

1 General

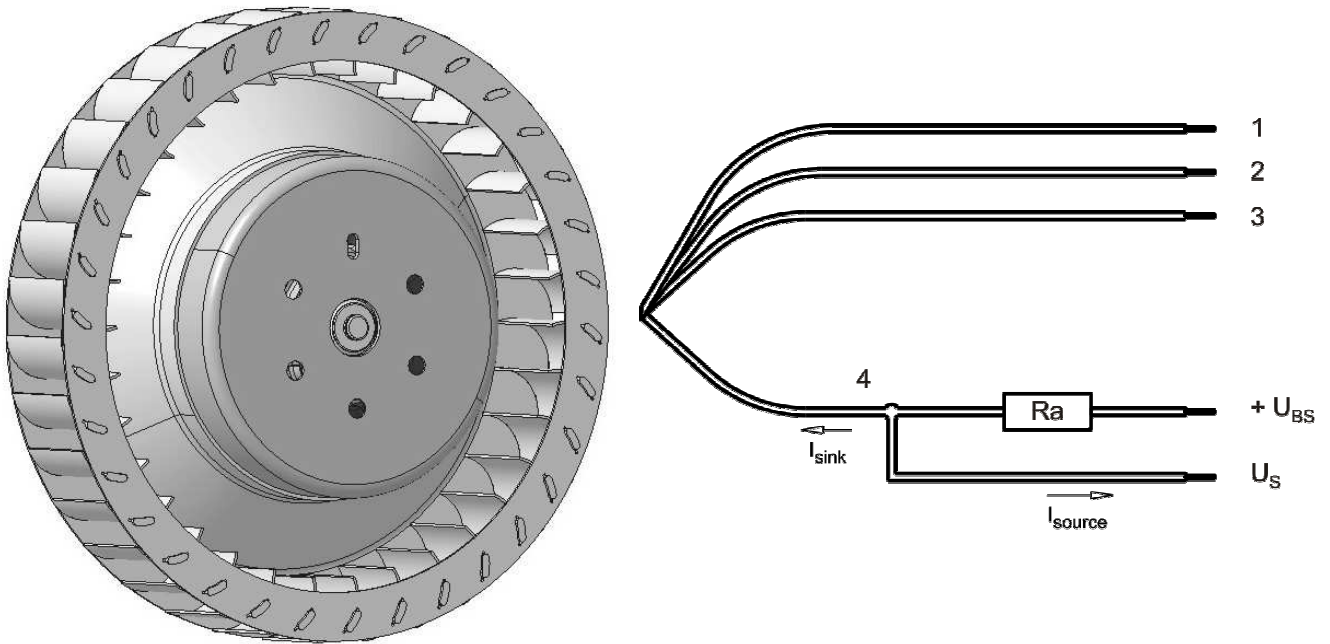
Fan type	Blower without chassis without intake nozzle	
Rotating direction looking at rotor	Clockwise	
Airflow direction	Air in axially, Air out radially	
Bearing system	Stainless steel bearing	
Mounting position - shaft	Any	

2 Mechanics**2.1 General**

Depth	40,0 mm	
Diameter	97,0 mm	
Mass	0,34 kg	
Housing material		
Impeller material	Metal	

2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 310 mm	
Tolerance	+ - 10 mm	
Tube length	S = 65 mm	
Tolerance	+ - 5 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 22	1,7 mm
2	blue	- GND	AWG 22	1,7 mm
3	violet	PWM	AWG 22	1,7 mm
4	white	Tacho	AWG 22	1,7 mm

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

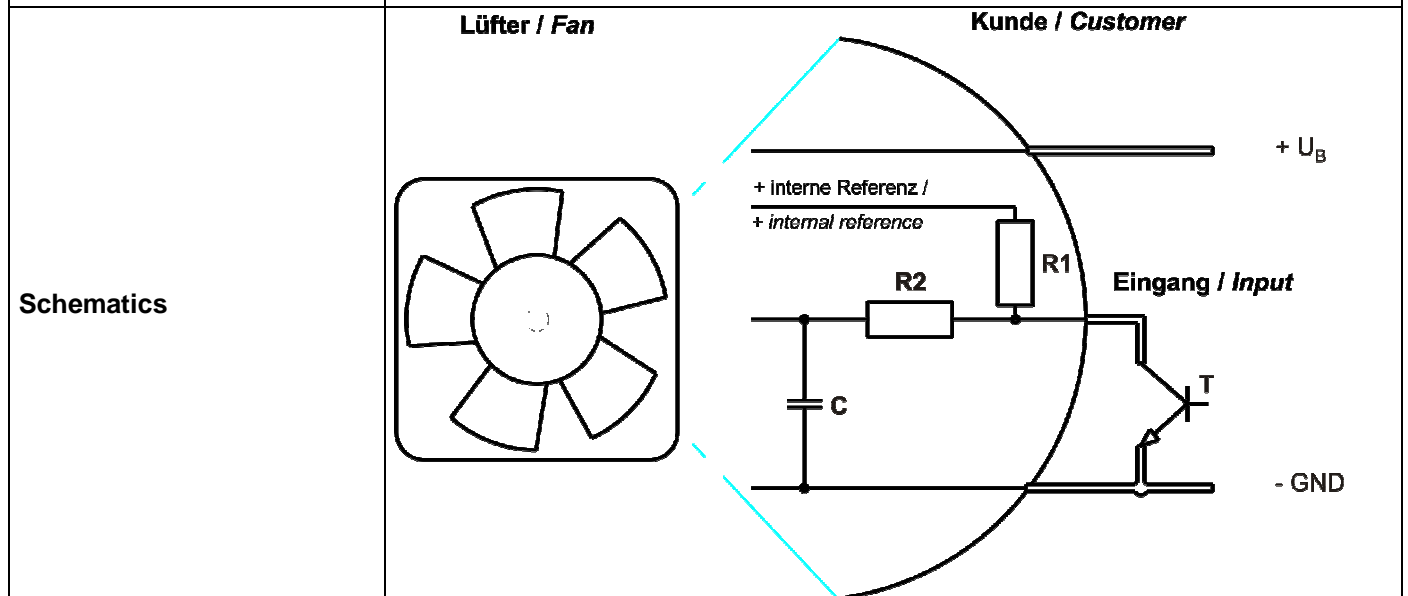
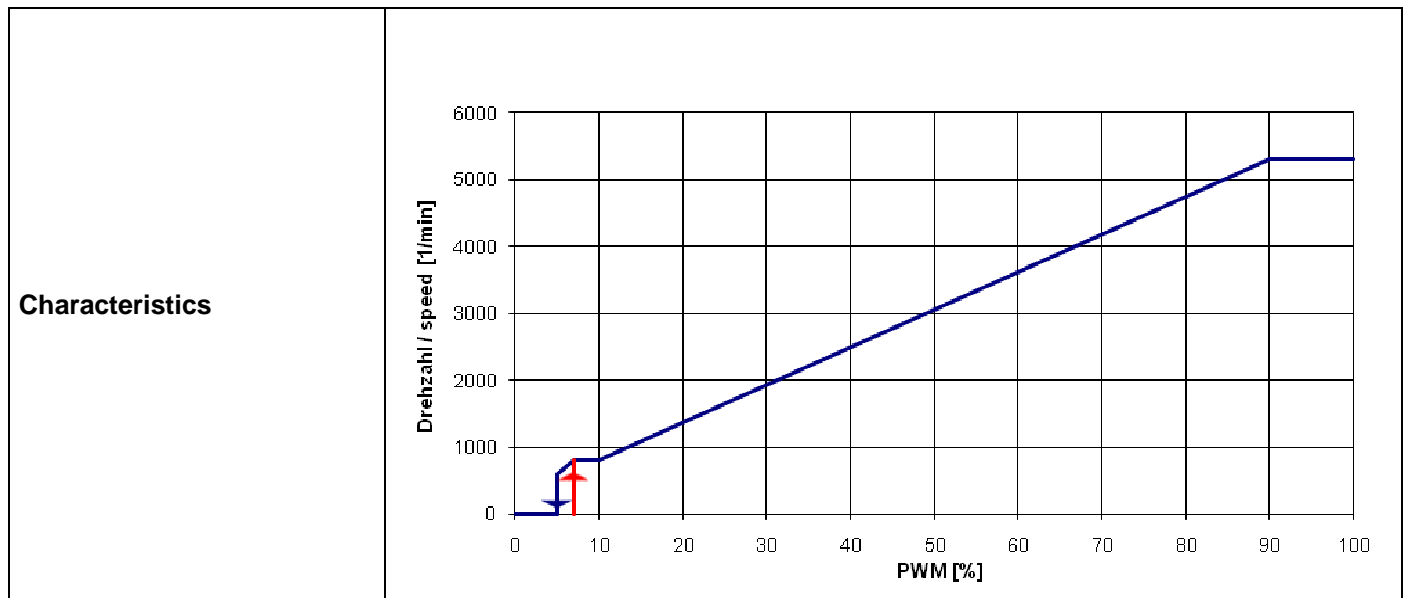
3 Operating Data

3.1 Electrical Interface - Input

Control input	PWM
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Features

Input type	Open collector	
PWM - Frequency		1 kHz - 10 kHz typical: 2 kHz



Speed control:

By Puls width modulation (PWM) 0 ... 100%
Open collector in relation to signal-ground

Information to the curve:

0 % - 7% PWM: 0 1/min
 7 % - 10% PWM: 800 1/min (corresponding to min. speed)
 10 % - 90% PWM: linear increasing curve
 90 % - 100% PWM: 5.300 1/min (corresponding to max. speed)
 7 % PWM: 800 1/min (Fan on, comming from 0% PWM)
 5 % PWM: 600 1/min or 0 1/min (Fan off, comming from 100% PWM)

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: 100 %;

100% PWM or broken lead wire (open control input); f = 2kHz

The data at 50% PWM are no FK features and need not be tested.

Features	Condition	Symbol	Values
Voltage range		U	
Nominal voltage		U _N	48 V
Power consumption	$\Delta p = 0$	P	120 W
Tolerance	PWM 0010		
Current consumption	$\Delta p = 0$	I	2.500 mA
Tolerance	PWM 0010		
Speed	$\Delta p = 0$	n	5.300 1/min
Tolerance	PWM 0010		
Starting current consumption			3.700 mA

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

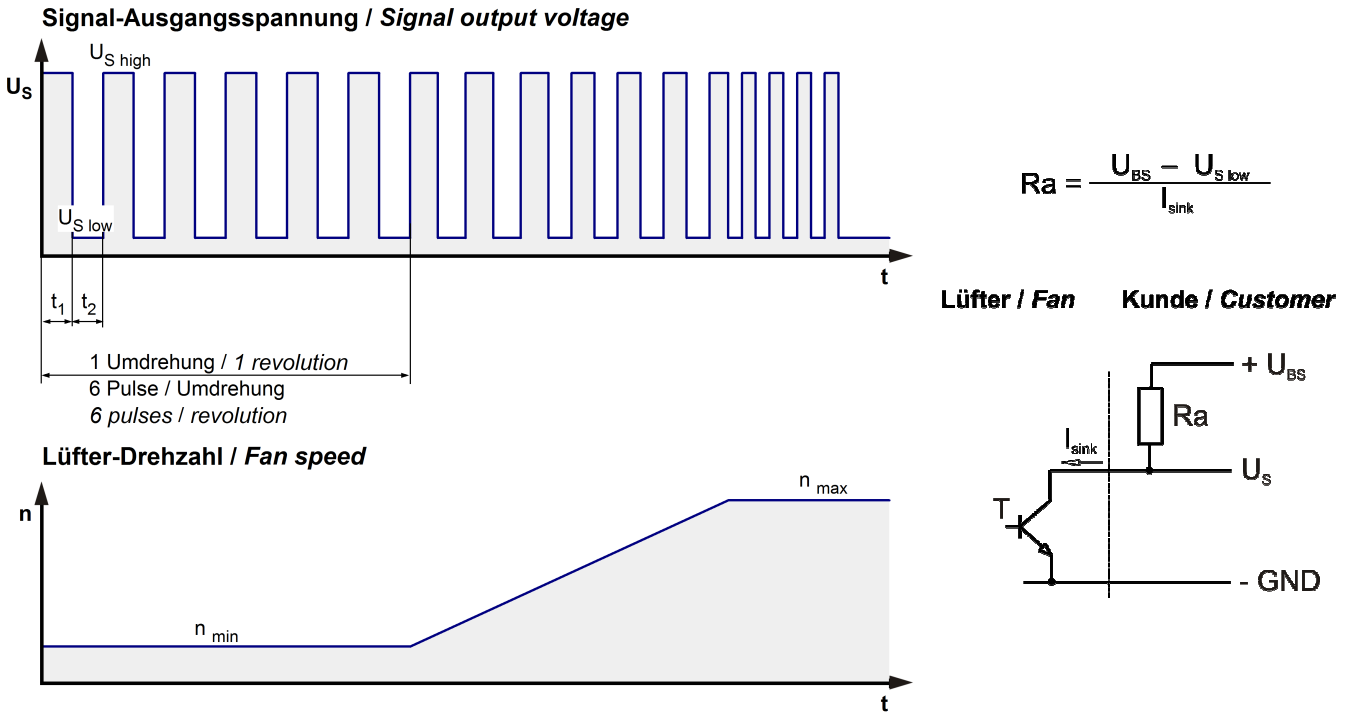
Name	Condition
PWM 0001	PWM: 100 %;

The data at 50% PWM are no FK features and need not be tested.

Features	Condition	Symbol	Values		
Voltage range		U	36 V		60,0 V
Nominal voltage		U _N		48,0 V	
Power consumption Tolerance	$\Delta p = 0$ PWM 0010	P	83 W +- 10,0 %	120 W +- 10,0 %	120 W +- 10,0 %
Current consumption Tolerance	$\Delta p = 0$ PWM0010	I	2.300 mA +- 10,0 %	2.500 mA +- 10,0 %	2.000 mA +- 10,0 %
Speed Tolerance	$\Delta p = 0$ PWM 0010	n	4.800 1/min +- 10,0 %	5.300 1/min +- 5,0 %	5.300 1/min +- 5,0 %

3.3 Electrical Interface - Output

Tacho type	/2 (open collector)
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Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 60\ V$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\ V$
Tacho signal High	$U_{S\ high}$	$\leq 60\ V$
Maximum sink current	I_{sink}	$\leq 20\ mA$
Maximum source current		$0\ mA$
External resistor	External resistor R_a from U_{BS} to U_s required. All voltages measured to GND.	
Tacho frequency	$(6 \times n) / 60$	
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\ V/\mu s$

n = revolutions per minute (1/min)

Please note:

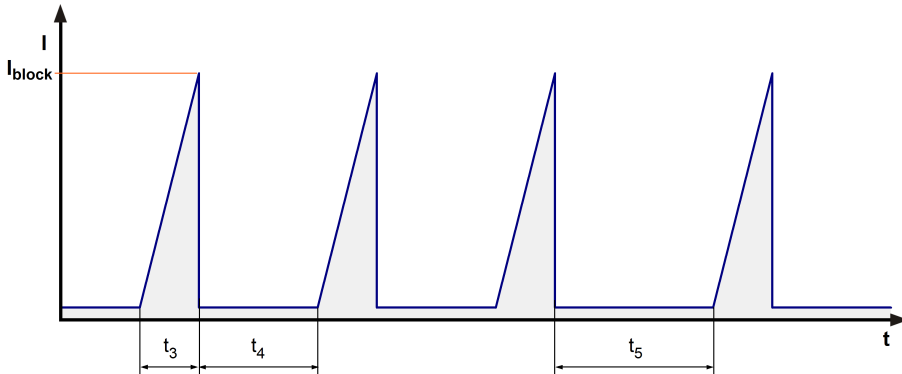
At zero speed the tacho signal is at a static HIGH. It will be also HIGH when the fan is still spinning, but the speed control signal is set to zero speed already.

The tacho signal is only activated after the start-up is completed.

3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	N-CH FET	

Max. residual current at U_N	$I_F \leq 5 \text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	I_{block} approx. 1.500 mA	
Clock signal at locked rotor	t_3 / t_4 typical: 3,6 s / 10 s	



Locked rotor signal t_5 :

After 4 failed start-ups there is an extended timeout of 40 s.

Internal Fuse:

Littelfuse NANO2(R) FUSE; Very fast acting 451 Series; 5 A

3.5 Aerodynamics

Measurement conditions:

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

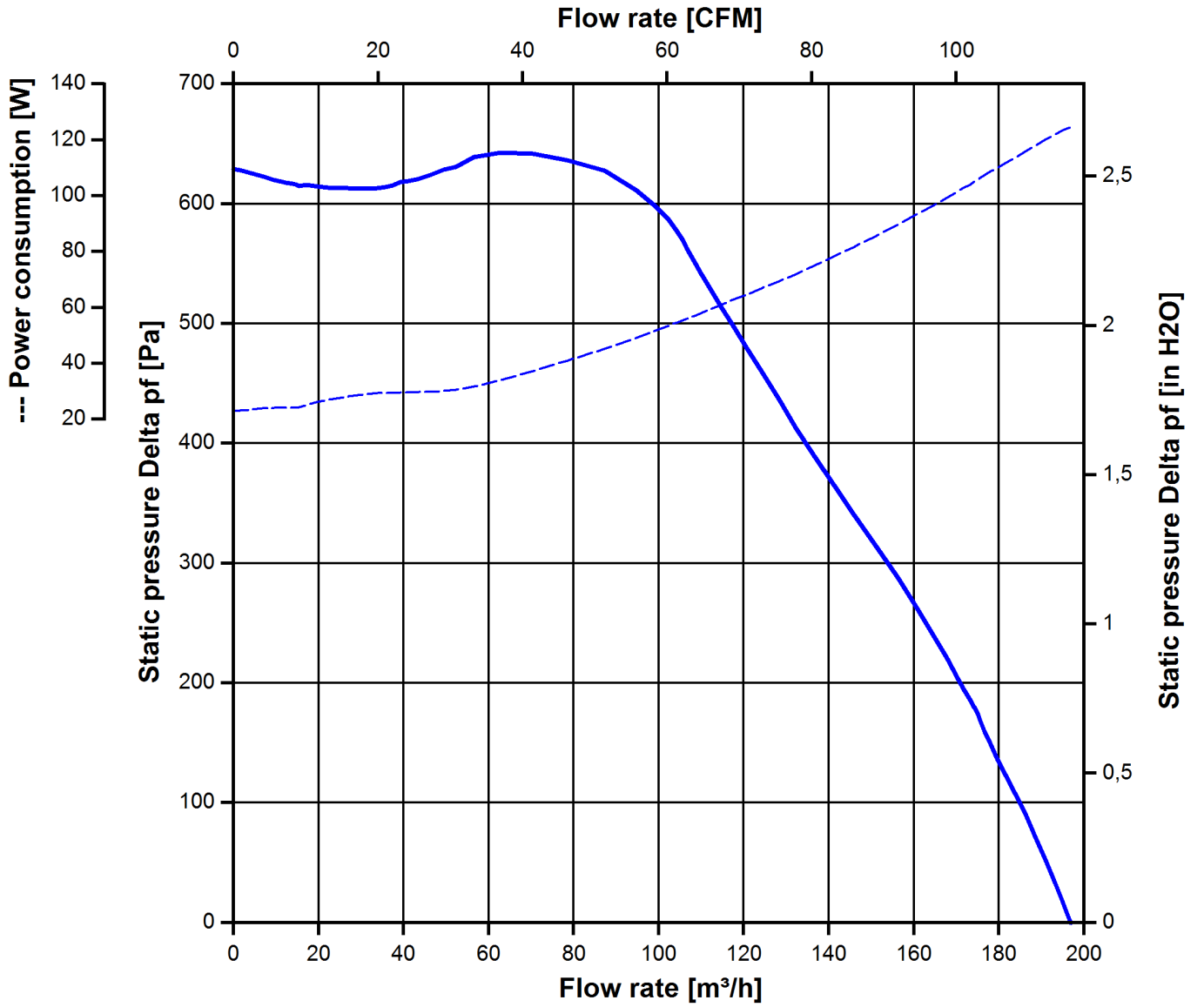
Normal air density = 1,2 kg/m³; Temperature 23°C +/- 3°C;

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. Power consumption of the fan motor when operating at normal voltage is shown. Depending on the operating conditions of the application, the power input may be higher.

a.) Operation condition:

5.300 1/min at free air flow	PWM 100 %;		
Max. free-air flow ($\Delta p = 0 / \dot{V} = \text{max.}$)		197,0 m ³ /h	
Max. static pressure ($\Delta p = \text{max.} / \dot{V} = 0$)		630 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:

5.300 1/min at free air flow	PWM 100 %;		
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Optimal operating point	95,0 m ³ /h @ 546 Pa	
Sound power level at the optimal operating point	7,8 bel(A)	
Sound pressure level at free air flow, measured in rubber bands		

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-20 °C	
Max. permitted ambient temperature TU max.	60 °C	
Min. permitted storage temperature TL min.	-40 °C	
Max. permitted storage temperature TL max.	80 °C	

4.2 Climatic Requirements

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	
Water exposure	Splash water check IPX4; according to DIN EN 60529 VDE 0470, not certified	
Dust requirements	Dust check IP5X; according to DIN EN 60529 VDE 0470, not certified	
Salt fog requirements	Salt fog, cyclic, in operation; according to DIN EN 60068-2-52; 10 cycles	

Permitted application area:

The product is for the use in open and unsheltered areas. Direct exposure to water as well as saline ambient conditions are allowed provided that this does not prevent the normal operation.

Pollution degree 4 (according DIN EN 60664-1)

It occurs permanent conductivity caused by conductive dust, rain or moisture.

4.3 Mechanical Requirements

severity level	Vibration (sinusoidal)	
2 G	Vibration (sinusoidal) in use	

IEC 60068-2-6	Vibration (sinusoidal)
Displacement / frequency range	0,15 mm / 10-58, 58-10 Hz
Acceleration / frequency range	2 G / 58-500-58 Hz
Sweep rate	1 Oct./min
Sweep cycles	10
Duration	2 hrs.
Axes of vibration	3

severity level	stationary 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 m ² / 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
	stationary 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 m ² / s ³ 20- 150 Hz : - 3 dB / Oct 0,83 G 3 3 x 5 h
	stationary 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

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	0,5 mm / 1,2 mm	
Protection class	III	

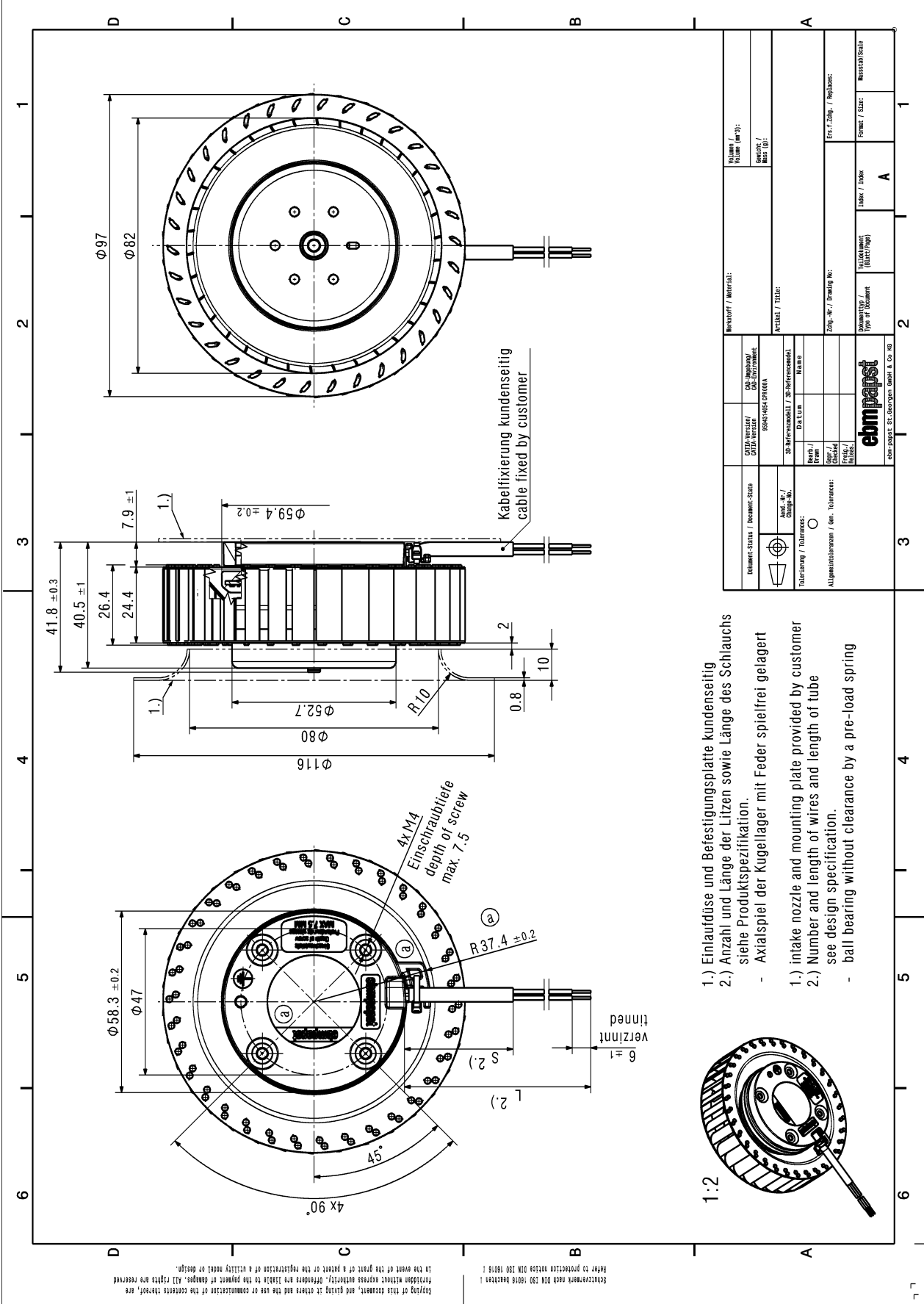
5.2 Approval Tests

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	Yes / GB 12350 Safety Requirements for small Power Motors

6 Reliability

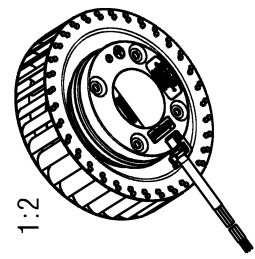
6.1 General

Life expectancy L10 at TU = 40 °C	95.000 h	
Life expectancy L10 at TU max.	60.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	160.000 h	



SKETCHWORK nach DIN ISO 10110/10118
 Refer to production notes DIN ISO 10118/1
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- 1.) Einlaufdüse und Befestigungsplatte kundenseitig
 2.) Anzahl und Länge der Litzen sowie Länge des Schlauchs siehe Produktspezifikation.
 - Axialspiel der Kugellager mit Feder spielfrei gelagert
- 1.) intake nozzle and mounting plate provided by customer
 2.) Number and length of wires and length of tube see design specification.
 - ball bearing without clearance by a pre-load spring



Document Status / Document-Status	CDTÄ-Version / CDTÄ-Version	CDTÄ-Modell / CAD-Environment	Revisiert / Material:	Volumen / (m³) / Volume / (m³)
Änderung / Change No.	09481964 SP000A	SP-Referenzmodell / SP-Reference Model	APTELKAT / TITLE:	Spezifik. / Specs / Mess (D)
Tabularung / Tolerances:	Datum	Name	Zeich. Nr. / Drawing No.	ERS / Zeich. / Revision:
Abgibtoleranzen / Gen. Tolerances:				Formate / Sizes:
				Index / Index
				Teilenummer / Part No.
				Formate / Sizes
				Messstandard / Meas. Std.
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