

Product Data Sheet 8317085051
VWLH200CJLWS
AE200-85051 24V O/2U 5.800 Li.410

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1 General

Fan type	Mixed-flow fan	
Rotating direction looking at rotor	Clockwise	
Airflow direction	Air outlet over struts	
Bearing system	Stainless steel ball bearing	
Mounting position - shaft	Any	

2 Mechanics

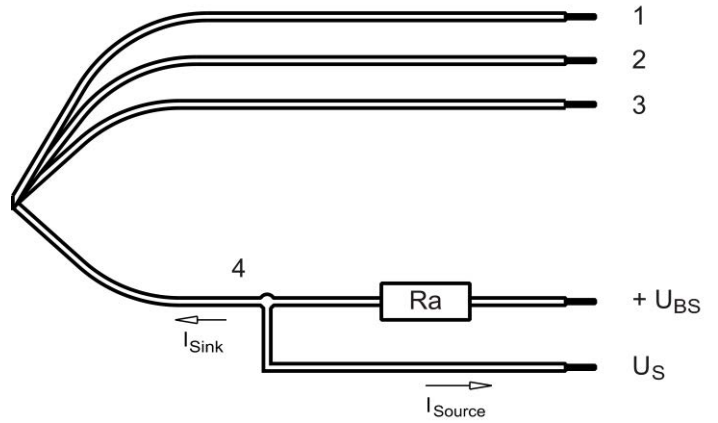
2.1 General

Width	200 mm	
Height	200 mm	
Depth	70 mm	
Diameter	225 mm	
Mass	1,6 kg	
Housing material	Mixed	
Impeller material	Plastic	
Screw size: Max torque when mounted across both mounting Plastic and metal flanges.	ISO 4762 - M4x80, Locknut and washer are preferred. Max. tightening torque: 1.9Nm	

2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 410 mm	
Tolerance	+/- 30 mm	
Tube length	S = 390 mm	
Tolerance	+/- 30 mm	
Plug	See drawing	
Contact	See drawing	





Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 16	2,05 mm
2	blue	- GND	AWG 16	2,05 mm
3	violet	PWM	AWG 22	1,7 mm
4	white	Tacho	AWG 22	1,7 mm

3 Operating Data

3.1 Electrical Interface - Input

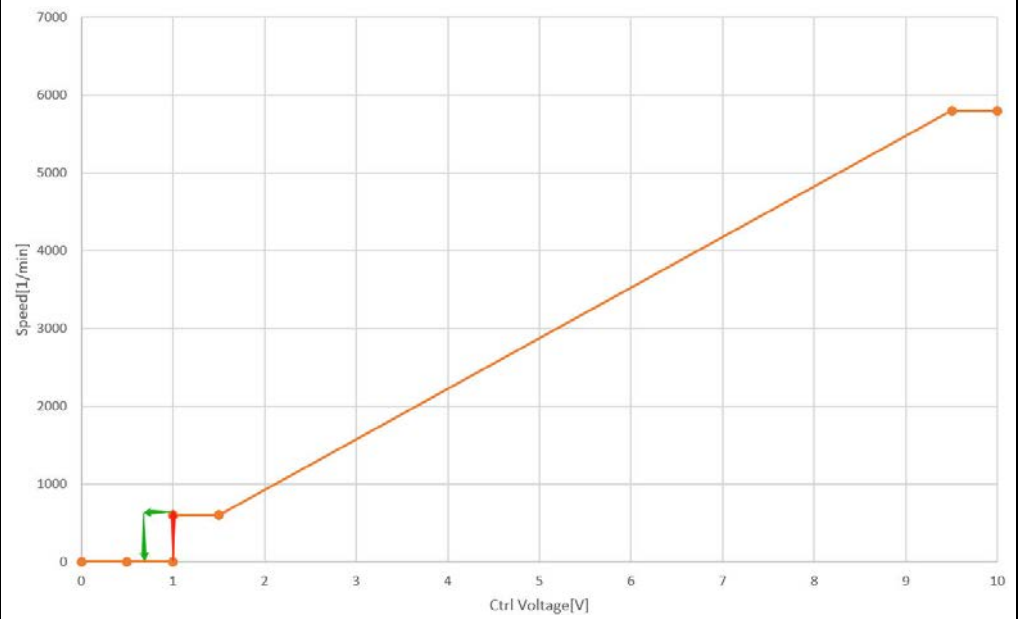
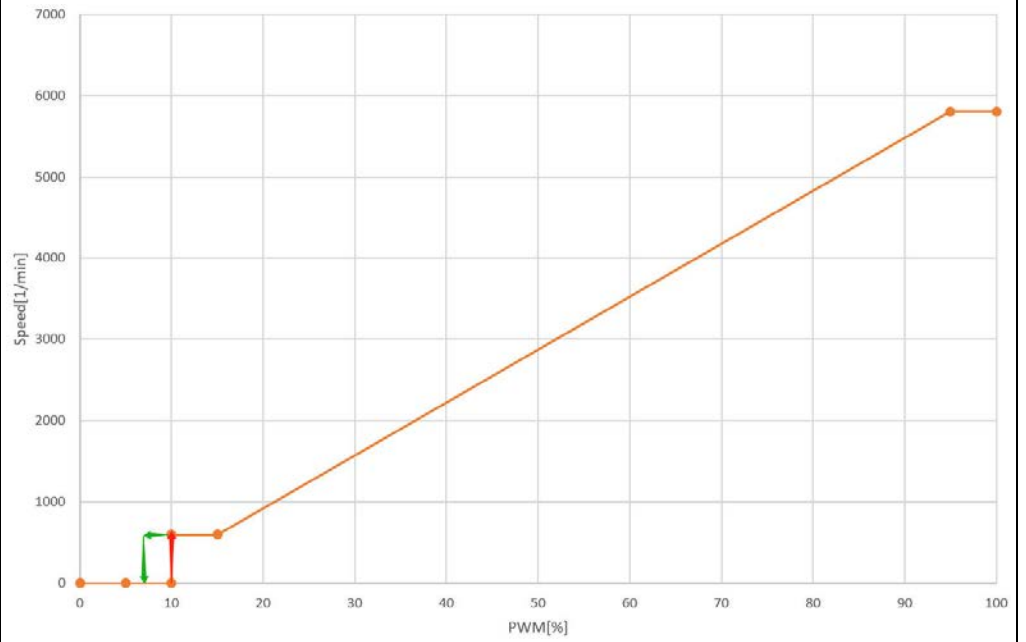
Control input	Analog
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Features

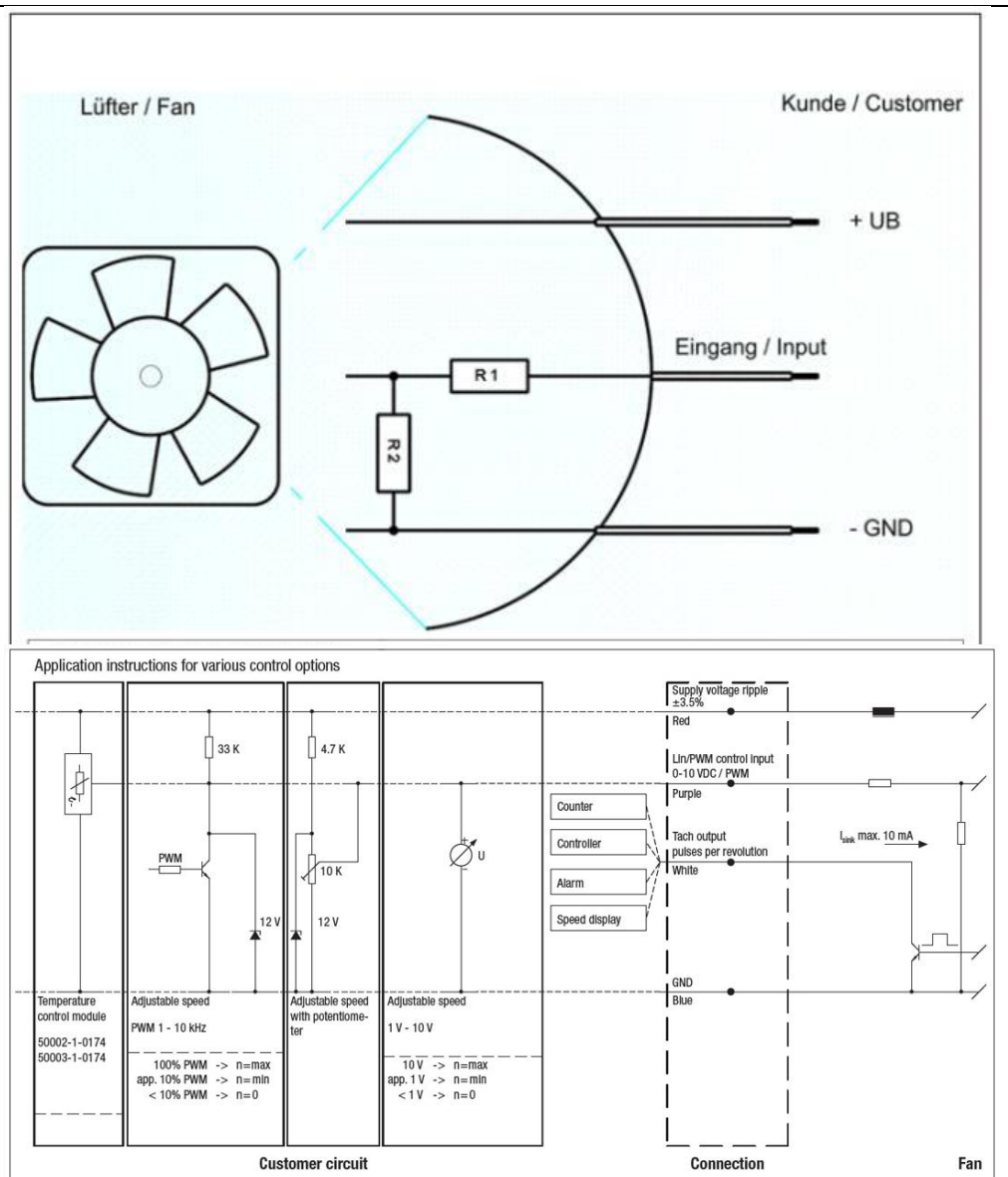
PWM - Frequency		1 kHz - 10 kHz typical: 2 kHz
Input voltage range		0 V - 10 V



Characteristics



Schematics



Input voltage divider:

R1 = 65 kOhm
 R2 = 22kOhm

Speed control:

By pulse-width modulation (PWM) 0 ... 100%
 with switching transistor in emitter circuit and collector resistor to 12 V
 Frequency = 2 kHz (1 - 10 kHz)

Information to the curve PWM:

0% - <10% PWM: 0 1/min
 10% PWM: 500 1/min (Fan on, coming from 0% PWM)
 10% - 15% PWM: 500 1/min (corresponding to min. speed)
 15% - 95% PWM: linear increasing curve
 95% - 100% PWM: 5.800 1/min (corresponding to max. speed)

Speed control:

By analog voltage 0 - 10 V

Information to the curve analog:

- 0 V - < 1,0 V: 0 1/min
- 1,0 V: 500 1/min (Fan on, coming from von 0 V)
- 1,0 V - 1,5 V: 500 1/min (corresponding to min. speed)
- 1,5 V - 9,5 V: linear increasing curve
- 9,5 V - 10 V: 5.800 1/min (corresponding to max. speed)

Note:

It must be ensured that the power supply is applied before the control signal (U Contr) is turned on.

The fan has no sensor break detection. This means - when the input is not connected, the speed is set to zero.

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. 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)
- l: corresp. to arithm. mean current value

Name	Condition
U Contr. 0001	U Contr.: 10 V

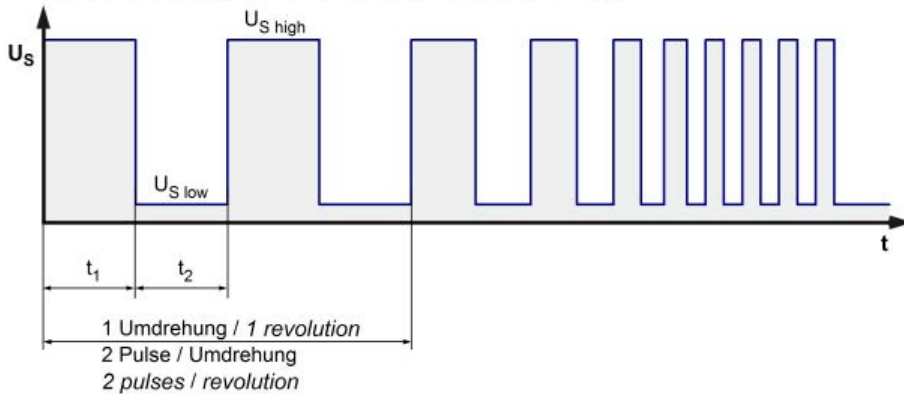
Features	Condition	Symbol	Values		
Voltage range		U	16 V		32 V
Nominal voltage		U _N		24 V	
Power consumption	$\Delta p = 0$	P	96W	220W	212W
Tolerance	U Contr. 0010		$\pm 12.5\%W$	$\pm 10\%W$	$\pm 10\%W$
Current consumption	$\Delta p = 0$	I	6.000mA	9.200 mA	6.600mA
Tolerance	U Contr. 0010		$\pm 12.5\% mA$	$\pm 10\% mA$	$\pm 10\% mA$
Speed	$\Delta p = 0$	n	4.400 1/min	5.800 1/min	5.8001/min
Tolerance	U Contr. 0010		$\pm 7\% 1/min$	$\pm 3\% 1/min$	$\pm 3\% 1/min$



3.3 Electrical Interface - Output

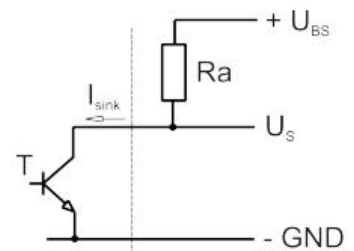
Tacho type	/2 (open collector)
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Signal-Ausgangsspannung / Signal output voltage

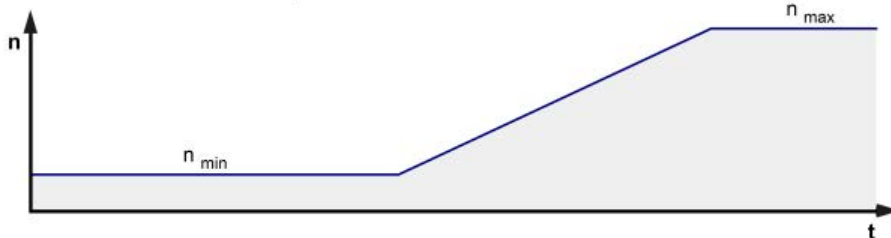


$$R_a = \frac{U_{BS} - U_{S\ low}}{I_{sink}}$$

Lüfter / Fan Kunde / Customer



Lüfter-Drehzahl / Fan speed



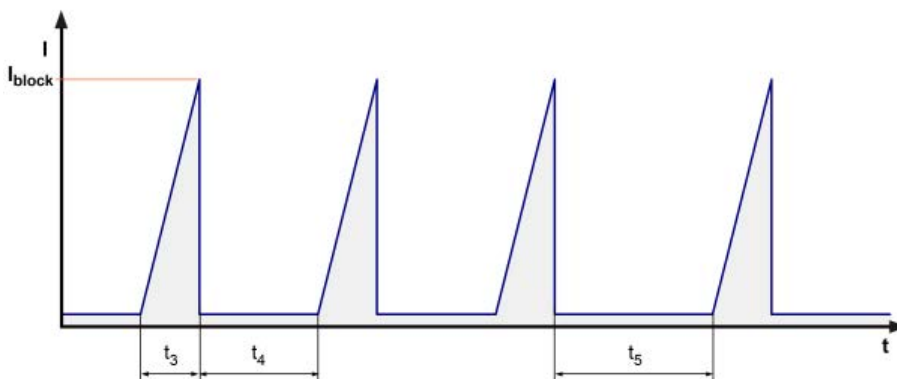
Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 60\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$\leq 60\text{ V}$
External resistor	External resistor R_a from U_{BS} to U_S required. All voltages measured to GND.	
Tacho frequency	$(2 \times n) / 60$	233 Hz @ 5.800 1/min

n = revolutions per minute (1/min)

3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	N-CH FET	
Max. residual current at U_N	$I_F < 5 \text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	$I_{block} \text{ approx. } 2.200 \text{ mA}$	
Clock signal at locked rotor	$t_3 / t_4 \text{ typical: } 2,5 \text{ s} / 10 \text{ s}$	
Extended Downtime	$t_5: 40 \text{ s after 2 start-up attempts}$	
Voltage control *)	Fan turns on at $U_B > 16 \text{ V}$ or $< 32 \text{ V}$ Fan turns off at $U_B < 15 \text{ V}$ or $> 33 \text{ V}$	

*) This fan has an undervoltage and overvoltage control circuit integrated which turns the motor off if the voltage is out of range.



Inrush current limiter:

This fan is equipped with an inrush current limiter to reduce the charging current of the internal capacitors. By this circuit the fan gets a start-up delay of 1,5 s after connecting the supply voltage. Only a short peak current can be measured at the inrush by charging the small internal filter capacitors with approximately 4.4 uF.

3.5 Data According ErP Directive

Installation / Efficiency category	A / static
Speed control	integrated
Specific ratio	1,00857
Target overall efficiency 2015	36,3 %
Overall efficiency	48,3 %
Efficiency grade	40
Power input	315 W
Speed	5.800 1/min

All values measured in optimum energy efficiency point.

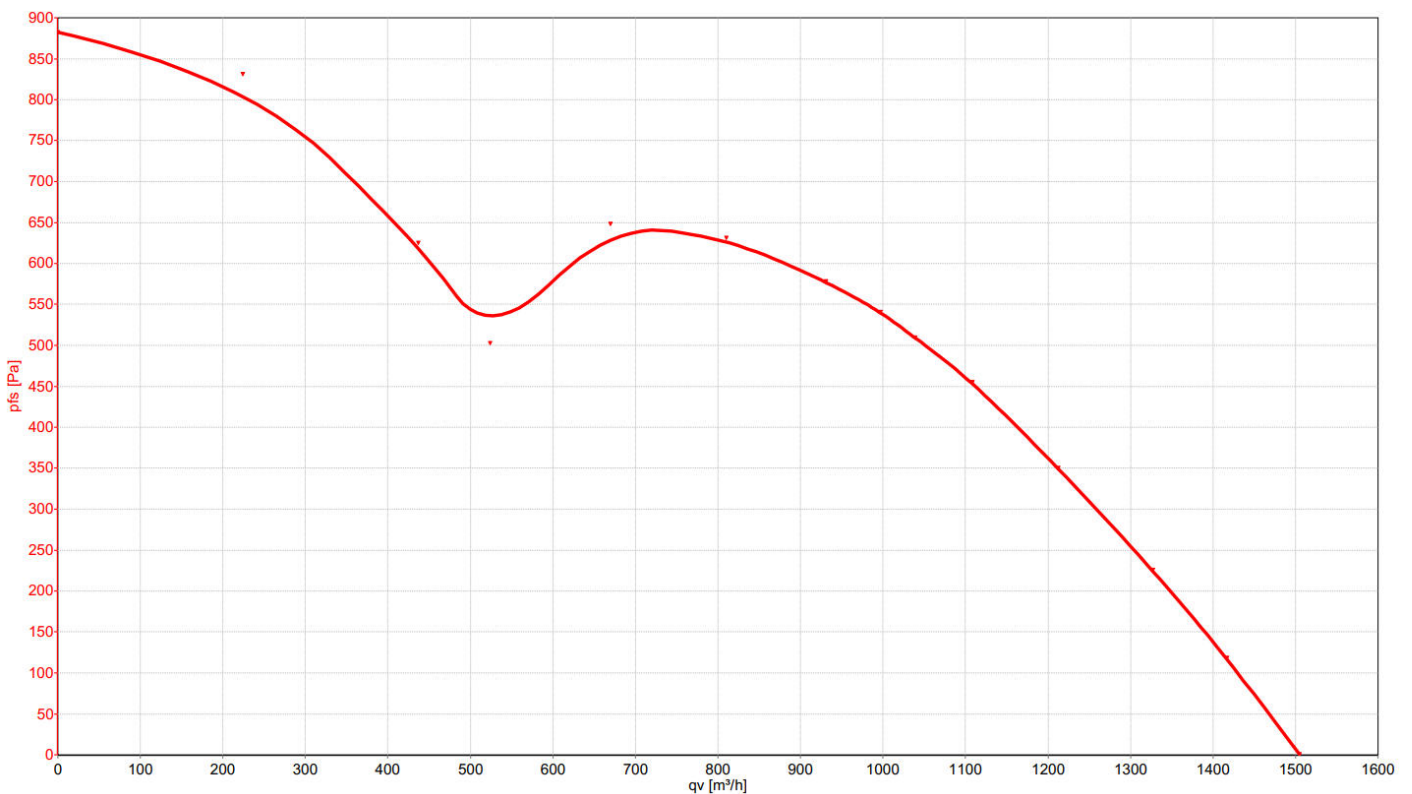
Production date code is printed on the fan label.

3.6 Aerodynamics

Measurement conditions: Measured with a double chamber intake rig acc. to DIN EN ISO 5801.
 Normal air density = 1,2 kg/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:

5800 1/min at free air flow	U Contr. 10 V		
Max. free-air flow ($\Delta p = 0 / \dot{V} = \text{max.}$)		1.508m ³ /h	
Max. static pressure ($\Delta p = \text{max.} / \dot{V} = 0$)		840 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 semi-anechoic chamber with a background noise level of Lp(A) < 5 dB(A)
 For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

5800 1/min at free air flow	U Contr. 10 V		
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Optimal operating point	1.343m ³ /h @ 200Pa	
Sound power level at the optimal operating point	9,0 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	76 dB(A)	

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-30 °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

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, 14days	
Salt fog requirements	720h	

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.

Pollution degree 3 (according to 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 GRMS 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 GRMS 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

4.4 EMC

Kind	Radiated Emission; 30MHz - 1000MHz (with PE)
According	DIN EN 55032-:2016-02
Check accuracy / Limit	Class A
Result	Below limit Class A

Kind	Radiated Emission; 30MHz - 1000MHz
According	DIN EN 55032-:2016-02
Check accuracy / Limit	Class A
Result	Below limit Class A

Kind	Electromagnetic 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
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.

Kind	Electrical Fast Transient / Burst Immunity Test
Accordinging	DIN EN 61000-4-3:2005-07
Check accuracy / Limit	+/- 2kV on power lines; Coupling: POS, NEG, {PE}, ALL, 5kHz and 100 kHz; 1min
Result	A: The monitored function operates as designed during and after exposure to a disturbance.

Kind	Immunity to Conducted Disturbances, Induced by RF-Fields
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.	Not applicable 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 / 1,5 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 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	/

6 Reliability

6.1 General

Life expectancy L10 at TU = 40 °C	70.000 h	
Life expectancy L10 at TU max.	45.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	117.500 h	

