

251657216

**Product Data Sheet**

**9691900181**

VWC0040JUDBS

422J/2HPU-181

**ebmpapst**

The engineer's choice



422J/2HPU-181

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**1 General**

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

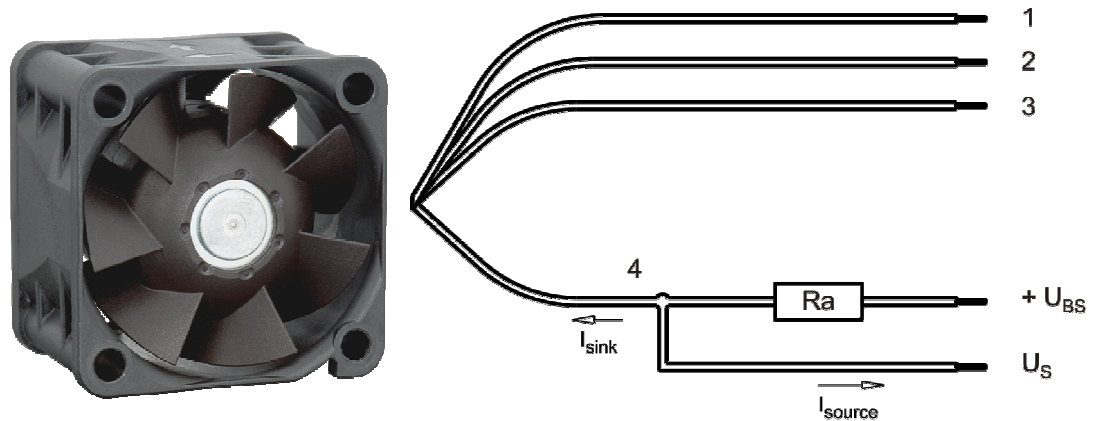
**2 Mechanics**

**2.1 General**

Width	40,0 mm	
Height	40,0 mm	
Depth	28,0 mm	
Mass	0,05 kg	
Housing material	Plastic	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	Wire outlet corner: 40 Ncm Remaining corners: 60 Ncm	
Screw size	ISO 4762 - M3 degreased, without an additional brace and without washer	

**2.2 Connections**

Electrical connection	Wires	
Lead wire length	L = 310 mm	
Tolerance	+ - 10,0 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 28	0,90 mm
2	blue	- GND	AWG 28	0,90 mm
3	violet	PWM	AWG 28	0,90 mm
4	white	Tacho	AWG 28	0,90 mm

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

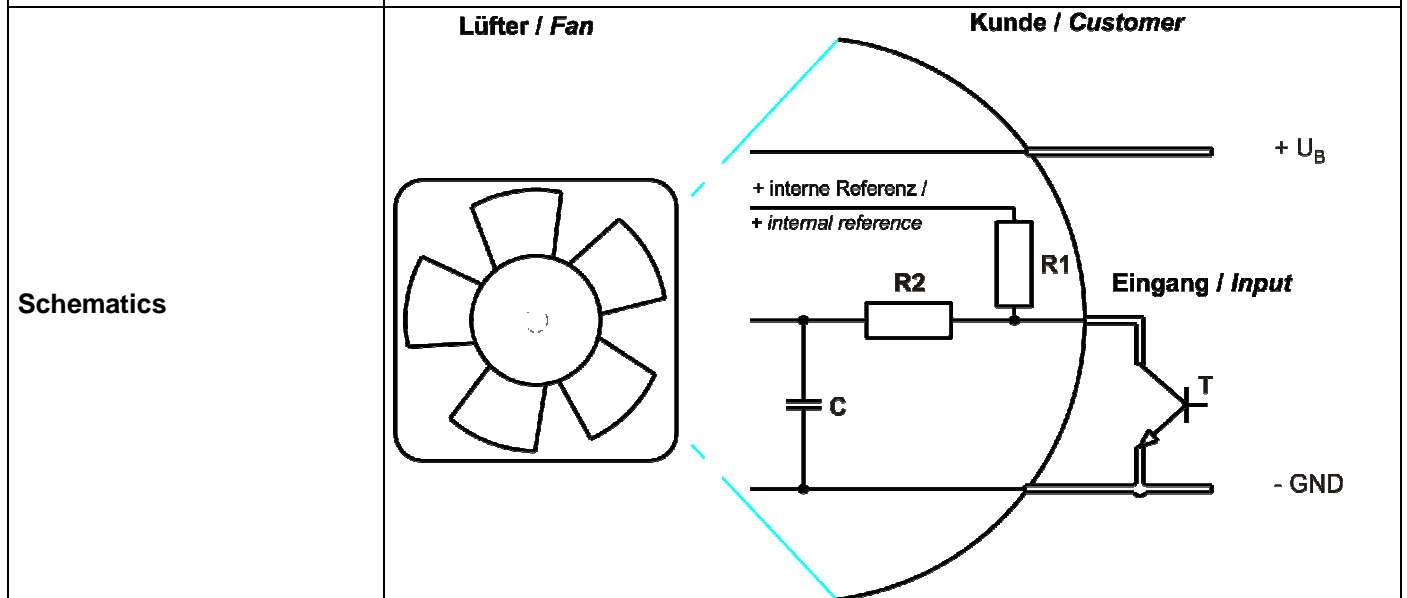
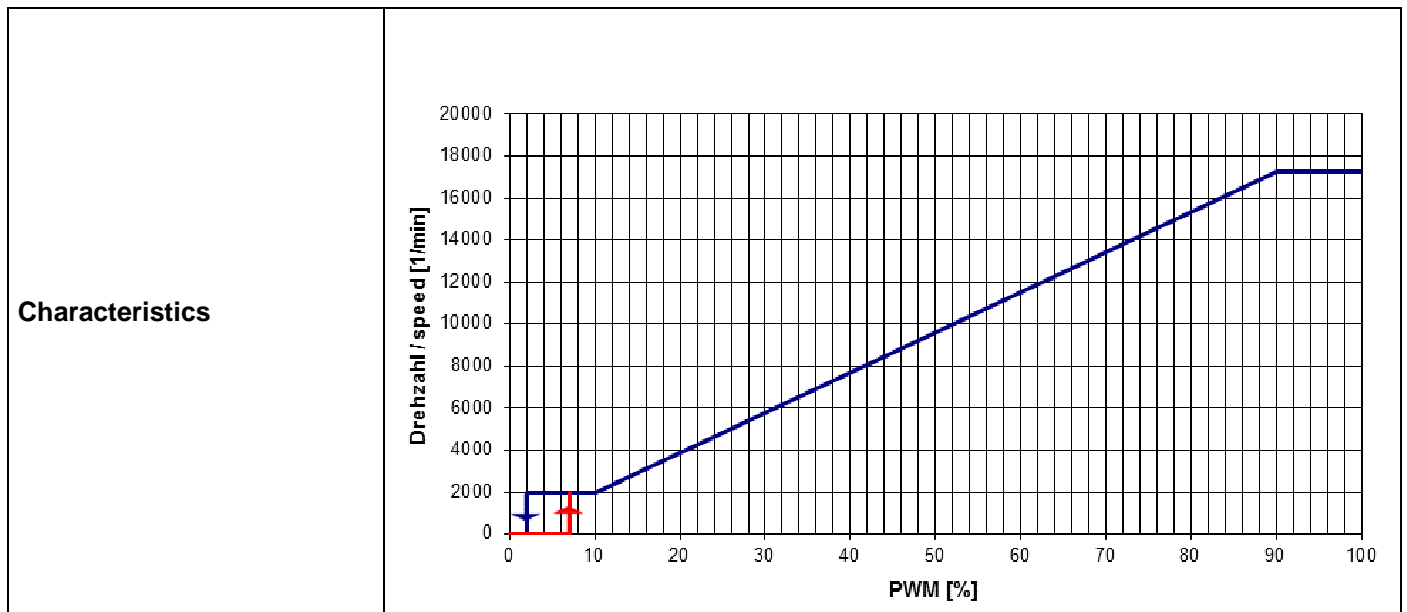
3 Operating Data

3.1 Electrical Interface - Input

Control input	PWM
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Features

Input type	Open collector	
PWM - Frequency		1 kHz - 30 kHz typical: 2 kHz



### 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 15 minutes. 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

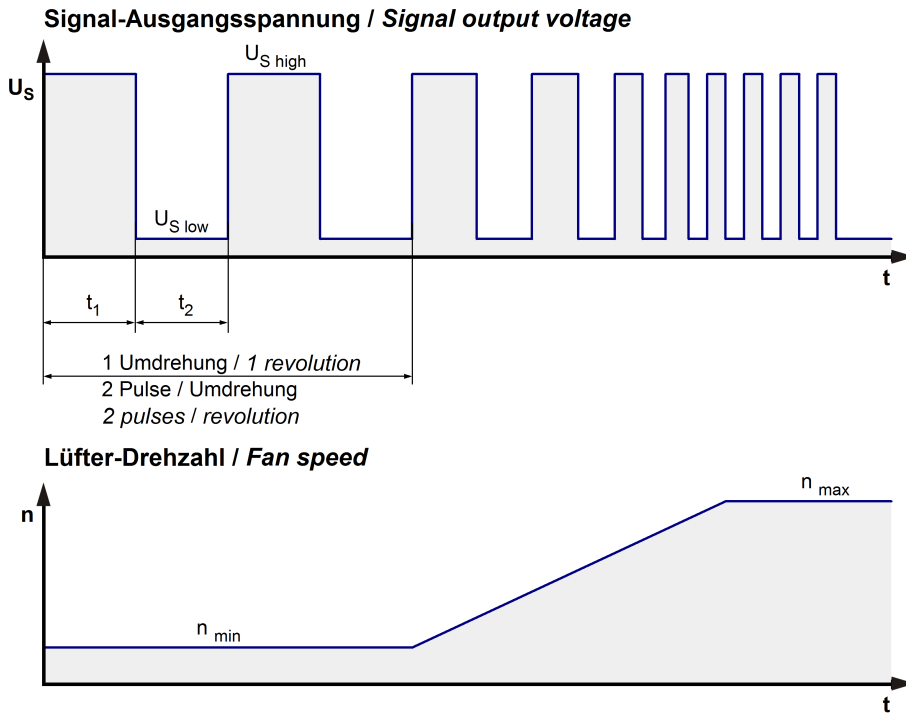
Name	Condition
PWM 0001	PWM: 100 %; f: 2 kHz

Unless otherwise specified in the table a general fan speed tolerance applies, relating to the maximum value of the required characteristic curve. Tolerance: +/-10%

Features	Condition	Symbol	Values		
Voltage range		U	8,0 V		13,8 V
Nominal voltage		U <sub>N</sub>		12 V	
Power consumption	$\Delta p = 0$	P	3,4 W	7,5 W	7,7 W
Tolerance	PWM 0010		+/- 17,5 %	+/- 20,0 %	+/- 25 %
Current consumption	$\Delta p = 0$	I	425 mA	630 mA	560 mA
Tolerance	PWM 0010		+/- 17,5 %	+/- 15 %	+/- 20,0 %
Speed	$\Delta p = 0$	n	13.250 1/min	17.250 1/min	17.250 1/min
Tolerance	PWM 0010		+/- 12,5 %	+/- 5,0 %	+/- 5,0 %
Starting current consumption				<= 2.400 mA	

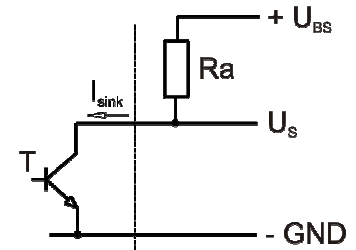
### 3.3 Electrical Interface - Output

Tacho type	/2 (open collector)
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$$R_a = \frac{U_{BS} - U_{S\ low}}{I_{sink}}$$

Lüfter / Fan      Kunde / Customer

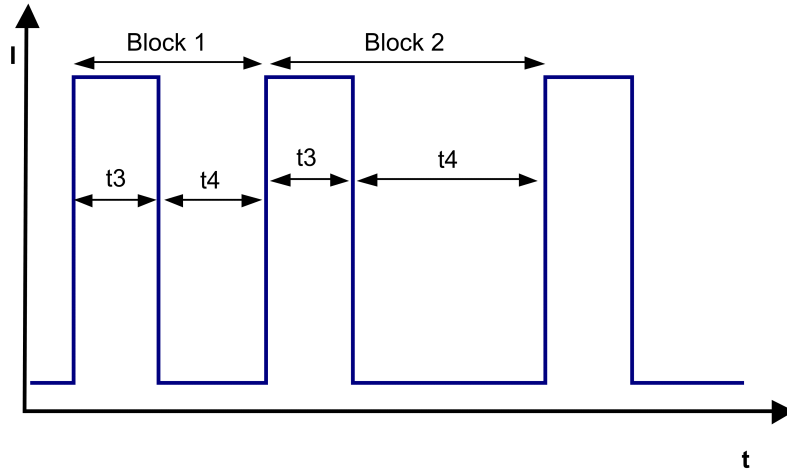


Features	Note	Values
Tacho operating voltage	$U_{BS}$	$\leq 30\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$\leq 30\text{ V}$
Maximum sink current	$I_{sink}$	$\leq 4\text{ mA}$
External resistor	External resistor $R_a$ from $U_{BS}$ to $U_S$ required. All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

n = revolutions per minute (1/min)

3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	Rectifying diode	
Max. residual current at $U_N$	$I_F \leq 200 \mu A$	
Locked rotor protection	Auto restart	
Locked rotor current at $U_N$	$I_{block}$ approx. 2.200 mA	
Clock signal at locked rotor	$t_3 / t_4$ typical: 0,2 s / 5 s	



Block1: special locked rotor protection: 5 cycles  $t_3 / t_4 = 0,2s / 1s$  Block2: locked rotor protection  $t_3 / t_5 = 0,2s / 5s$

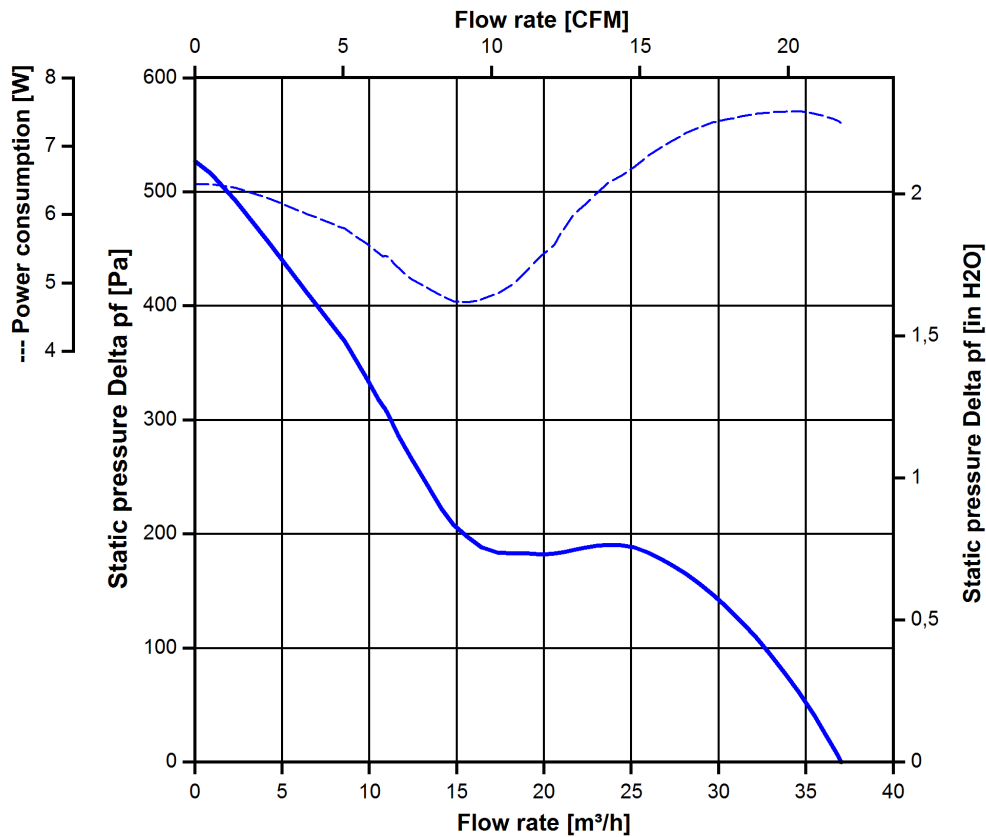
### 3.5 Aerodynamics

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. 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:

17.250 1/min at free air flow	PWM 100 %; f: 2 kHz		
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Max. free-air flow ( $\Delta p = 0 / \dot{V} = \text{max.}$ )	37 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \text{max.} / \dot{V} = 0$ )	527 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 semianechoic chamber with a background noise level of  $L_p(A) < 5 \text{ dB(A)}$   
 For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

17.250 1/min at free air flow	PWM 100 %; f: 2 kHz		
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Optimal operating point	26 m <sup>3</sup> /h @ 164 Pa		
Sound power level at the optimal operating point	6,6 bel(A)		
Sound pressure level at free air flow, measured in rubber bands	56 dB(A)		

## 4 Environment

### 4.1 General

Min. permitted ambient temperature TU min.	-40 °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		

The start attempt can last up to 1min at -40°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	salt fog, cyclic, in operation; according to DIN EN 60068-2-52, 3 cycle	

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 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.

## 4.3 Mechanical Requirements

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 : $1,0 \text{ m}^2 / \text{s}^3$ 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
	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 : $2,0 \text{ m}^2 / \text{s}^3$ 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

## 4.4 EMC

<b>Kind</b>	<b>Conducted Emission; Voltage; 150 kHz-30 MHz</b>
Accordinging	DIN EN 55032:2016-02
Check accuracy / Limit	Class B
Result	Below limit Class B

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

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

<b>Kind</b>	<b>Electrostatic Discharge Immunity Test</b>
Accordinging	DIN EN 61000-4-2:2001-12
Check accuracy / Limit	Contact Discharge +/- 4 kV; Air Discharge +/- 8 kV
Result	B: The monitored function may deviate from designed performance to a specified level during exposure to a disturbance or revert to a fail safe mode or operation, but shall return to normal operation after the disturbance is removed.

<b>Kind</b>	<b>Electromagnetic Field Immunity Test</b>
Accordinging	DIN EN 61000-4-3:2006-12
Check accuracy / Limit	10 V/m; 80 - 1000 MHz; AM; m = 0,8; f = 1 kHz; 1%; t = 3 s
Result	A: The monitored function operates as designed during and after exposure to a disturbance.

<b>Kind</b>	<b>Electrical Fast Transient / Burst Immunity Test</b>
Accordinging	DIN EN 61000-4-4:2005-07
Check accuracy / Limit	+/- 2 kV on Power Lines; Coupling: POS, NEG, {PE}, ALL, 5 kHz and 100 kHz; 1 min
Result	A: The monitored function operates as designed during and after exposure to a disturbance.

<b>Kind</b>	<b>Immunity to Conducted Disturbances, Induced by RF-Fields</b>
Accordinging	DIN EN 61000-4-6:2001-12
Check accuracy / Limit	10 Vrms; 150 kHz - 80 MHz; AM; m = 0,8; f = 1 kHz; 1%; t = 3 s
Result	A: The monitored function operates as designed during and after exposure to a disturbance.

**5 Safety****5.1 Electrical Safety**

Dielectric strength DIN EN 62368 and DIN EN 60335 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 E38324
VDE	Association for Electrical, Electronic and Information Technologies	Yes / Approval acc. to EN 62368 - Audio/video, information and communication technology equipment
CSA	Canadian Standards Association	Yes / CSA audited by UL according to C22.2 No. 113 Fans and Ventilators
CCC	China Compulsory Certification	Not applicable

**6 Reliability****6.1 General**

Life expectancy L10 at TU = 40 °C	60.000 h	
Life expectancy L10 at TU max.	30.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	102.500 h	

