

Product Data Sheet **8300101151**
VWCD060KHDFS
AxiForce60

ebmpapst

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AxiForce60

INDEX

1 General 3

2 Mechanics 3

2.1 General 3

2.2 Connections 3

3 Operating Data 5

3.1 Electrical Interface - Input 5

3.2 Electrical Operating Data 6

3.3 Electrical Interface - Output 7

3.4 Electrical Features 8

3.5 Aerodynamics 9

3.6 Sound Data 10

4 Environment 10

4.1 General 10

4.2 Climatic Requirements 10

4.3 Mechanical Requirements 11

4.4 EMC 11

5 Safety 12

5.1 Electrical Safety 12

5.2 Approval Tests 12

6 Reliability 12

6.1 General 12

1 General

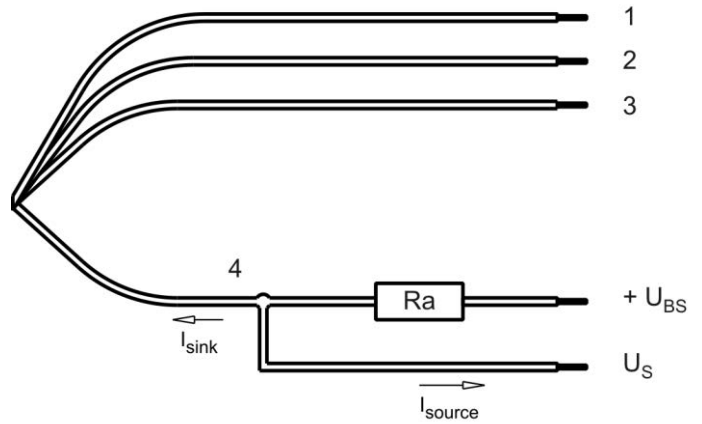
Fan type	Axial-Panel-Fan	
Rotating direction looking at rotor	Counterclockwise	
Airflow direction	Air outlet over struts	
Bearing system	Ball bearing	
Mounting position - shaft	Any	

2 Mechanics**2.1 General**

Width	60 mm	
Height	60 mm	
Depth	25 mm	
Mass	60,7 g	
Housing material	Plastic	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	Wire outlet corner: 30 Ncm Remaining corners: 30 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 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 26	1,0 mm
2	blue	- GND	AWG 26	1,0 mm
3	violet	PWM	AWG 26	1,0 mm
4	white	Tacho	AWG 26	1,0 mm

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

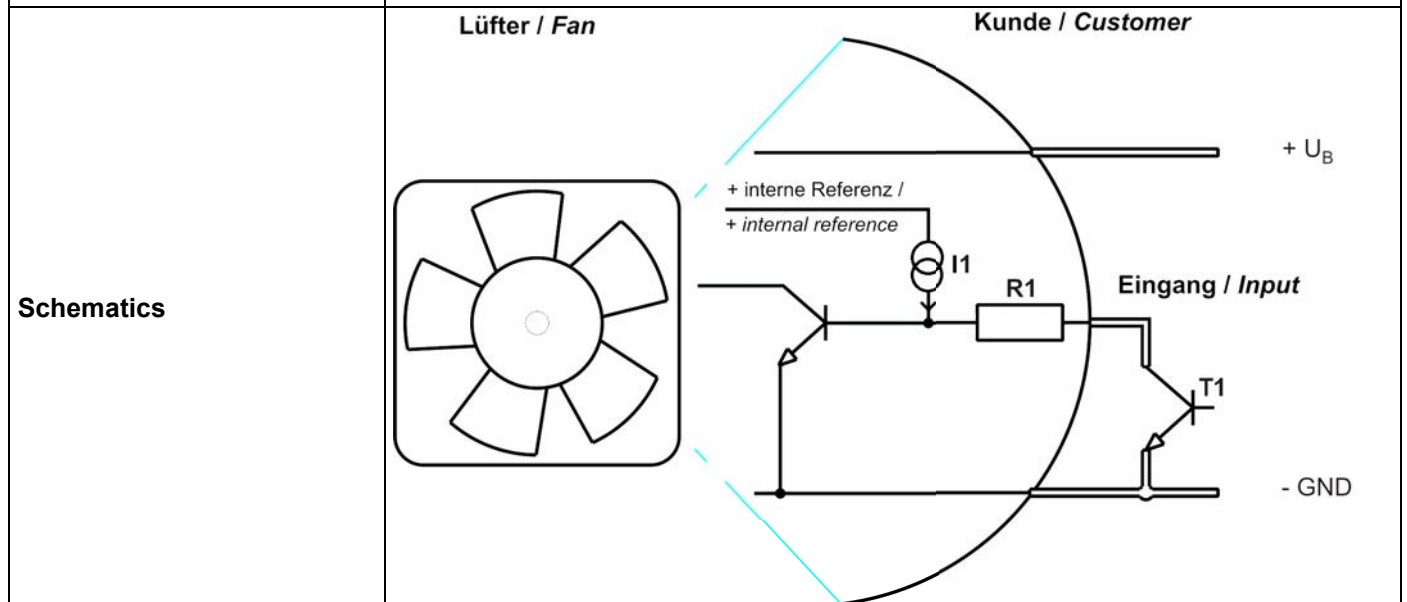
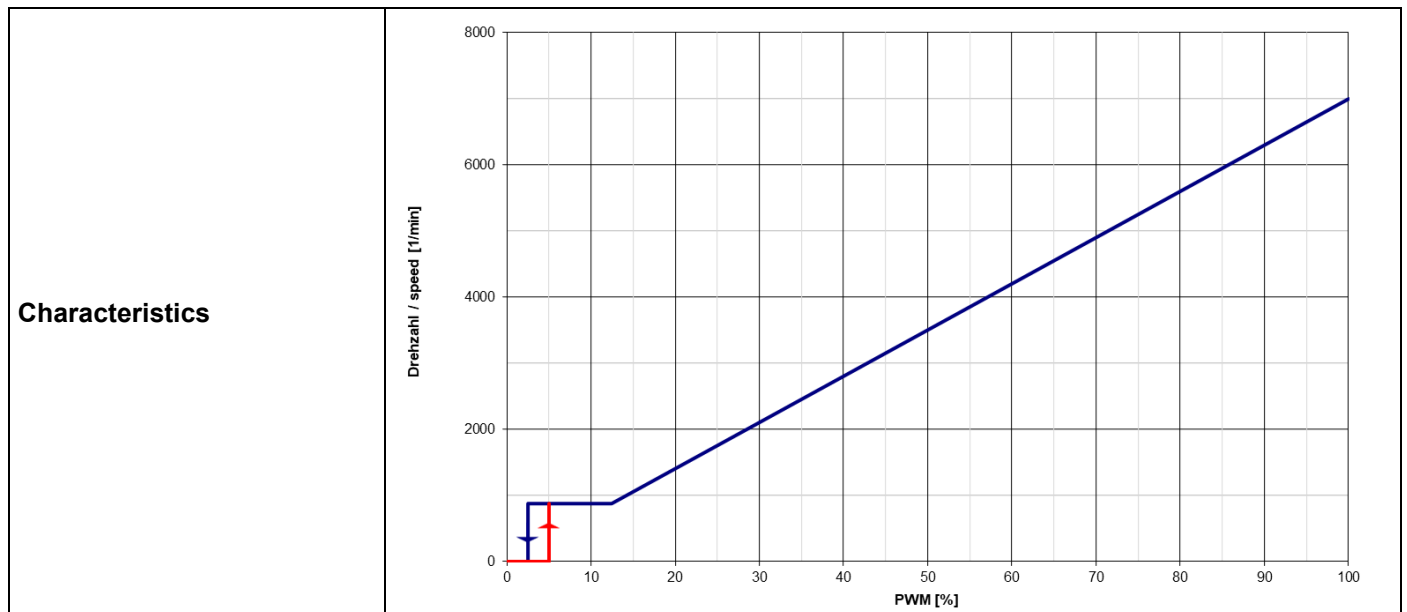
3 Operating Data

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



Speed control: 0... 100 %, PWM-Low < 0,2V

The current source I1 connected to the internal reference (+3,3V) has a current of 50µA during standby and up to 300µA when the fan

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 15 minutes. In the intake and outlet area should not be any solid obstruction within 0,5 m.

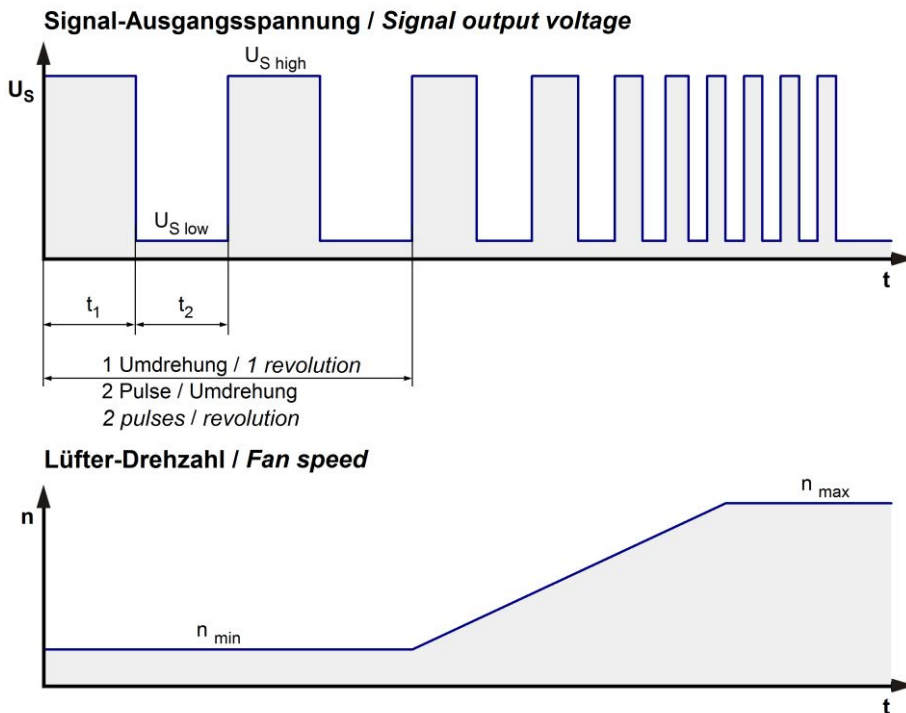
$\Delta p = 0$: corresp. to free air flow (see chapter aerodynamics)
I: corresp. to arithm. mean current value

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

Features	Condition	Symbol	Values		
Voltage range		U	6 V		13,8 V
Nominal voltage		U _N		12 V	
Power consumption	$\Delta p = 0$	P	2,2 W	2,7 W	2,5 W
Tolerance	PWM 0010		+/- 20 %	+/- 20 %	+/- 20 %
Current consumption	$\Delta p = 0$	I	370 mA	230 mA	180 mA
Tolerance	PWM 0010		+/- 20 %	+/- 20 %	+/- 20 %
Speed	$\Delta p = 0$	n	7.000 1/min	7.000 1/min	7.000 1/min
Tolerance	PWM 0010		+/- 5,0 %	+/- 5,0 %	+/- 5,0 %
Starting current consumption				<= 2.300 mA	

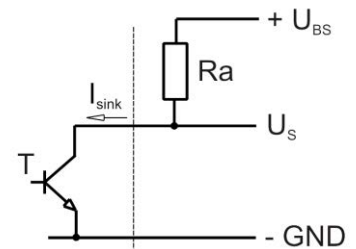
3.3 Electrical Interface - Output

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

Lüfter / Fan Kunde / Customer

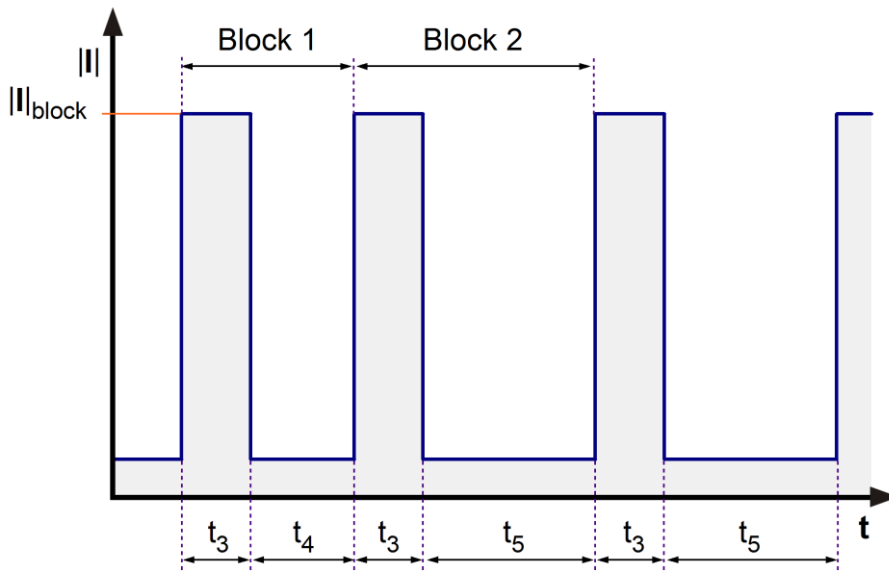


Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 30\ V$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\ V$
Tacho signal High	$U_{S\ high}$	$\leq 30\ V$
Maximum sink current	I_{sink}	4 mA
External resistor	External resistor R_a from U_{BS} to U_S required. All voltages measured to GND.	
Tacho frequency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

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	$I_F \leq 1 \text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	I_{block} approx. 2.300 mA	
Clock signal at locked rotor	t_3 / t_4 typical: 0,33 s / 0,33 s	
Extended Downtime	t_5 : 9,4 s after 3 start-up tests	
Internal fuse	None	



Block1: (The first 2 cycles) $t_3/t_4 = 0,33s/0,33s$;
 Block2: locked rotor protection $t_3/t_5 = 0,33s/9,4s$

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.

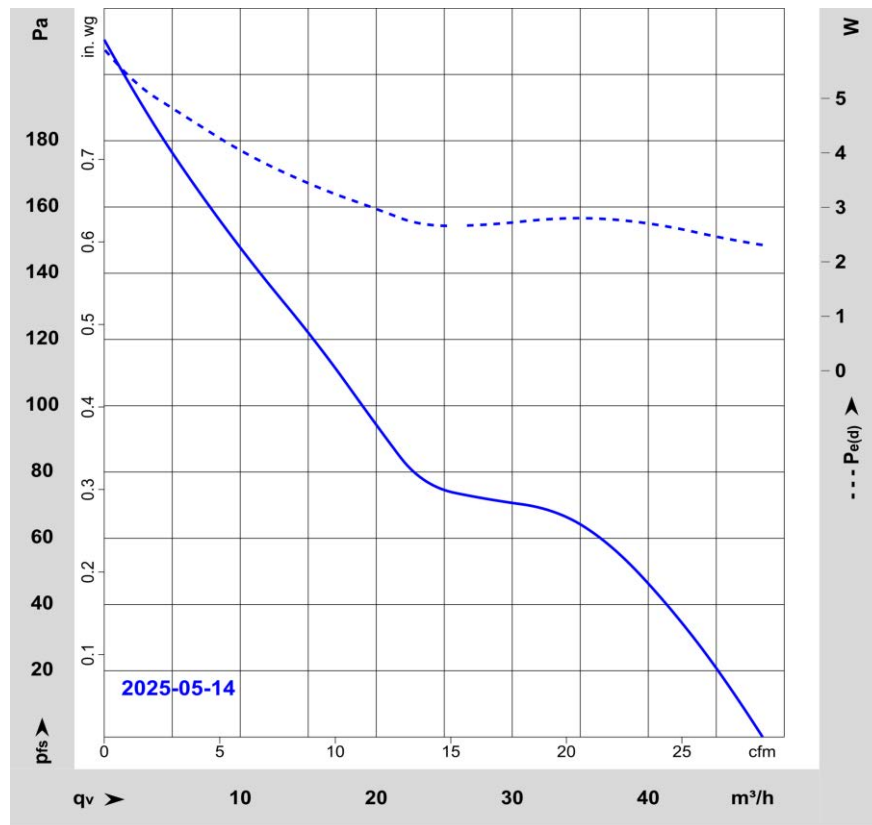
The information is only valid under the specified test conditions and may be changed by the installation conditions. If there are deviations from the standard test conditions, the characteristic values must be checked under the installed conditions. Power consumption of the fan motor when operating at normal voltage is shown. Depending on the operating conditions of the application, the power input may be higher.

a.) Operation condition:

7.000 1/min at free air flow	PWM 100 %; f: 2 kHz		
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Max. free-air flow ($\Delta p = 0 / \dot{V} = \text{max.}$)	48,5 m ³ /h	
Max. static pressure ($\Delta p = \text{max.} / \dot{V} = 0$)	210 Pa	

Preliminary data.



3.6 Sound Data

Measurement conditions: Sound pressure level: 1 meter distance between microphone and the air intake.
Sound power level: According to ISO 10302-1
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:

7.000 1/min at free air flow	PWM 100 %; f: 2 kHz		
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Optimal operating point	48,5 m ³ /h @ 0 Pa		
Sound power level at the optimal operating point	5 bel(A)		
Sound pressure level at free air flow, measured in rubber bands	40 dB(A)		

Preliminary data.

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		

4.2 Climatic Requirements

IP-protection type (certified)	IP 68 (for fan only, not for connector if applicable) **)		
Environmental class	H2		

**) 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

Please require severity levels and specification parameters from the responsible development departments.

4.4 EMC

Kind	Radiated Emission; 30 MHz - 1000 MHz (without PE)
According	DIN EN 55032:2016-02
Check accuracy / Limit	Class B
Result	Below limit Class B

Kind	Electrostatic Discharge Immunity Test
According	DIN EN 61000-4-2:2001-12
Check 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.

Kind	Electromagnetic Field Immunity Test
According	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.

Kind	Electrical Fast Transient / Burst Immunity Test
According	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.

Kind	Immunity to Conducted Disturbances, Induced by RF-Fields
According	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

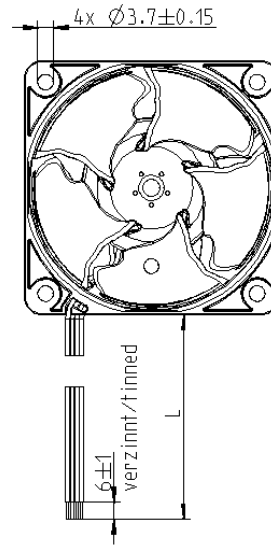
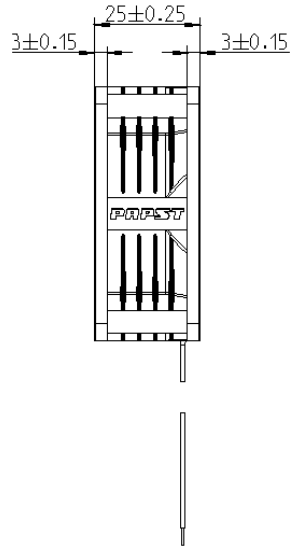
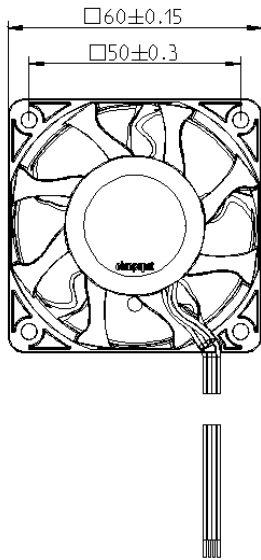
CE	EC Declaration of Conformity	Yes
UKCA	UK Conformity Assessed	Yes
EAC	Eurasian Conformity	Yes
America	UL - Underwriters Laboratories	Yes / UL507, Electric Fans E38324
Europe	VDE - Association for Electrical or UL - Underwriters Laboratories or comparable	Yes / Approval acc. to EN 62368 - Audio/video, information and communication technology equipment
Canada	UL - Underwriters Laboratories or CSA - Canadian Standards Association	Yes / CSA audited by UL according to C22.2 No. 113 Fans and Ventilators
China	CCC - China Compulsory Certification or CQC - China Quality Certification	Not applicable

6 Reliability

6.1 General

Life expectancy L10 at TU = 40 °C	70.000 h	
Life expectancy L10 at TU max.	35.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	120.000 h	

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- kein Axialspiel der Kugellager durch Federausgleich / No axial clearance of the ball bearings due to a pre-load spring
- Anzahl und Länge der Litzen siehe Produktspezifikation Number and Length of the wires see product specification

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