

## 1 General

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

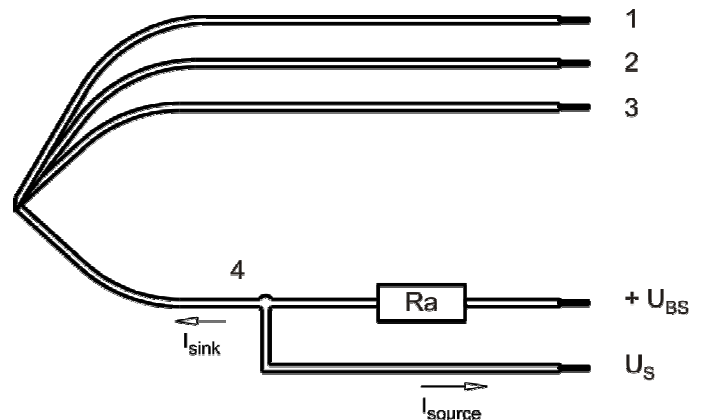
## 2 Mechanics

### 2.1 General

Depth	69,0 mm	
Diameter	175,0 mm	
Mass	0,775 kg	
Housing material		
Impeller material	Plastic	

### 2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 425 mm	
Tolerance	+/- 10,0 mm	
Tube length	S = 115 mm	
Tolerance	+/- 5,0 mm	



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	1,35 mm
4	white	Tacho	AWG 22	1,35 mm

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

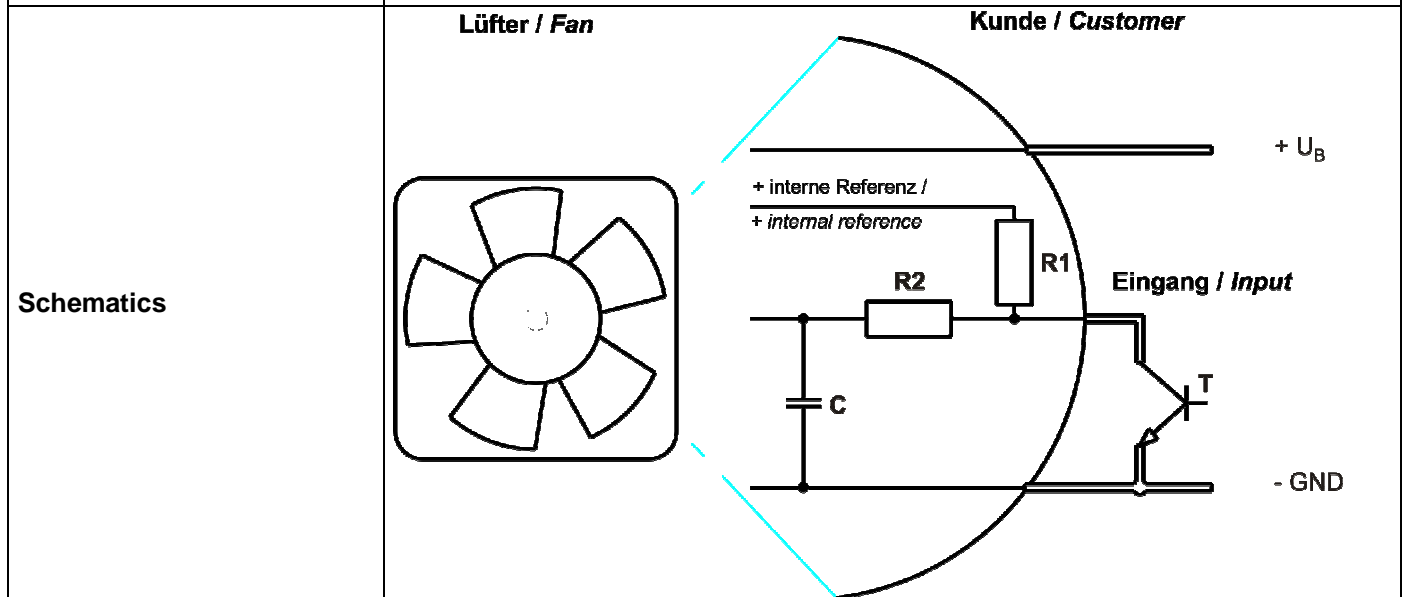
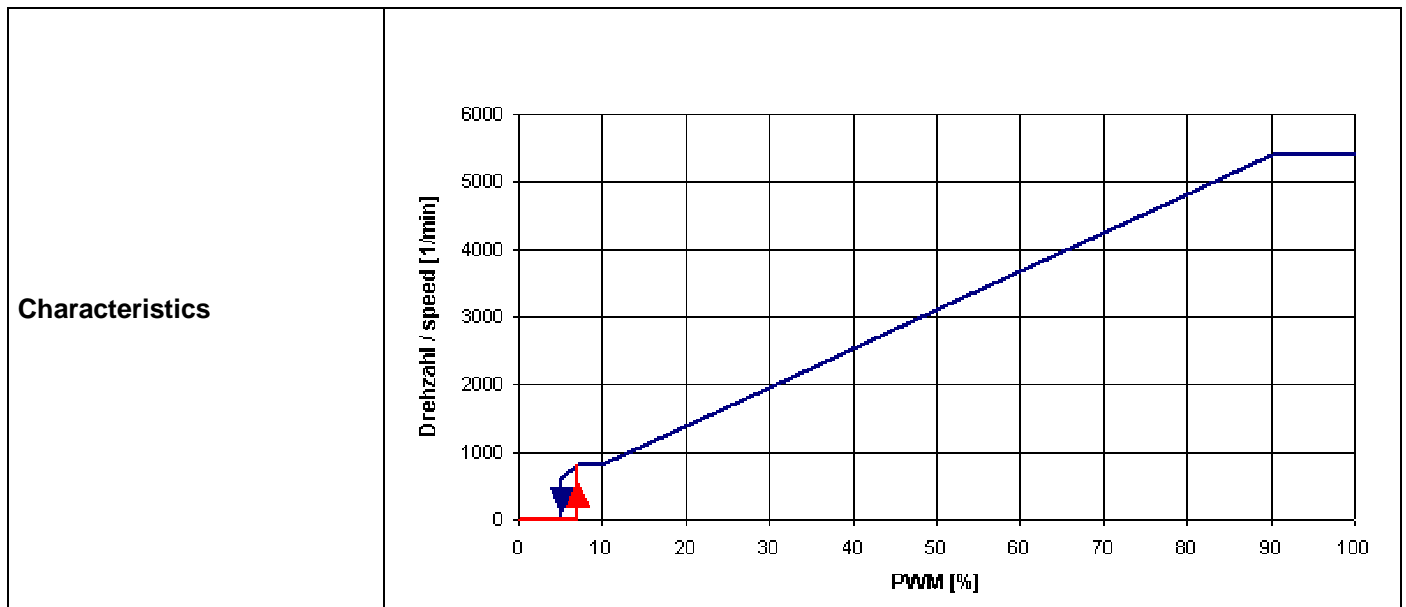
### 3 Operating Data

#### 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



The shown pull-up resistor R1 to the internal reference voltage (+5V) has 4.7kOhm.

**Speed control:**

By puls width modulation (PWM) 0 ... 100%

Open collector in relation to signal-ground

**Transistor requirements:**

VCE max.  $\geq 12V$ ; Isink max  $> 5mA$ ; VCEsat  $< 0,15V$

**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: 5.400 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/m<sup>3</sup>; 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.

Measurement setup:	Measured between two steel plates
Steel plate:	180 mm x 180 mm
Intake nozzle:	D: 125,5 mm; R: 10 mm
Distance between bottom and top plate:	80 mm
Overlapping impeller / nozzle:	2 mm

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

I: corresp. to arithm. mean current value

Name	Condition
PWM 0001	PWM: 100 %; f: 2 kHz

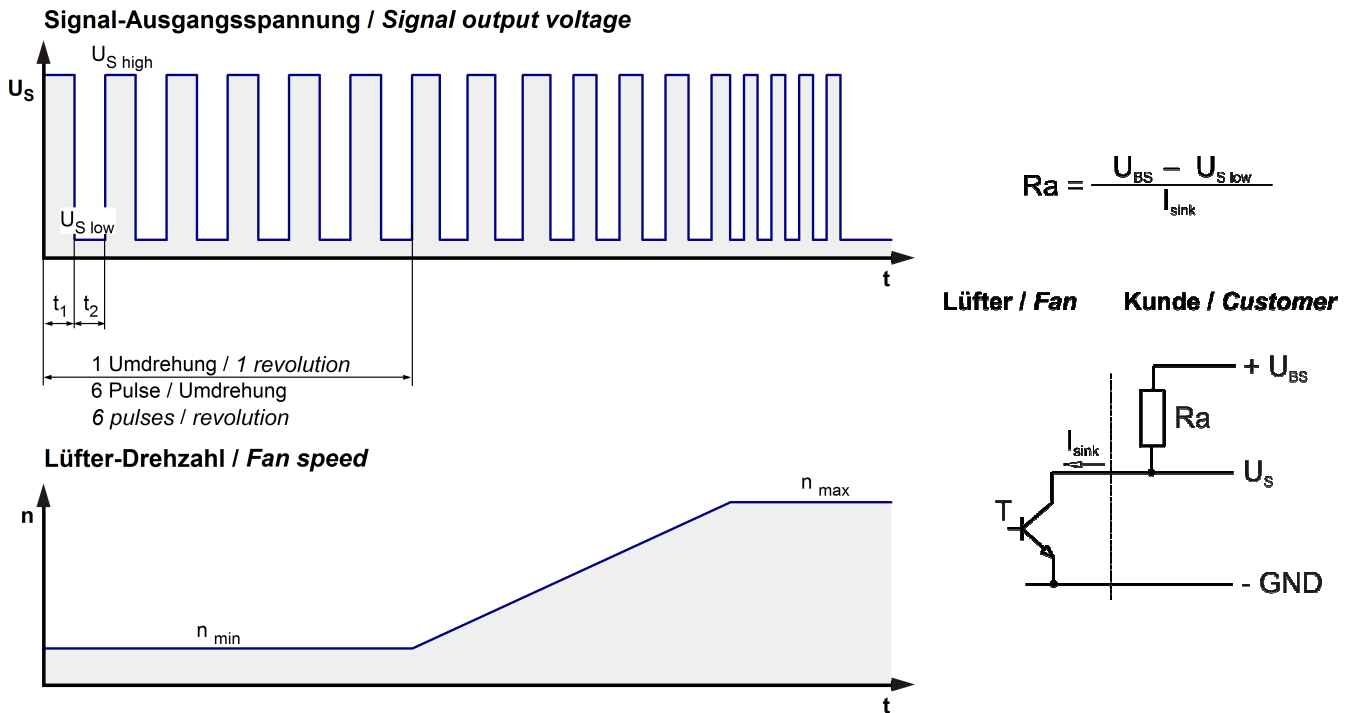
**100% PWM; f = 2 kHz or broken lead wire (open control input)**

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

Features	Condition	Symbol	Values		
Voltage range		U	36 V		72,0 V
Nominal voltage		$U_N$		48,0 V	
Power consumption	$\Delta p = 0$	P	108,0 W	166,0 W	161,0 W
Tolerance	PWM 0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Current consumption	$\Delta p = 0$	I	3.000 mA	3.450 mA	3.350 mA
Tolerance	PWM0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Speed	$\Delta p = 0$	n	4.800 1/min	5.400 1/min	5.400 1/min
Tolerance	PWM 0010		+/- 7,5 %	+/- 5,0 %	+/- 5,0 %

### 3.3 Electrical Interface - Output

Tacho type	/2 (open collector)
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Features	Note	Values
Tacho operating voltage	$U_{BS}$	$\leq 60,0\ V$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\ V$
Tacho signal High	$U_{S\ high}$	$\leq 60,0\ V$
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	$(6 \times n) / 60$	$540\ Hz$
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\ V/\mu s$

$n$  = revolutions per minute (1/min)

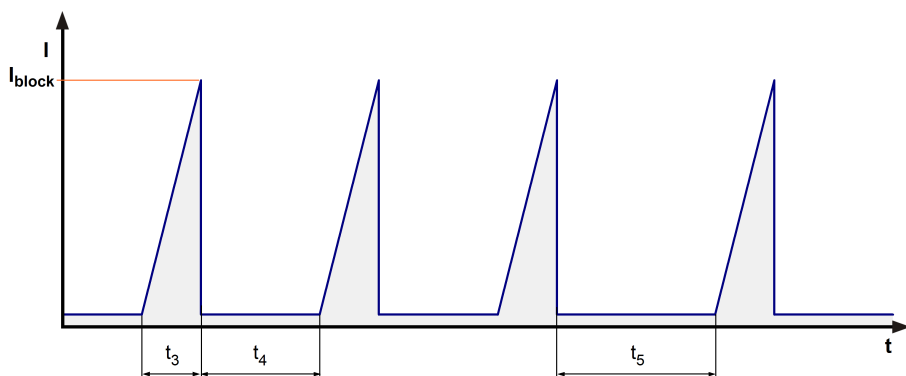
**Please note:**

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	P-CH FET	

Max. residual current at $U_N$	$I_F \leq 5 \text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at $U_N$	$I_{\text{block}}$ approx. 2.300 mA	
Clock signal at locked rotor	$t_3 / t_4$ typical: 1,0 s / 10,0 s	



**Locked rotor signal  $t_5$ :**

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

### 3.5 Data According ErP Directive

Installation / Efficiency category	A / static
Speed control	integrated
Specific ratio	1,00598
Target overall efficiency 2015	45,2 %
Overall efficiency	44,1 %
Efficiency grade	62
Power input	249,7 W
Speed	5.360 1/min

All values measured in optimum energy efficiency point.

Productiondatecode is printed on the fan label.

### 3.6 Aerodynamics

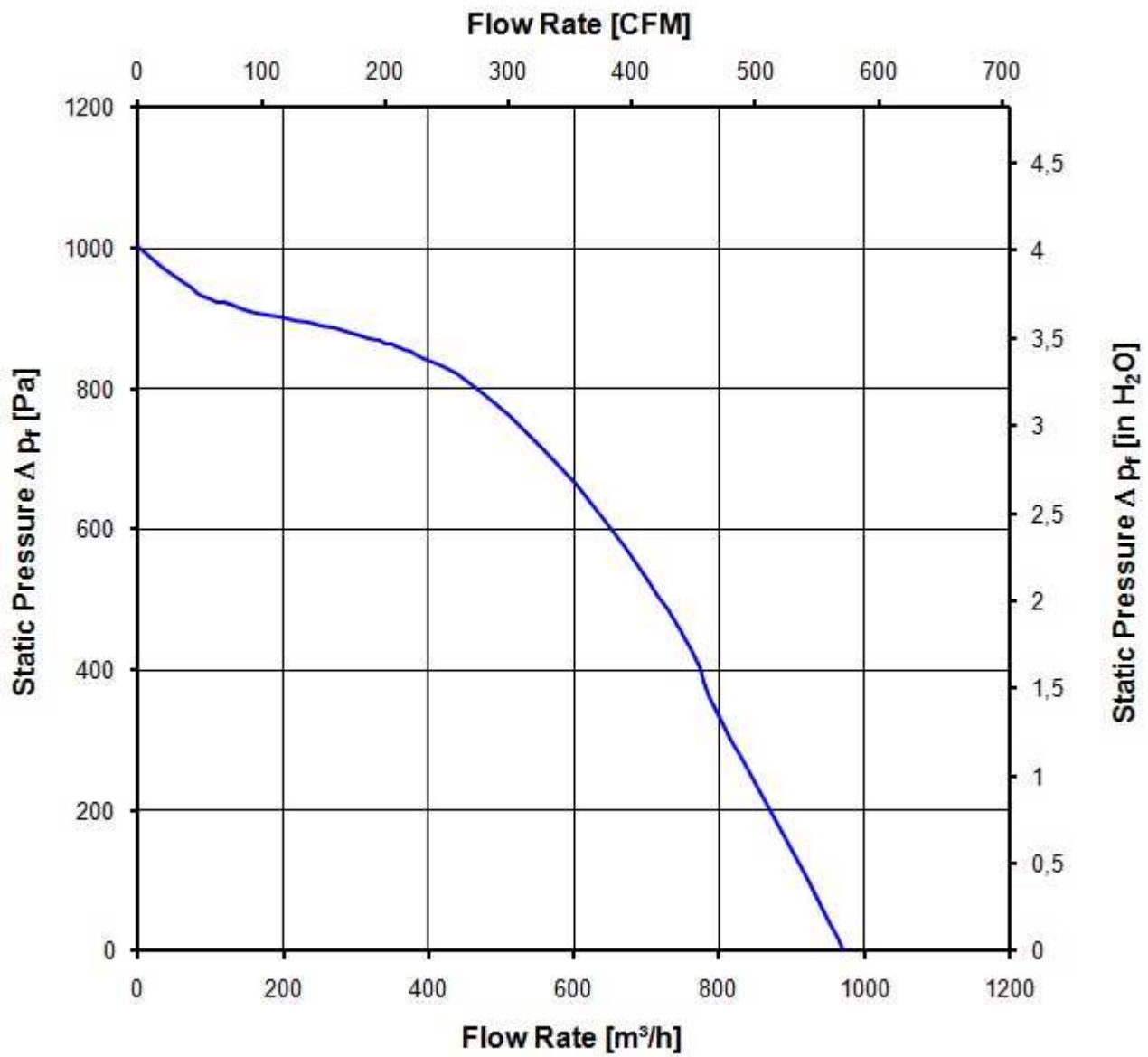
Measurement conditions: Measured with a double chamber intake rig acc. to DIN EN ISO 5801.  
 Normal air density = 1,2 kg/m<sup>3</sup>; Temperature 23°C +/- 3°C;  
 In the intake and outlet area should not be any solid obstruction within 0,5 m. Motor shaft horizontal.  
 The information is only valid 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.

Measurement setup:	Measured between two steel plates
Steel plate:	180 mm x 180 mm
Intake nozzle:	D: 125,5 mm; R: 10 mm
Distance between bottom and top plate:	80 mm
Overlapping impeller / nozzle:	2 mm

a.) Operation condition:

5.400 1/min at free air flow	PWM 100 %; f: 2 kHz		
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Max. free-air flow ( $\Delta p = 0 / \dot{V} = \max.$ )	970,0 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \max. / \dot{V} = 0$ )	1.000 Pa	





### 3.7 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 100 %; f: 2 kHz		
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Optimal operating point	690,0 m <sup>3</sup> /h @ 485 Pa	
Sound power level at the optimal operating point	8,4 bel(A)	
Sound pressure level at free air flow, measured in rubber bands		

## 4 Environment

### 4.1 General

Min. permitted ambient temperature TU min.	-33 °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 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	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.

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.	1000 VAC / 1 Min.	
B.) Routine test Measuring conditions: At indoor climate. No arcing or breakdown is allowed! All connections together to ground.	1700 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	I	

### 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

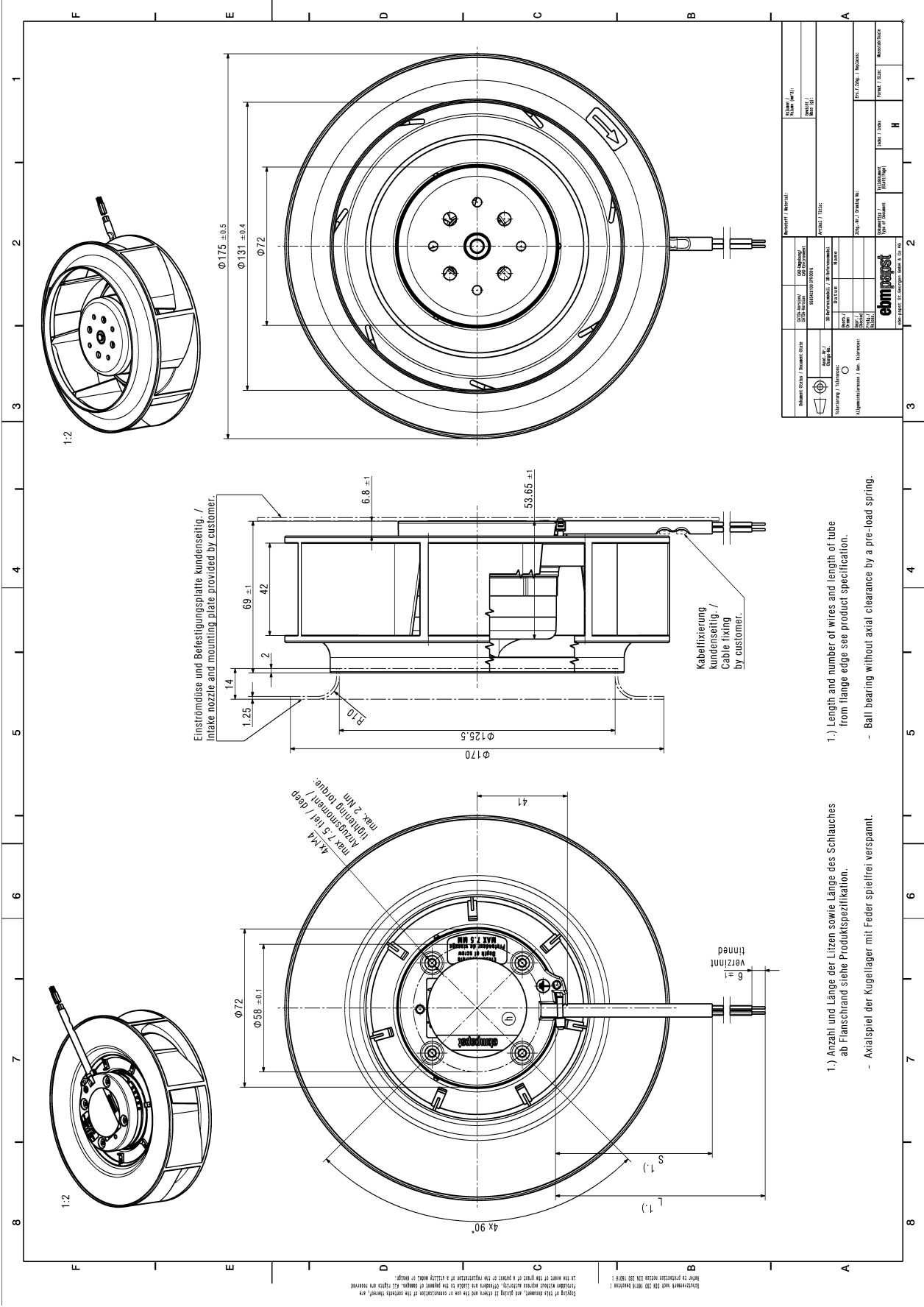
The approval tests are observed to:

U approval max.: 72,0 V @ TU approval max.: 65,0 °C

## 6 Reliability

### 6.1 General

Life expectancy L10 at TU = 40 °C	60.000 h	
Life expectancy L10 at TU max.	32.500 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	102.500 h	



Einströmduse und Befestigungsplatte kundenseitig. /  
Intake nozzle and mounting plate provided by customer.

Kabelfixierung  
kundenseitig. /  
Cable fixing  
by customer.

- 1.) Length and number of wires and length of tube from flange edge see product specification.
- Ball bearing without axial clearance by a pre-load spring.

- 1.) Anzahl und Länge der Litzen sowie Länge des Schlauches ab Flanschrand siehe Produktspezifikation.
- Axialspiel der Kugellager mit Feder spielfrei verspannt.

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Produkt / Product:		Teilname / Name:		Material / Material:		Norm / Standard:	
Gehäuse / Housing:		Gehäuse / Housing:		Gehäuse / Housing:		Gehäuse / Housing:	
Drehmoment / Torque:		Drehmoment / Torque:		Drehmoment / Torque:		Drehmoment / Torque:	
Nennleistung / Rated Power:		Nennleistung / Rated Power:		Nennleistung / Rated Power:		Nennleistung / Rated Power:	
Nennstrom / Rated Current:		Nennstrom / Rated Current:		Nennstrom / Rated Current:		Nennstrom / Rated Current:	
Nennspannung / Rated Voltage:		Nennspannung / Rated Voltage:		Nennspannung / Rated Voltage:		Nennspannung / Rated Voltage:	
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