

**1 General**

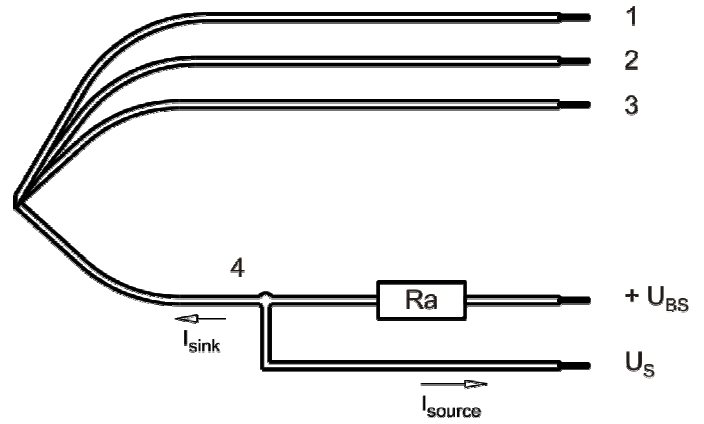
Fan type	Blower without chassis with intake nozzle	
Rotating direction looking at rotor	Clockwise	
Airflow direction	Air in axially, Air out radially	
Bearing system	Ball bearing	
Mounting position - shaft	Any	

**2 Mechanics****2.1 General**

Depth	71 mm	
Diameter	220 mm	
Mass	0,920 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 = 135 mm	
Tolerance	+ - 5 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 20	2,05 mm
4	white	Tacho	AWG 20	2,05 mm

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

Lead wire 1 - 2: AWG20

Lead wire 3 - 4: AWG22 (Insulation diameter 1,35mm)

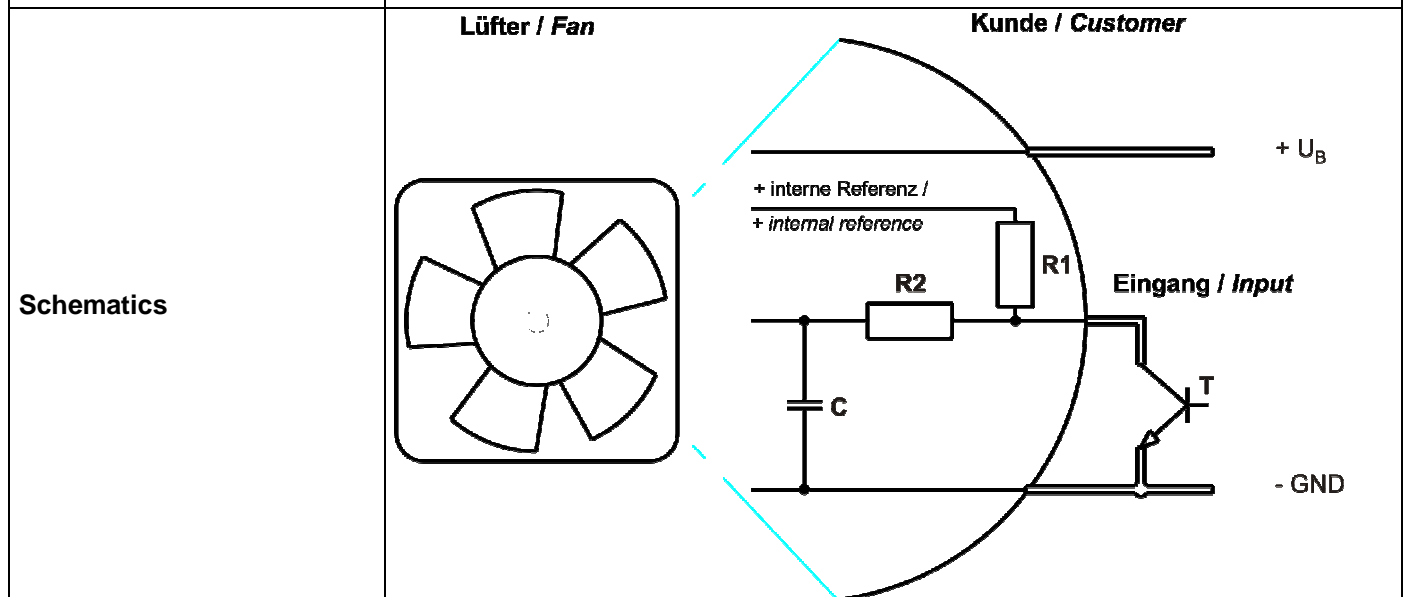
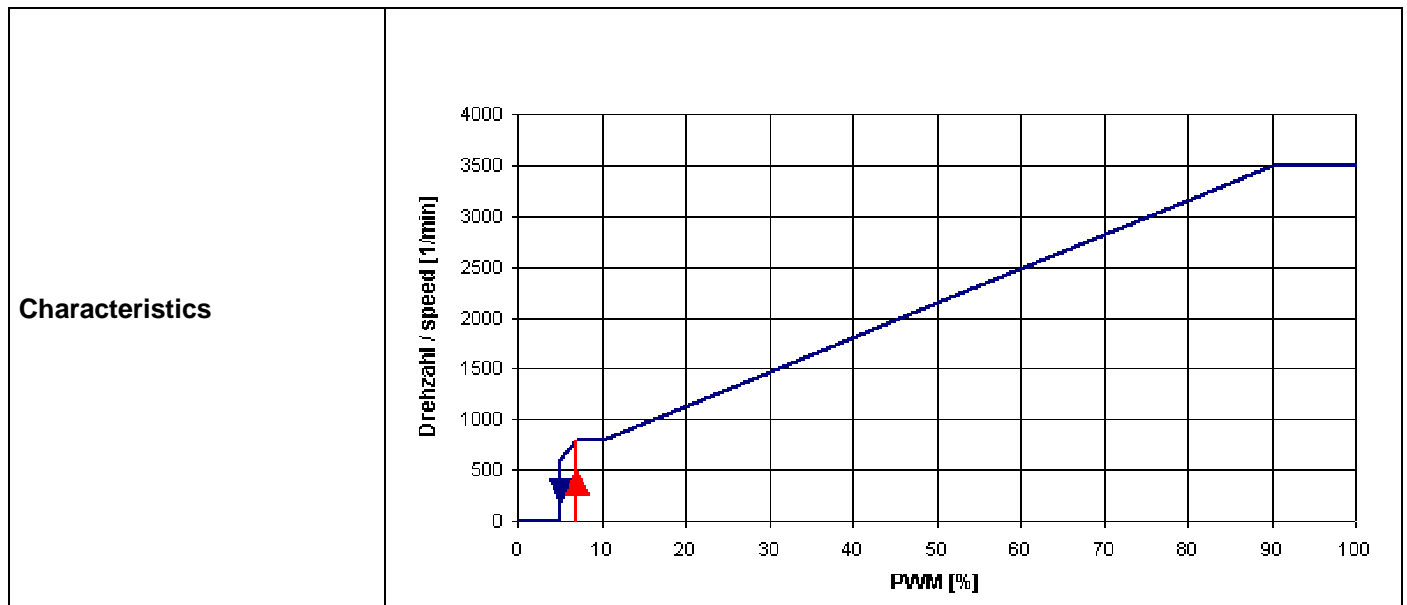
### 3 Operating Data

#### 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



**Transistor requirements:**

Vce max. = >12 V; I sink max. = >5 mA

Vce sat. = <0,15 V

**Speed control:**

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

Open collector in relation to signal-ground

f = 2kHz +-20%

**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:	3.500 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:	225 mm x 225 mm
Intake nozzle:	D: 155 mm; R: 25 mm
Distance between bottom and top plate:	90 mm
Overlapping impeller / nozzle:	2 mm

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

I: corresp. to arithm. mean current value

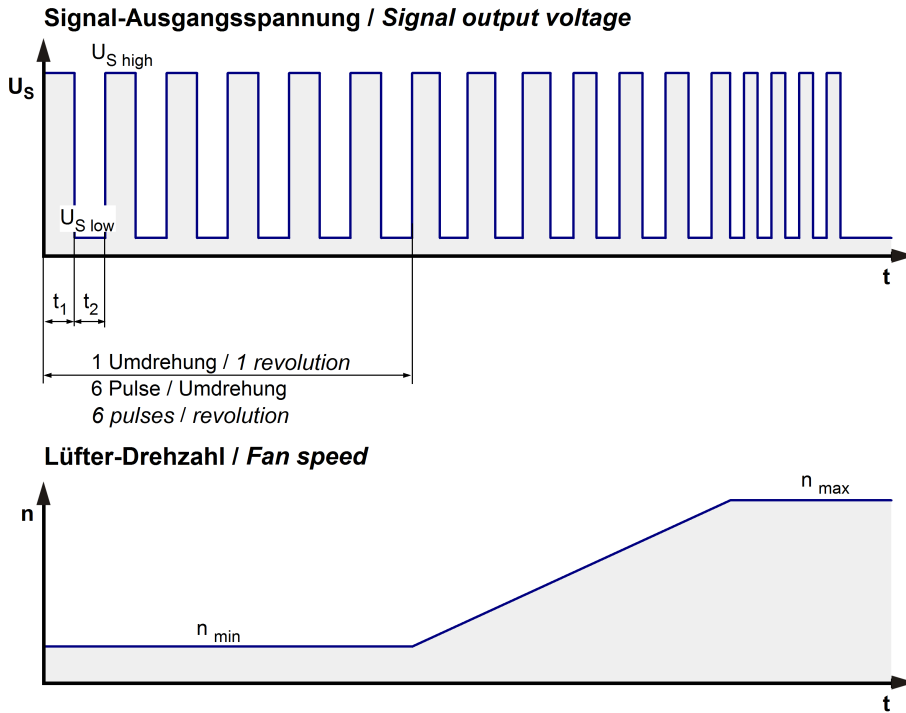
Name	Condition
PWM 0001	PWM: 100 %; f: 2 kHz

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

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	75,6 W	140 W	137 W
Tolerance	PWM 0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Current consumption	$\Delta p = 0$	I	2.100 mA	2.900 mA	1.900 mA
Tolerance	PWM0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Speed	$\Delta p = 0$	n	2.900 1/min	3.500 1/min	3.500 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	$U_{BS}$	$\leq 60\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$\leq 60\text{ V}$
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	$(6 \times n) / 60$	350 Hz
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\text{ V/us}$

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

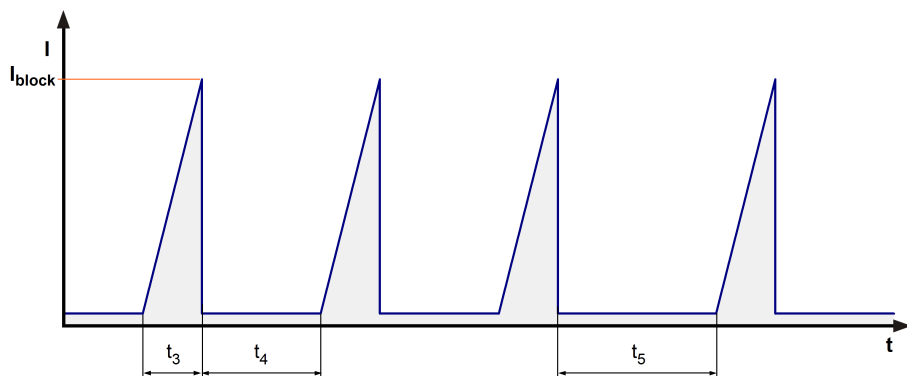
**Please note:**

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 $U_N$	$I_{block}$ approx. 2.000 mA	
Clock signal at locked rotor	$t_3 / t_4$ typical: 7 s / 10 s	



**Locked rotor signal t5 50s:**

**After 2 failed start-ups there is an extended timeout of 50 s.**

### 3.5 Data According ErP Directive

Installation / Efficiency category	A / static
Speed control	integrated
Specific ratio	1,00373
Target overall efficiency 2015	43,4 %
Overall efficiency	49,1 %
Efficiency grade	62
Power input	169 W
Speed	3.200 1/min

All values measured in optimum energy efficiency point.

Productiondatecode is printed on the fan label.

### 3.6 Aerodynamics

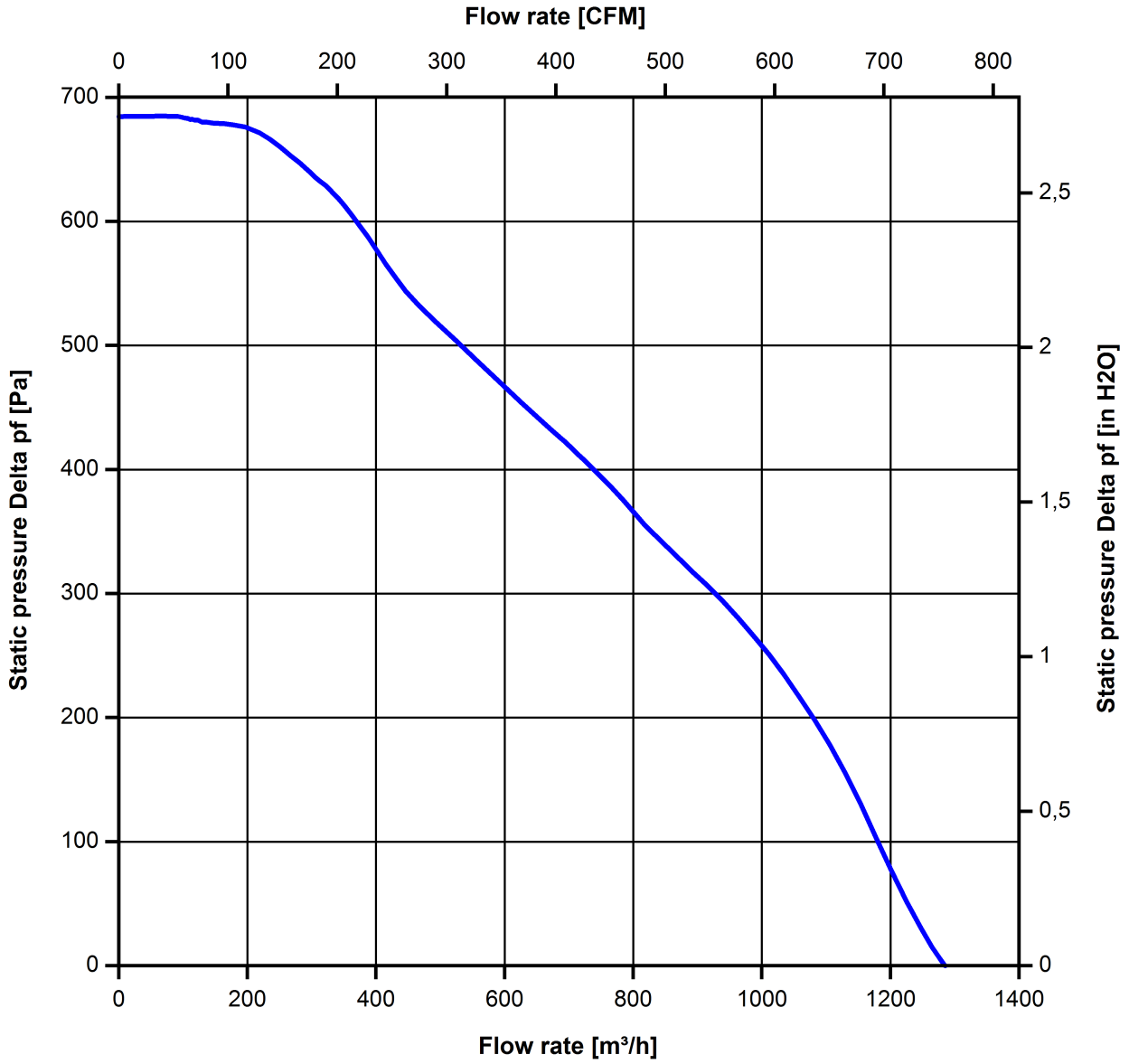
Measurement conditions: Measured with a double chamber intake rig acc. to DIN EN ISO 5801.  
 Normal air density = 1,2 kg/m<sup>3</sup>; Temperature 23°C +/- 3°C;  
 In the intake and outlet area should not be any solid obstruction within 0,5 m. Motor shaft horizontal.  
 The information is only valid 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:	225 mm x 225 mm
Intake nozzle:	D: 155 mm; R: 25 mm
Distance between bottom and top plate:	90 mm
Overlapping impeller / nozzle:	2 mm

a.) Operation condition:

3.500 1/min at free air flow	PWM 100 %; f: 2 kHz		
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Max. free-air flow ( $\Delta p = 0 / \dot{V} = \max.$ )	1.285,0 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \max. / \dot{V} = 0$ )	685 Pa	





## 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 / 1,5 mm	
Protection class	I	

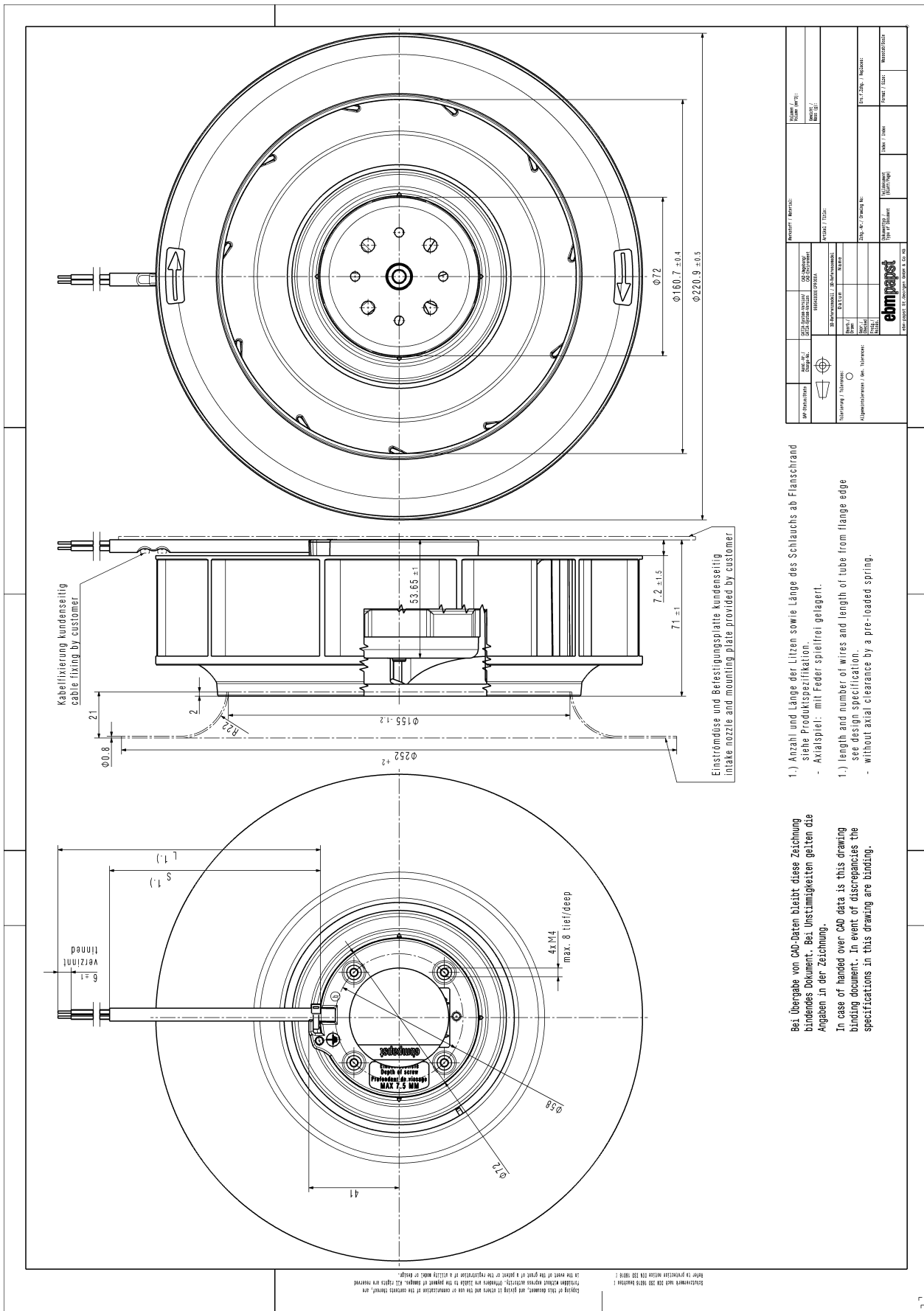
### 5.2 Approval Tests

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

## 6 Reliability

### 6.1 General

Life expectancy L10 at TU = 40 °C	70.000 h	
Life expectancy L10 at TU max.	50.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	117.500 h	



- Bei Übergabe von CAD-Daten bleibt diese Zeichnung bindendes Dokument. Bei Unstimmigkeiten gelten die Angaben in der Zeichnung.  
In case of handover over CAD data is this drawing binding document. In event of discrepancies the specifications in this drawing are binding.
- Anzahl und Länge der Litzen sowie Länge des Schlauchs ab Flanschrand siehe Produktspezifikation.  
- Axialspiel: mit Feder spielfrei gelagert.  
1.) length and number of wires and length of tube from flange edge see design specification.  
- without axial clearance by a pre-loaded spring.

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