Product Data Sheet 2214 F/2 TDHOU-754

ebmpapst

The engineer's choice



GREEN TECH

2214 F/2 TDHOU-754

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1 General

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

2 Mechanics

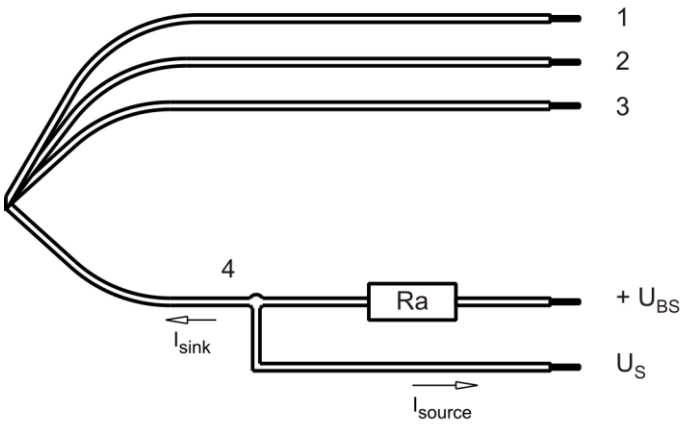
2.1 General

Width	200 mm	
Height	200 mm	
Depth	51,0 mm	
Diameter	220 mm	
Mass	1,0 kg	
Housing material	Metal	
Impeller material	Plastic	

2.2 Connections

Electrical connection	Wires - Plug	
Lead wire length Tolerance	See drawing	
Plug	See drawing	
Contact	See drawing	





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

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

3 Operating Data

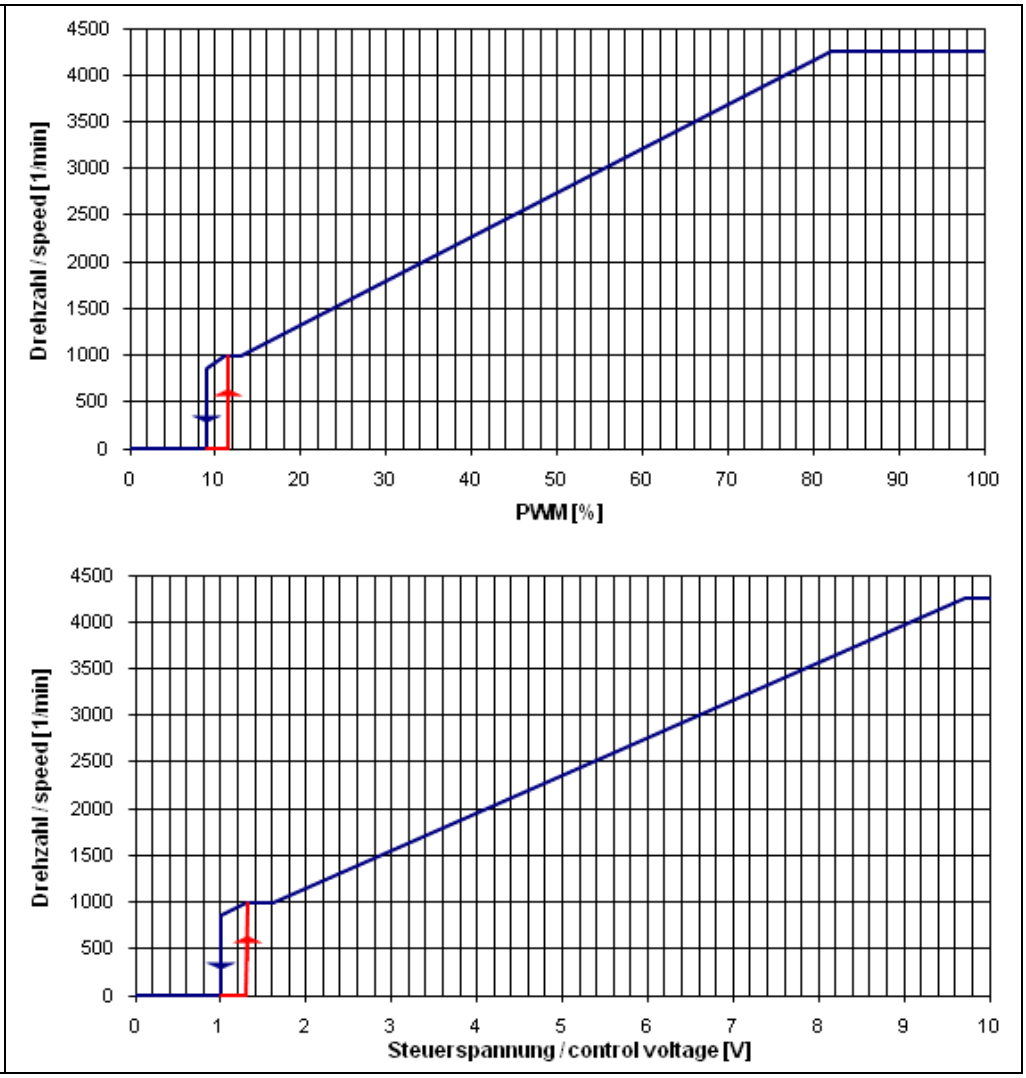
3.1 Electrical Interface - Input

Control input	Analog

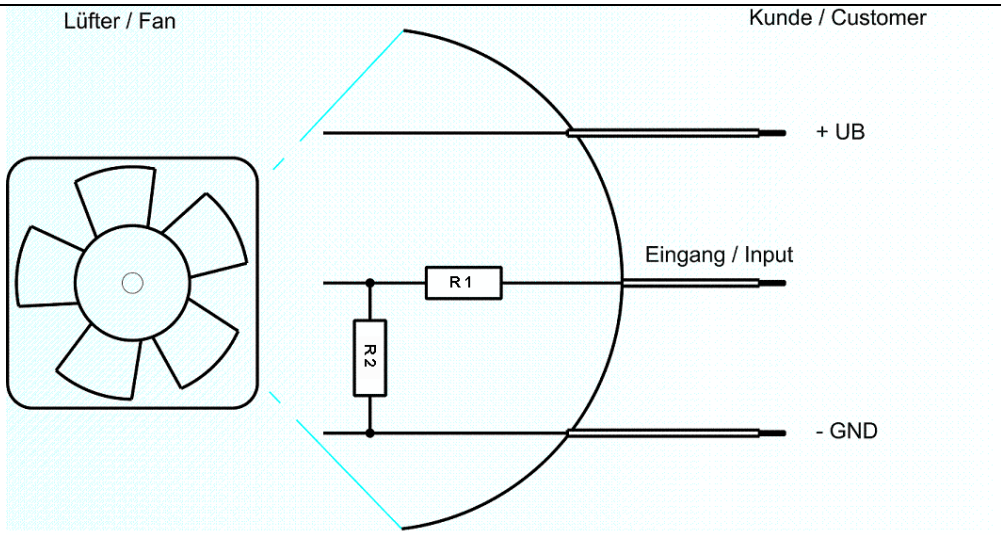
Features

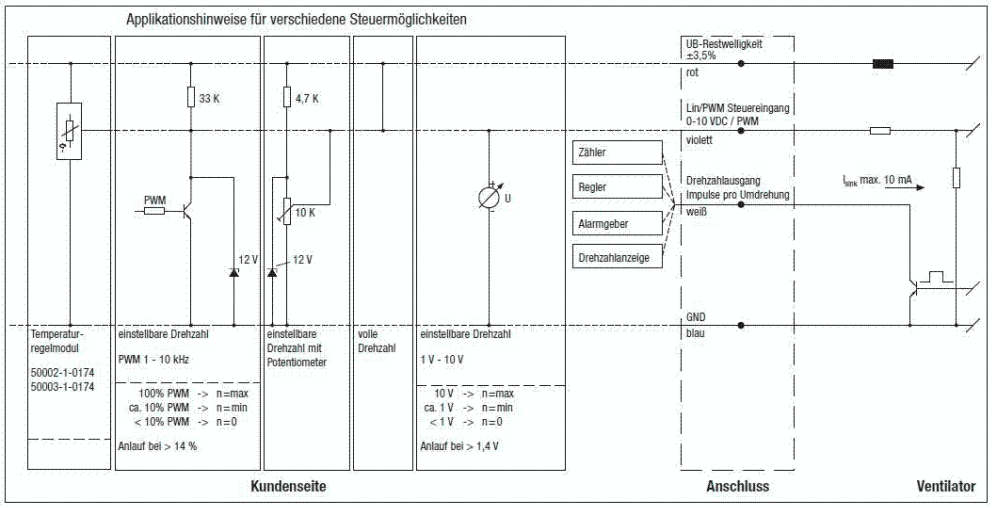
PWM - Frequency		1 kHz - 10 kHz typical: 2 kHz
Input voltage range		0 V - 10 V

Characteristics



Schematics





Input voltage divider:
R1 = 47 kOhm
R2 = 36 kOhm

Speed control:
By pulse-width modulation (PWM) 0 ... 100%
Open collector in relation to Signal-ground
Frequency = 2 kHz (1 - 10 kHz)
Push-Pull-Signal with high = 12 V

Information to the curve PWM:

0% - 10% PWM:	0 1/min
11% PWM:	1.000 1/min (Fan on, comming from 0% PWM)
11% - 13% PWM:	1.000 1/min (corresponding to min. speed)
13% - 82% PWM:	linear increasing curve
82% - 100% PWM:	4.250 1/min (corresponding to max. speed)
9% PWM:	800 1/min or 0 1/min (Fan off, comming from 100% PWM)

or:

Speed control:
By analog voltage 0 - 10 V (Max. permitted 30 V)

Information to the curve analog:

0 V - 1,2 V:	0 1/min
1,3 V:	1.000 1/min (Fan on, comming from von 0 V)
1,3 V - 1,6 V:	1.000 1/min (corresponding to min. speed)
1,6 V - 9,7 V:	linear increasing curve
9,7 V - 10 V:	4.250 1/min (corresponding to max. speed)
1,0 V:	800 1/min or 0 1/min (Fan off, comming from 10 V)

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 (unless otherwise specified). In the intake and outlet area should not be any solid obstruction within 0,5 m.

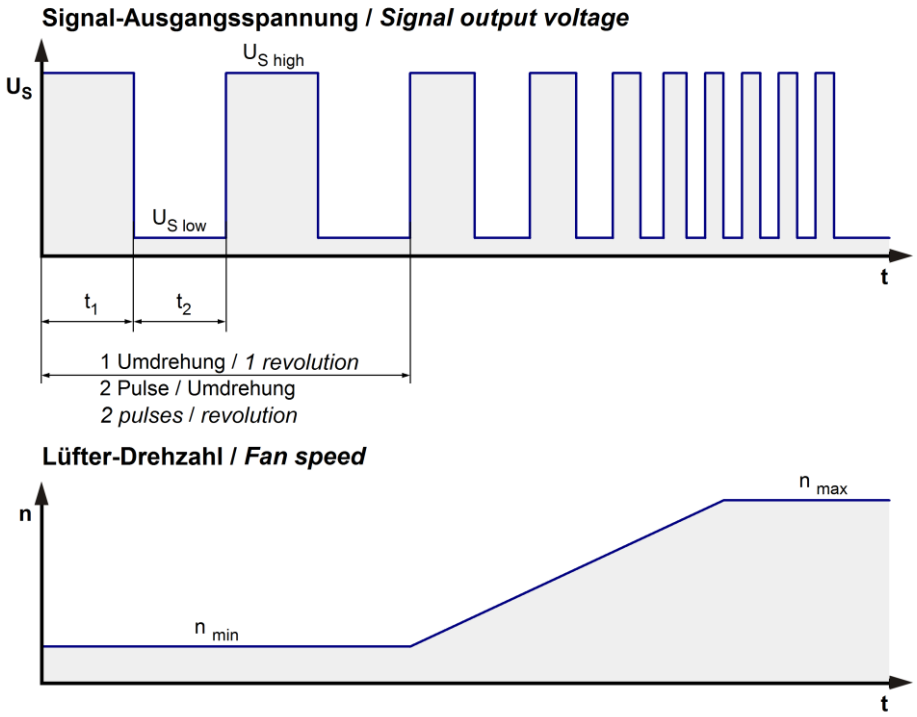
Δp = 0: corresp. to free air flow (see chapter aerodynamics)
I: corresp. to arithm. mean current value

Name	Condition		
U Contr. 0001		U Contr. min.: 9,7 V	U Contr. max.: 10,0 V

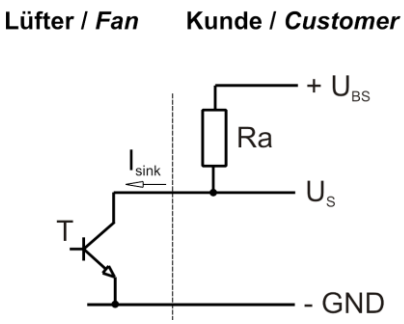
Features	Condition	Symbol	Values		
Voltage range		U	16 V		30 V
Nominal voltage		U_N		24 V	
Power consumption Tolerance	Δp = 0 U Contr. 0010	P	31 W +- 10 %	36 W +- 10 %	35 W +- 10 %
Current consumption Tolerance	Δp = 0 U Contr. 0010	I	1.950 mA +- 10 %	1.450 mA +- 10 %	1.170 mA +- 10 %
Speed Tolerance	Δp = 0 U Contr. 0010	n	4.100 1/min +- 7,5 %	4.250 1/min +- 5 %	4.250 1/min +- 5 %

3.3 Electrical Interface - Output

Tacho type	/2 (open collector)



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



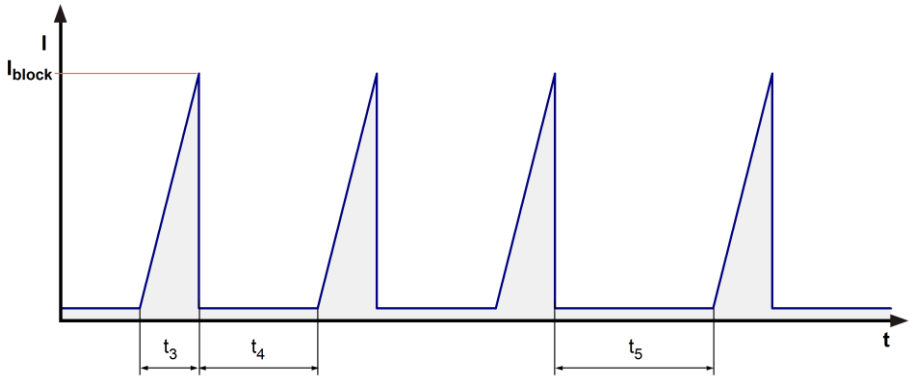
Features		Note	Values
Tacho operating voltage	U_{BS}		<= 30 V
Tacho signal Low	$U_{S\,low}$	I sink: 2 mA	<=0,4 V
Tacho signal High	$U_{S\,high}$	I source: 0 mA	<=30 V
Maximum sink current	I_{sink}		<= 20 mA
External resistor		External resistor Ra from UBS to US required. All voltages measured to GND.	
Tacho frequency		(2 x n) / 60	140 Hz @ 4.200 1/min
Tacho isolated from motor		No	
Slew rate			=> 0,5 V/us

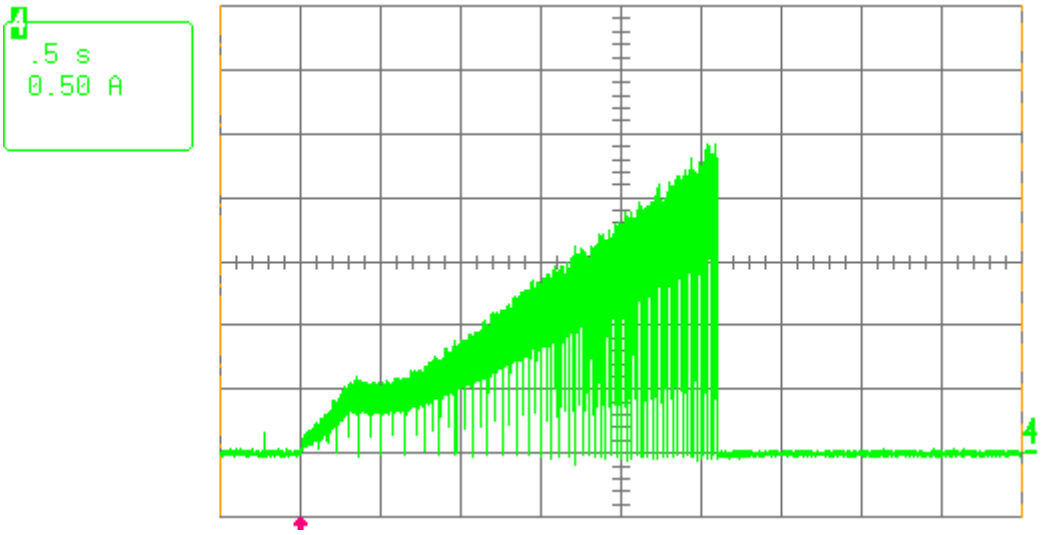
n = revolutions per minute (1/min)

3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection Max. residual current at U_N	Rectifying diode I_F < 5 mA	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	I_{block}	
Clock signal at locked rotor	t_3 / t_4 typical: 2,7 s / 10,0 s	
Internal fuse	Littelfuse NANO2 > Very Fast-Acting > 451/453 Series 6,3A / 125V (Art.No.: 045106.3MRL)	
Voltage control *)	Fan turns on at U_B > 12 V or < 13 V Fan turns off at U_B < 35 V or > 36 V	

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





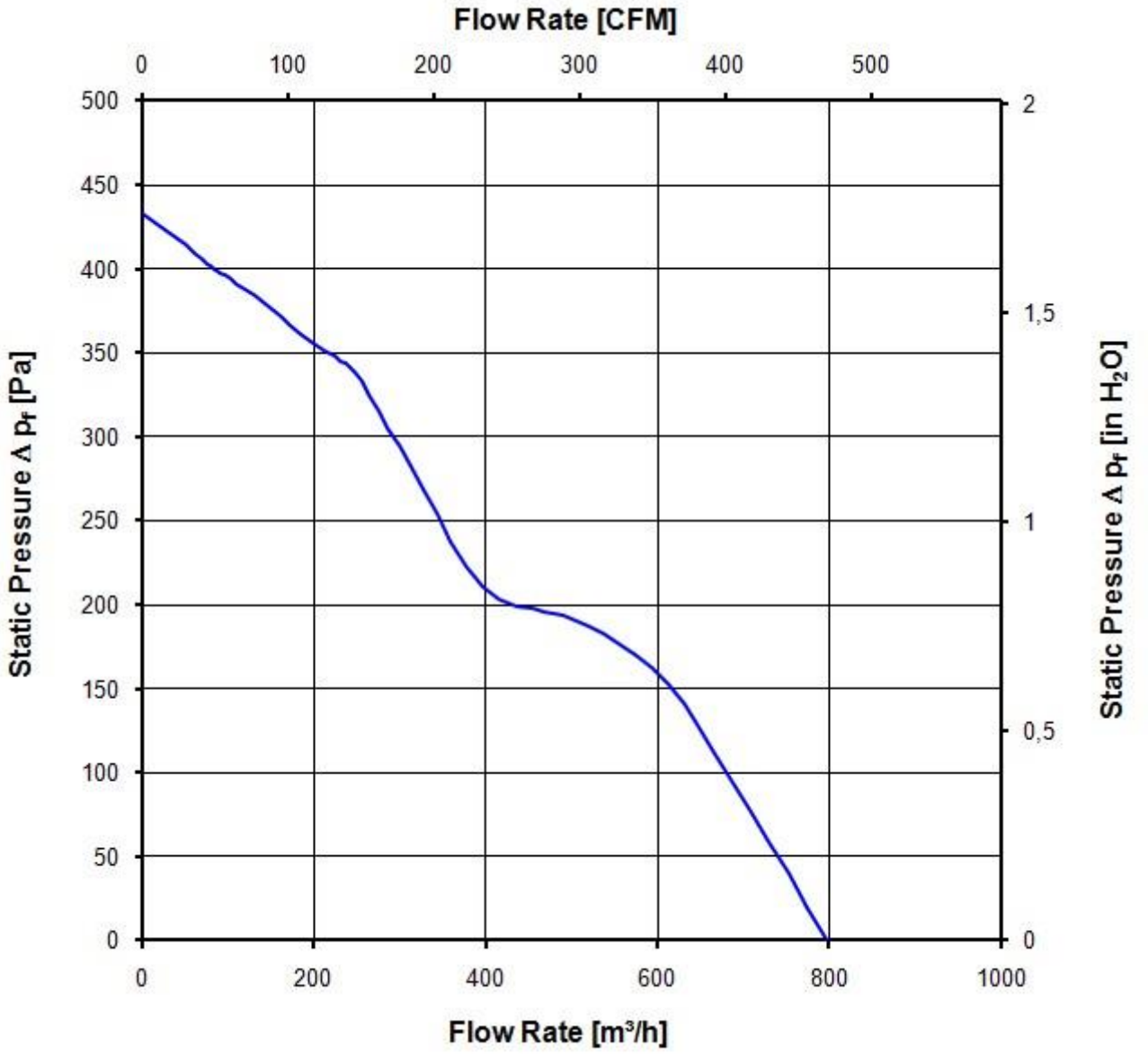
3.5 Aerodynamics

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.

a.) Operation condition:

4.250 1/min at free air flow		U Contr. min.: 9,7 V	U Contr. max.: 10,0 V

Max. free-air flow (Δp = 0 / $\dot{V}$ = max.)	800 m3/h	
Max. static pressure (Δp = max. / $\dot{V}$ =0)	430 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 semianchoic chamber with a background noise level of Lp(A) < 5 dB(A) For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

4.250 1/min at free air flow		U Contr. min.: 9,7 V	U Contr. max.: 10,0 V

Optimal operating point	688 m3/h @ 80 Pa	
Sound power level at the optimal operating point	7,1 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	62,0 dB(A)	

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-20 °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) **)	
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	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.

**) 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	mobile 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 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
	mobile 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 m^2 / s^3 20- 150 Hz : - 3 dB / Oct 0,83 G 3 3 x 5 h
	mobile use	Shock in use IEC 60068-2-27 Shock spectrum Acceleration Duration Number of bumps (+X, -X, -Y, +Y, -Z, +Z) Total bumps	 Shock half sine 30 G 6 ms 10 in each direction 60
	mobile 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

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. 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
VDE	Association for Electrical, Electronic and Information Technologies	Yes / Approval acc. to EN 60950 (VDE 0805) - Information technology equipment
CSA	Canadian Standards Association	No
CCC	China Compulsory Certification	Not applicable

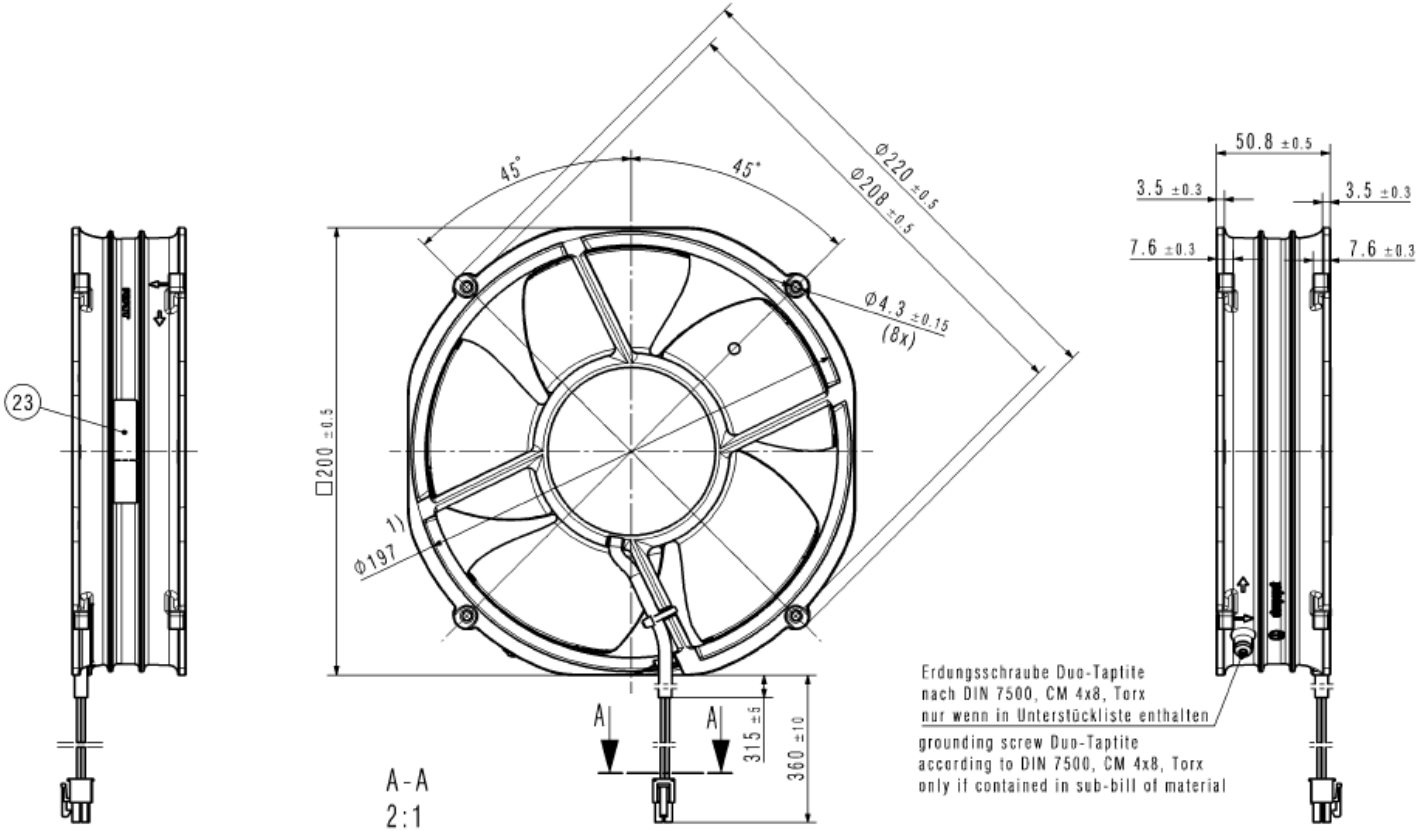
6 Reliability

6.1 General

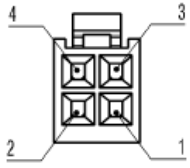
Life expectancy L10 at TU = 40 °C	90.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	152.500 h	

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A-A
2:1



Steckergehäuse/
Plug housing:
Molex 39-01-2040

Kontakt / Contact:
Molex 39-00-0059

1) Maße für Montageausschnitt

- Axialspiel der Kugellager mit Feder spielfrei verspannt

1) measures of mounting cut-out

- ball bearings without clearance by a pre-loaded spring

Steckerbelegung / Pin configuration	
Pin	Farbe / Color
1	rot / red (+ UB)
2	blau / blue (- GND)
3	violett / violet (PWM)
4	weiß / white (Tacho)

FR	V5R24	PAPST	Werkstoff / Material:
Dokument-Status / Document-State	CATIA-Version/ CATIA-Version	CAD-Umgebung/ CAD-Environment	Volumen / Volume (mm^3): 1305,329
	4322918130 CPA000-		Gewicht / Mass (g):
Änd.-Nr./ Change-No.	3D-Referenzmodell / 3D-Referenzmodel		Titel / Title: Axiallüfter 2200F / axial fan 2200F
Tolerierung / Tolerances: Size ISO 14405 E	Datum	Name	
	Bearb./ Drawn 17.10.2018	ECKMANN	
Allgemeintoleranzen / Gen. Tolerances: DIN ISO 2768-mK	Gepr./ Checked 17.10.2018	ECKMANN	Zchg.-Nr./ Drawing No: 9295416754
	Freig./ Released 17.10.2018	REBERK	Ers.f.Zchg. / Replaces:
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