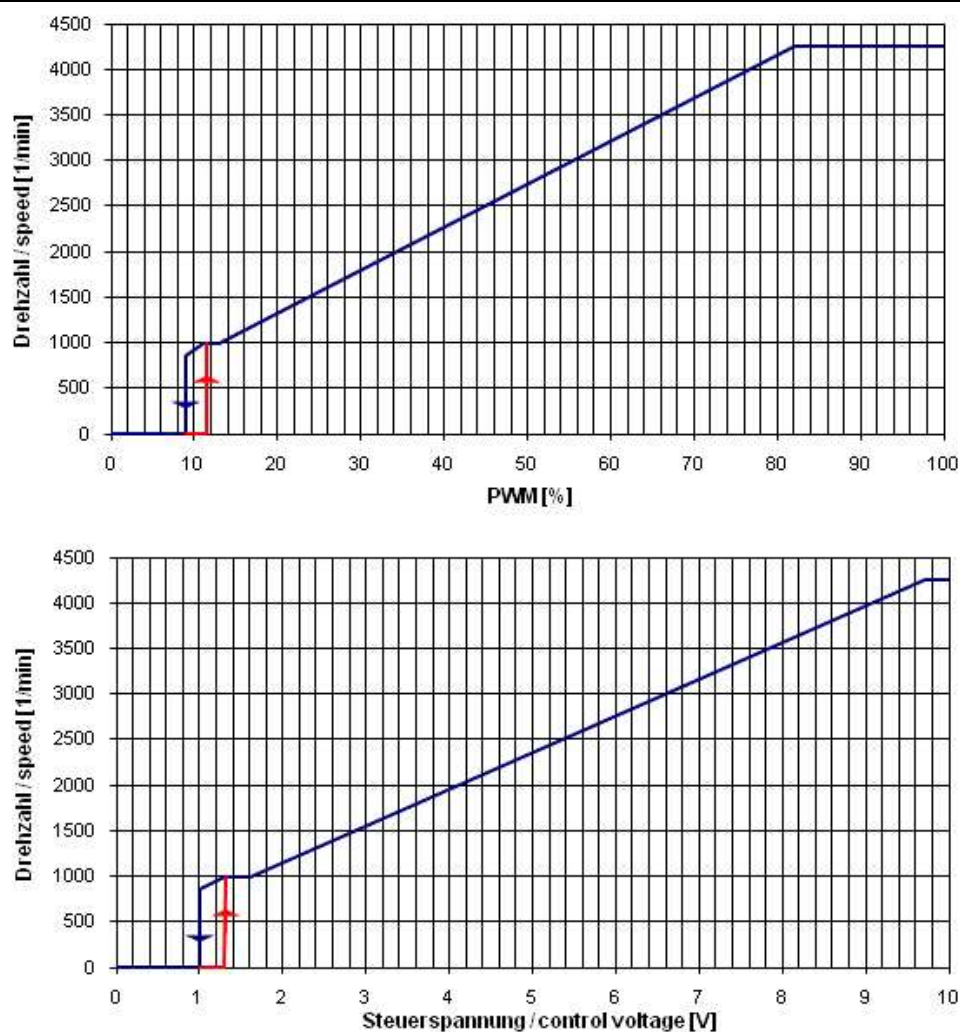
3.1 Electrical Interface - Input

Control input	Analog
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Features

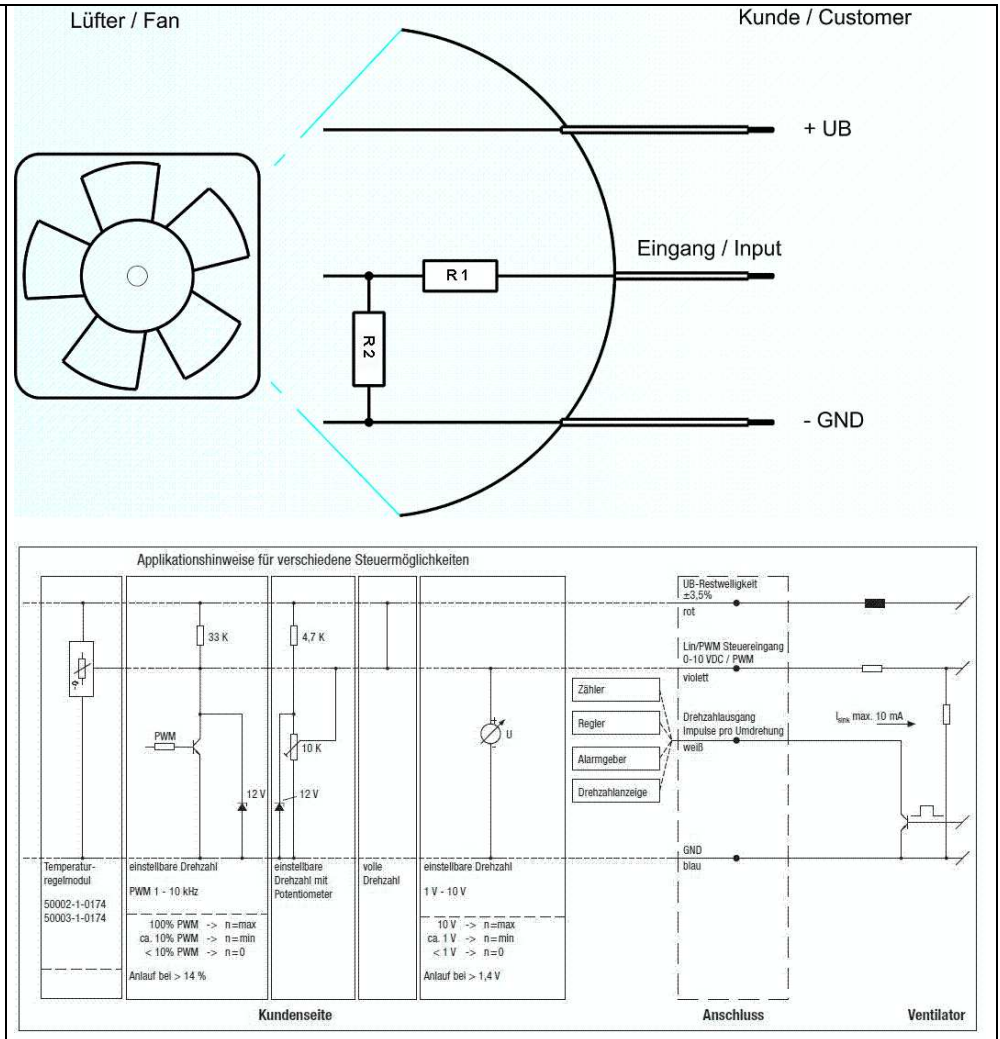
PWM - Frequency	1 kHz - 10 kHz typical: 2 kHz
Input voltage range	0 V - 10 V

Characteristics



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Schematics



Input voltage divider:

R1 = 47 kOhm

$$R_2 = 36 \text{ k}\Omega$$

Speed control:

By pulse-width modulation (PWM) 0 ... 100%

Open collector in relation to Signal-ground

Frequency = 2 kHz (1 - 10 kHz)

Push-Pull-Signal with high = 12 V

Information to the curve PWM:

0% - 10% PWM: 0 1/min

11% PWM: 1.000 1/min (Fan on, comming from 0% PWM)

11% - 13% PWM: 1.000 1/min (corresponding to min. speed)

13% - 82% PWM: linear increasing curve

82% - 100% PWM: 4.250 1/min (corresponding to max. speed)

9% PWM: 800 1/min or 0 1/min (Fan off, coming from 100% PWM)

or:

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Speed control:

By analog voltage 0 - 10 V (Max. permitted 30 V)

Information to the curve analog:

0 V - 1,2 V:	0 1/min
1,3 V:	1.000 1/min (Fan on, coming from 0 V)
1,3 V - 1,6 V:	1.000 1/min (corresponding to min. speed)
1,6 V - 9,7 V:	linear increasing curve
9,7 V - 10 V:	4.250 1/min (corresponding to max. speed)
1,0 V:	800 1/min or 0 1/min (Fan off, coming from 10 V)

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.

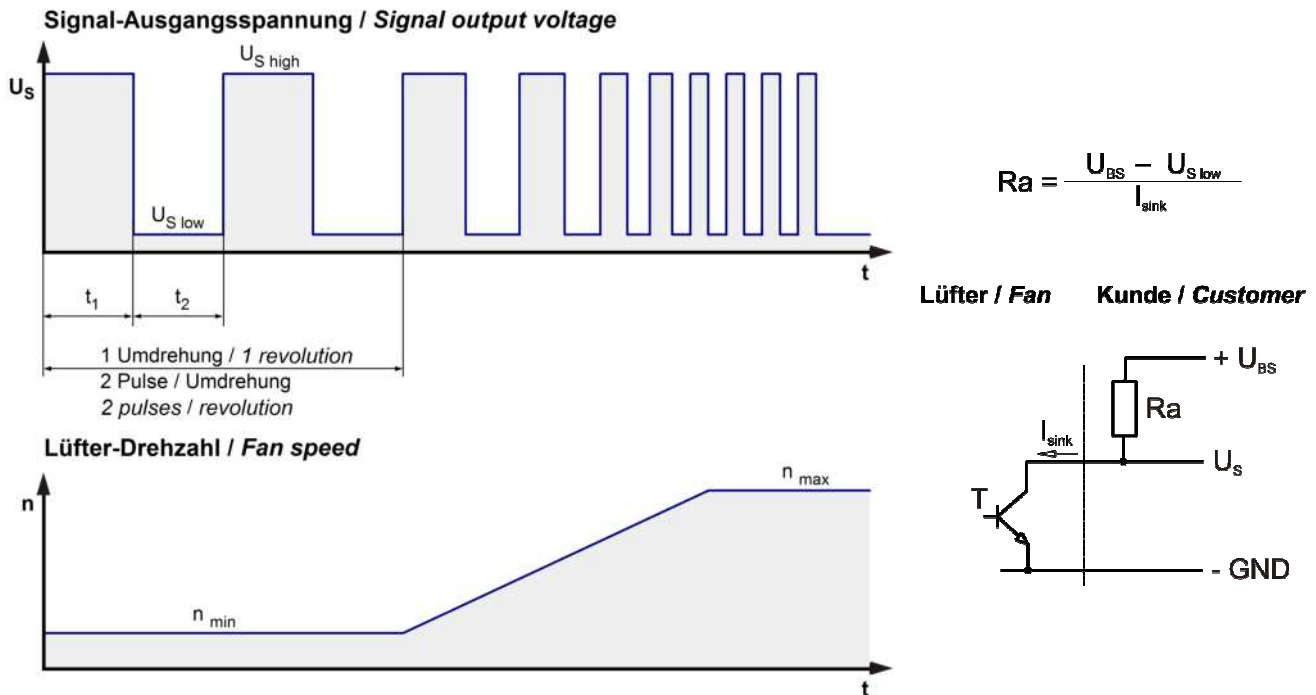
$\Delta p = 0$: corresp. to free air flow (see chapter aerodynamics)
 I: corresp. to arithm. mean current value

Name	Condition
U Contr. 0001	U Contr. min.: 9,7 V U Contr. max.: 10,0 V

Features	Condition	Symbol	Values		
Voltage range		U	16 V		30 V
Nominal voltage		U _N		24 V	
Power consumption	$\Delta p = 0$	P	31 W	36 W	35 W
Tolerance	U Contr. 0010		+/- 10 %	+/- 10 %	+/- 10 %
Current consumption	$\Delta p = 0$	I	1.950 mA	1.450 mA	1.170 mA
Tolerance	U Contr. 0010		+/- 10 %	+/- 10 %	+/- 10 %
Speed	$\Delta p = 0$	n	4.100 1/min	4.250 1/min	4.250 1/min
Tolerance	U Contr. 0010		+/- 7,5 %	+/- 5 %	+/- 5 %

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3.3 Electrical Interface - Output

Tacho type	/2 (open collector)
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Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 30\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$\leq 30\text{ V}$
Maximum sink current	I_{sink}	$\leq 20\text{ mA}$
External resistor	External resistor R_a from U_{BS} to U_S required. All voltages measured to GND.	
Tacho frequency	$(2 \times n) / 60$	140 Hz @ 4.200 1/min
Tacho isolated from motor	No	
Slew rate		$\geq 0,5\text{ V/us}$

n = revolutions per minute (1/min)

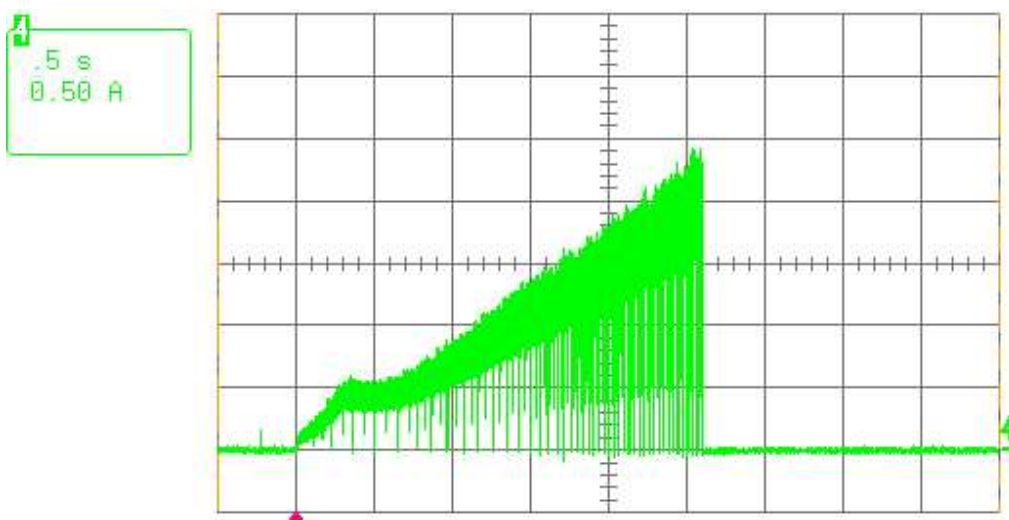
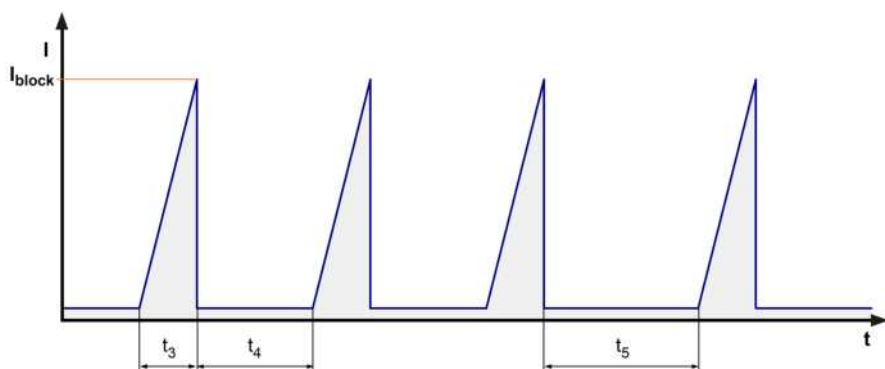
3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	Rectifying diode	
Max. residual current at U_N	$I_F < 5\text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	I_{block}	
Clock signal at locked rotor	t_3 / t_4 typical: 2,7 s / 10,0 s	
Internal fuse	Littelfuse NANO2 > Very Fast-Acting > 451/453 Series	

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Voltage control *)	6,3A / 125V (Art.No.: 045106.3MRL) Fan turns on at $U_B > 12\text{ V}$ or $< 13\text{ V}$ Fan turns off at $U_B < 35\text{ V}$ or $> 36\text{ V}$
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*) This fan has an undervoltage and overvoltage control circuit integrated which turns the motor off if the voltage is out of range.



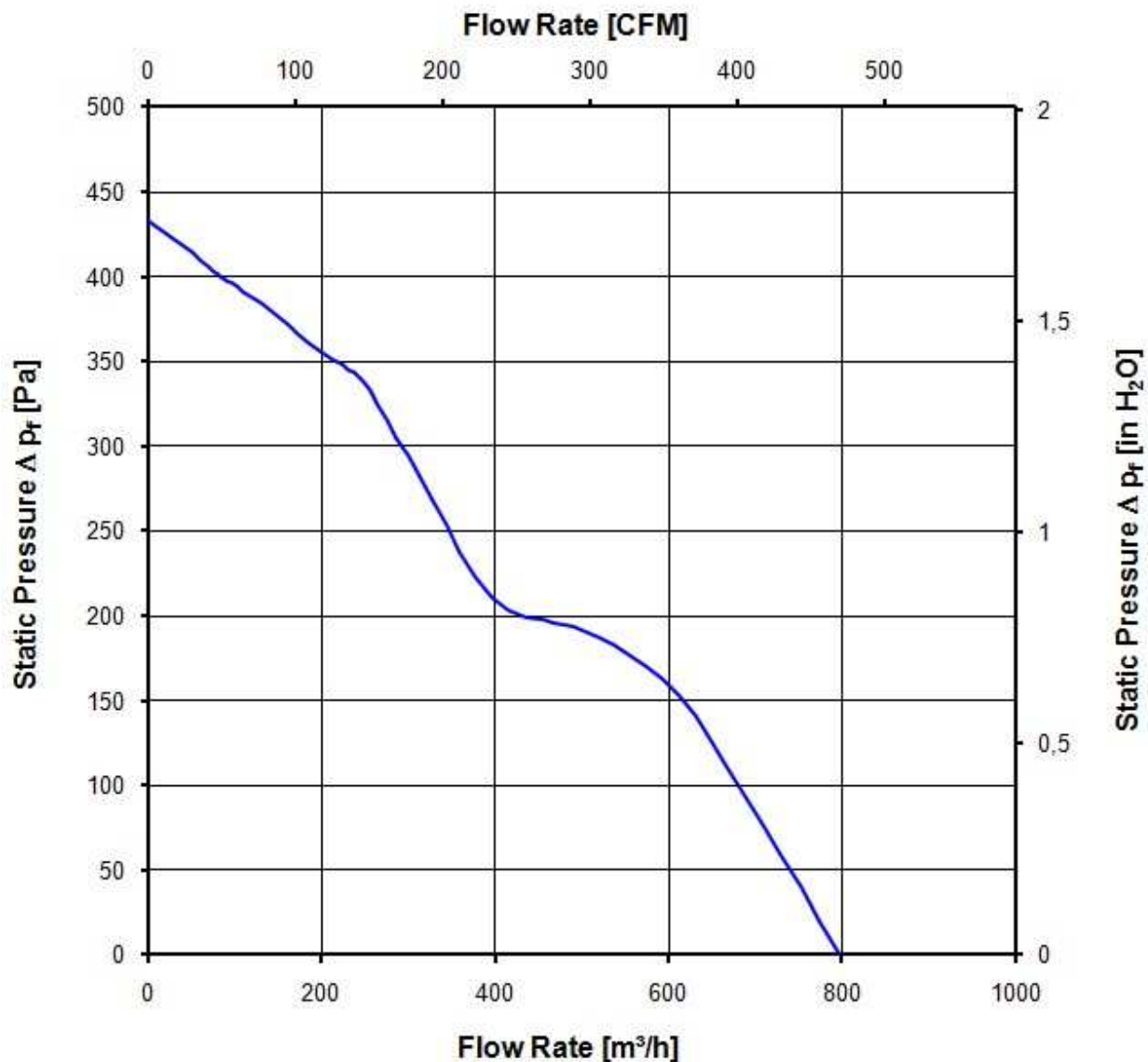
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3.5 Aerodynamics

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:

4.250 1/min at free air flow	U Contr. min.: 9,7 V	U Contr. max.: 10,0 V
Max. free-air flow ($\Delta p = 0$ / $\dot{V} = \max.$)	800 m ³ /h	
Max. static pressure ($\Delta p = \max.$ / $\dot{V} = 0$)	430 Pa	



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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:

4.250 1/min at free air flow		U Contr. min.: 9,7 V	U Contr. max.: 10,0 V
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Optimal operating point	688 m ³ /h @ 80 Pa	
Sound power level at the optimal operating point	7,1 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	62,0 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

IP-protection type (certified)	IP 68 (for fan only, not for connector if applicable) **)	
Humidity requirements	humid temperature, cyclic; according to DIN EN 60068-2-38, 10 cycle and condensation water check; according to DIN EN ISO 6270-2, 14 days	
Salt fog requirements	None	

Permitted application area:

The product is for the use in partial sheltered rooms or open, roofed areas. Direct exposure to water is allowed provided that this does not prevent the normal operation. Saline ambient conditions must be avoided.

Pollution degree 3 (according DIN EN 60664-1)

It occurs conductive pollution or dry non-conductive pollution which becomes conductive due to condensation.

**) The specification of the IP protection refers to the conditions mentioned in certification of the fan. The above mentioned short description of the protection scope is not final. For detailed information of the respective protection scope and definitions, see certification as well as DIN EN 60529 (protection by housings) and ISO 20653 (for vehicles) with the letter K.

Short description of the IP-protection type:

Solid particle Protection: Dust tight.

Protection against deliberate contact: Protected against contact to hazardous parts with a wire.

Protection against water: The fan test according to IP68 (Based on IEC 60529), is conducted in non-operating mode. The fan is tested by a complete immersion in water for a period of 2h at a water-level of 1,2m. Electrical connections are not immersed since they are customer specific.

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4.3 Mechanical Requirements

severity level	mobile use		
1	storage / transportation	Random vibration not in use IEC 60068-2-64 Frequency range / ASD G_{RMS} Axes of vibration Test duration	Random vibration 5 - 20 Hz : $1,0 \text{ m}^2 / \text{s}^3$ 20 - 500 Hz : - 3 dB / Oct 0,91 G 3 3 x 5 h
	storage / transportation	Bump not in use IEC 60068-2-29 Shock spectrum Acceleration Duration Number of bumps (+X, -X, -Y, +Y, -Z, +Z) Total bumps	Bump half sine 18 G 6 ms 100 in each direction 600
	mobile use	Random vibration in use IEC 60068-2-64 Frequency range / ASD G_{RMS} Axes of vibration Test duration	Random vibration 5 - 20 Hz : $2,0 \text{ m}^2 / \text{s}^3$ 20- 150 Hz : - 3 dB / Oct 0,83 G 3 3 x 5 h
	mobile use	Shock in use IEC 60068-2-27 Shock spectrum Acceleration Duration Number of bumps (+X, -X, -Y, +Y, -Z, +Z) Total bumps	Shock half sine 30 G 6 ms 10 in each direction 60
	mobile use	Bump in use IEC 60068-2-29 Shock spectrum Acceleration Duration Number of bumps (+X, -X, -Y, +Y, -Z, +Z) Total bumps	Bump half sine 5 G 11 ms 100 in each direction 600

4.4 EMC

Kind	Radiated Emission; 30 MHz - 1000 MHz
According	DIN EN 55032:2016-02
Check accuracy / Limit	Class B
Result	Below limit Class B

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Kind	Electrostatic Discharge Immunity Test
According	DIN EN 61000-4-2:2001-12
Ceck accuracy / Limit	Contact Discharge +/- 4 kV; Air Discharge +/- 8 kV
Result	A: The monitored function operates as designed during and after exposure to a disturbance.

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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. B.) Routine test Measuring conditions: At indoor climate. No arcing or breakdown is allowed! All connections together to ground.	500 VAC / 1 Min. 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
CCC	China Compulsory Certification	Not applicable

6 Reliability
6.1 General

Life expectancy L10 at TU = 40 °C	90.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	152. 500 h	

