251657216

Product Data Sheet

8315100195
VWS0184FULDS
2214F/2TDHHO

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The engineer's choice



GREEN TECH

2214F/2TDHHO

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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

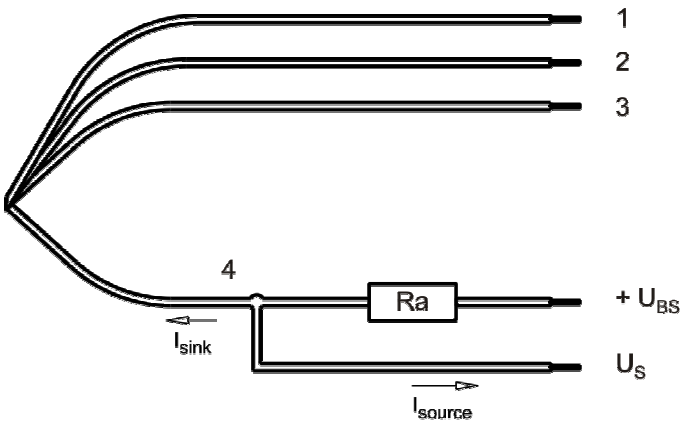
2.1 General

Width	200 mm	
Height	200 mm	
Depth	51,0 mm	
Diameter	220 mm	
Mass	1,06 kg	
Housing material	Metal	
Impeller material	Plastic	

2.2 Connections

Electrical connection	Wires - Plug	
Lead wire length Tolerance	L = 550 mm +- 10 mm	
Tube length Tolerance	S = 10 mm +- 2,0 mm	
Plug	See drawing	
Contact	See drawing	





Wire	Color	Operation	Wire size	Insulation diameter
1	black	+ UB	AWG 18	1,8 mm
2	blue	- GND	AWG 18	1,8 mm
3	violet	CONTR	AWG 22	1,35 mm
4	white	Tacho	AWG 22	1,35 mm

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

3 Operating Data

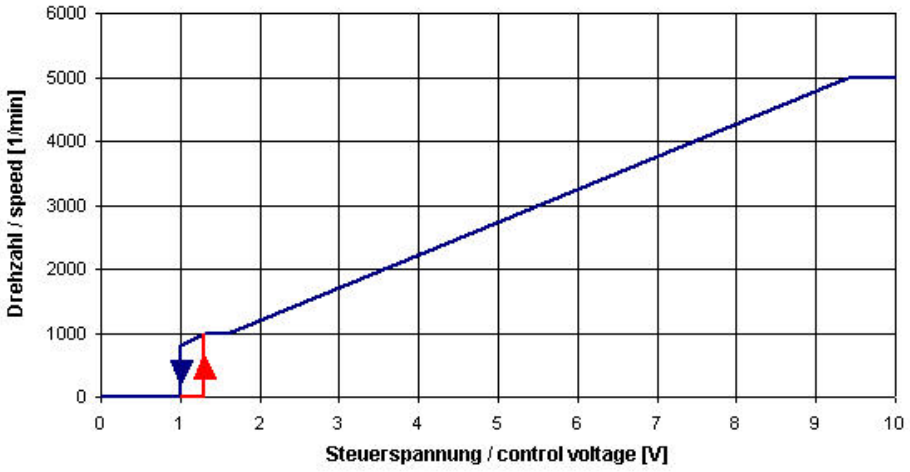
3.1 Electrical Interface - Input

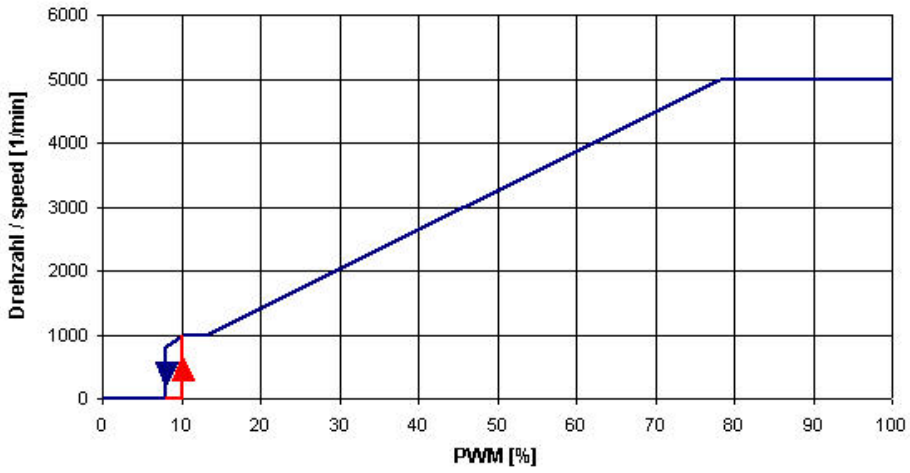
Control input	Analog

Features

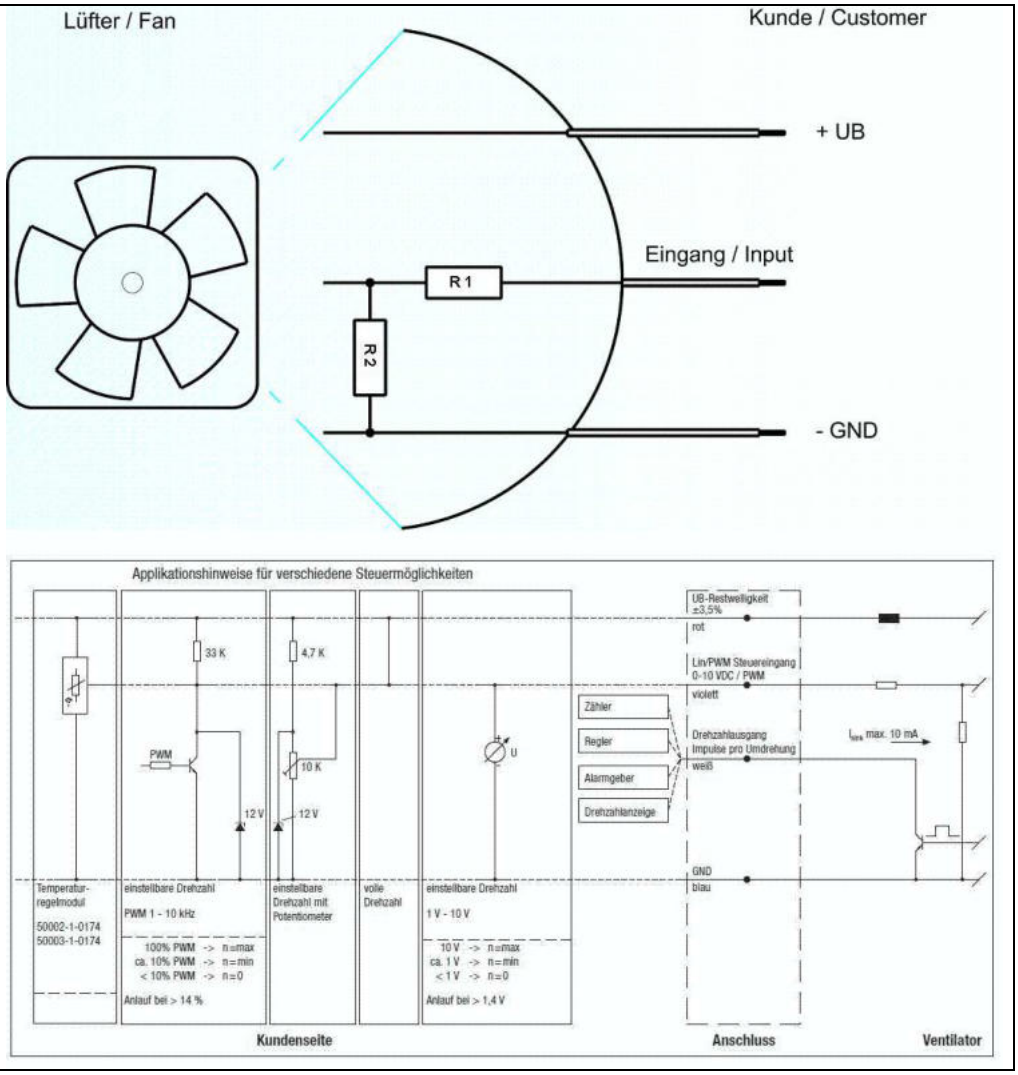
PWM - Frequency		1 kHz - 10 kHz typical: 2 kHz
Input voltage range		0 V - 10 V

Characteristics





Schematics



Input voltage divider:
R1 = 47 kOhm
R2 = 36 kOhm
For protection: There is parallel to R2 a 5,1 V Z-Diode

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:	1.000 1/min (Fan on, comming from 0% PWM)
10% - 13% PWM:	1.000 1/min (corresponding to min. speed)
13% - 78% PWM:	linear increasing curve
78% - 100% PWM:	5.000 1/min (corresponding to max. speed)
10% - >8% PWM:	linear decreasing curve (comming from 100% PWM)
8% PWM:	800 1/min or 0 1/min (Fan off, comming from 100% PWM)

oder:

Speed control:

By analog voltage 0 - 10 V

Information to the curve analog:

0 V - < 1,3 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 - 9,4 V:	linear increasing curve
9,4 V - 10 V:	5.000 1/min (corresponding to max. speed)
1,3 V - > 1,0 V:	linear decreasing curve (comming from 10 V)
1,0 V:	800 1/min or 0 1/min (Fan off, comming from 10 V)

Note:

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

3.2 Electrical Operating Data

Measurement conditions: Normal air density = 1,2 kg/m3; Temperature 23℃ +/ - 3℃; 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.

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

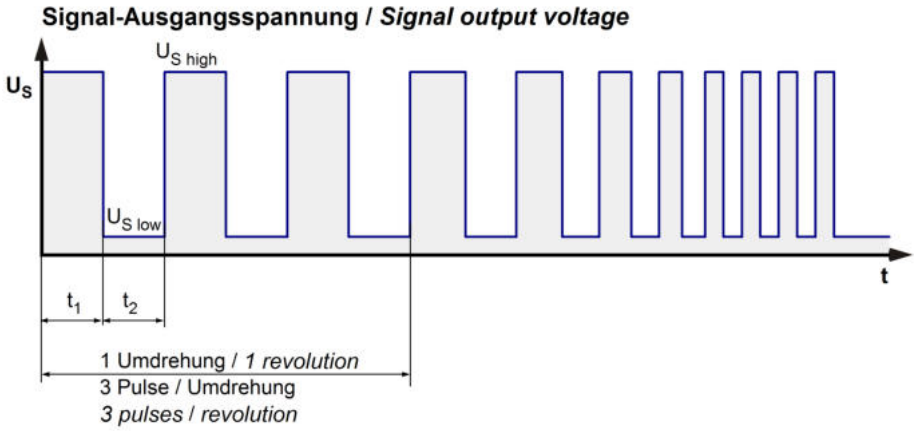
Name	**Condition**		
U Contr. 0001	U Contr.: 10 V		

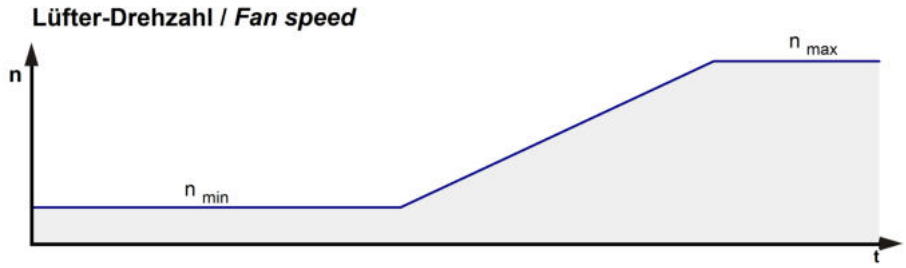
No sensor break detection. Speed is 0 1/min with open control input.

Features	**Condition**	**Symbol**	**Values**		
Voltage range		U	16 V		36 V
Nominal voltage		U_N		24 V	
Power consumption Tolerance	$\Delta p = 0$ U Contr. 0010	P	38 W +- 13 %	48 W +- 10 %	51 W +- 10 %
Current consumption Tolerance	$\Delta p = 0$ U Contr. 0010	I	2.360 mA +- 13 %	2.000 mA +- 10 %	1.400 mA +- 10 %
Speed Tolerance	$\Delta p = 0$ U Contr. 0010	n	4.600 1/min +- 5 %	5.000 1/min +- 3 %	5.000 1/min +- 3 %

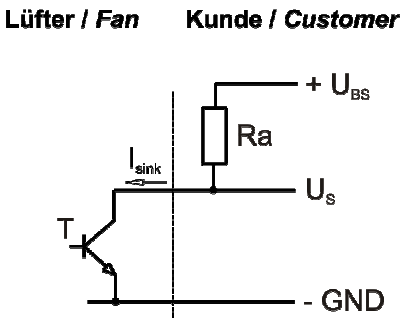
3.3 Electrical Interface - Output

Tacho type	/2 (open collector)





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



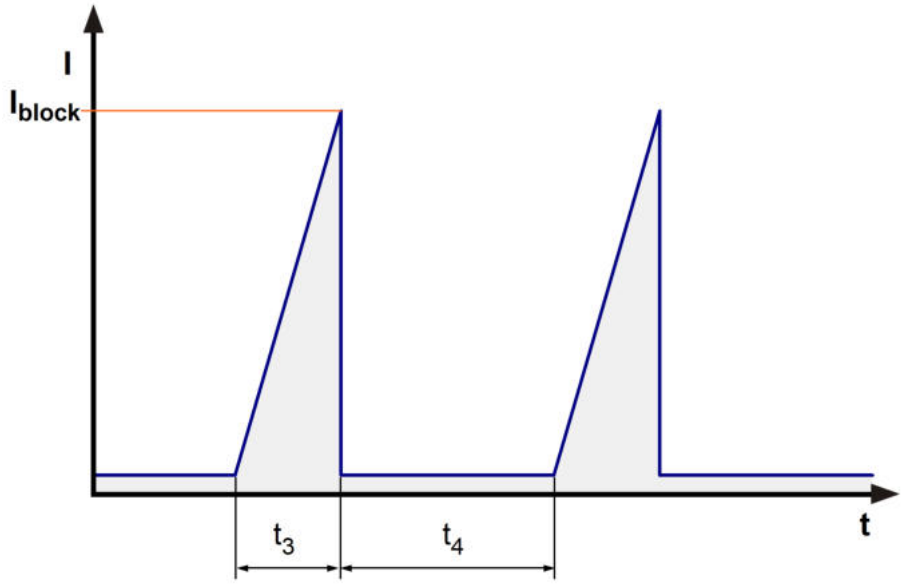
Features		**Note**	**Values**
Tacho operating voltage	U_{BS}		<= 36 V
Tacho signal Low	$U_{S\,low}$	I sink: 2 mA	<= 0,4 V
Tacho signal High	$U_{S\,high}$	I source: 0 mA	<=36 V
Maximum sink current	I_{sink}		<= 20 mA
External resistor		External resistor Ra from UBS to US required. All voltages measured to GND.	
Tacho frequency		(3 x n) / 60	250 Hz @ 5.000 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	P-CH FET I_F < 5 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: 6,0 s / 10,0 s	
Internal fuse	Littelfuse NANO2 > Very Fast-Acting > 451/453 Series 12A / 75V (Art.No.: 0451012.MRL)	
Voltage control *)	Fan turns on at U_B > 14 V or < 40 V Fan turns off at U_B < 13 V or > 42 V	

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

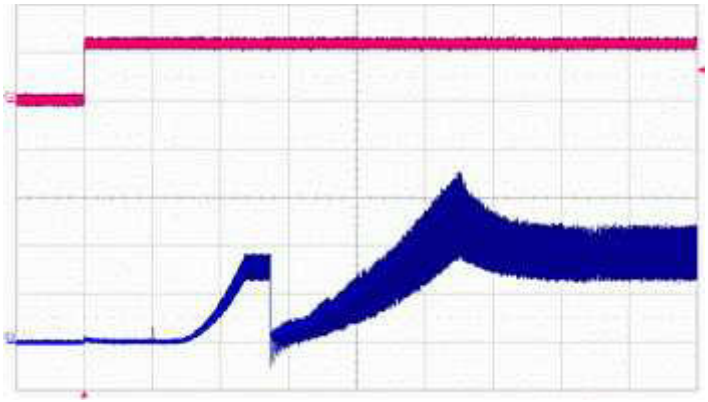


This fan has a startup delay of 2 seconds after applying supply voltage.

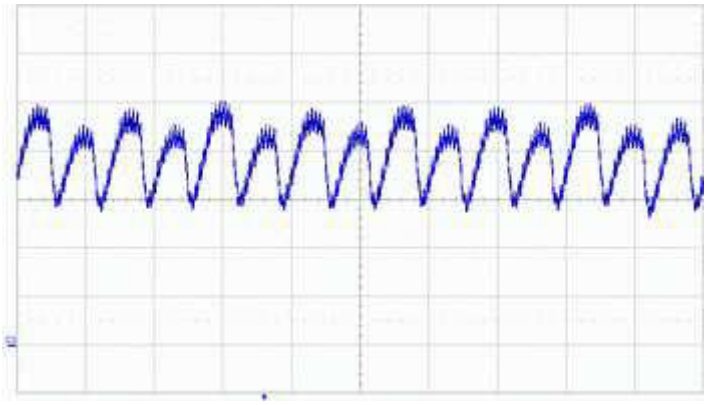
Each startup (t3) hast two steps. Positioning of the rotor (ca. 3-4s) and the actual startup (~3s).

After 4 failed start-ups there is an extended timeout of 40 seconds.

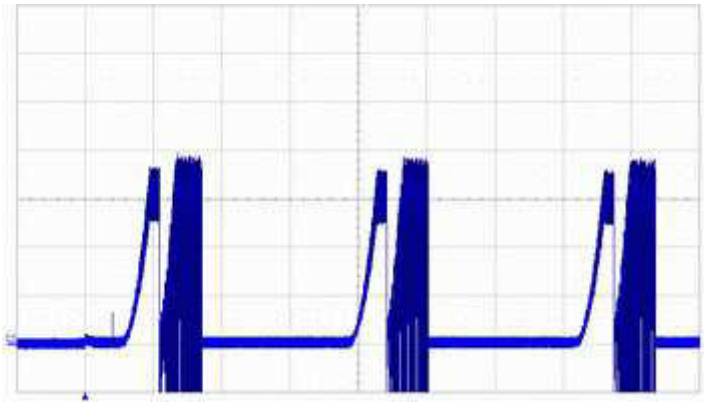
When several fans are operated together (in a fan tray) and one fan starts after the other and the starting current is eventually limited, it can happen that the not yet operated fan is driven in reverse by the counter pressure. This can lead to a failure of the first start-up. The fan detects this and makes another start with an increased current.



Start-up current @ 24 V (I = 1A/div ; t = 2s/div)



Running current @ 24 V (I = 0,5A/div ; t = 1ms/div)



Locked rotor current @ 24 V (I = 0,5A/div ; t = 5s/div)

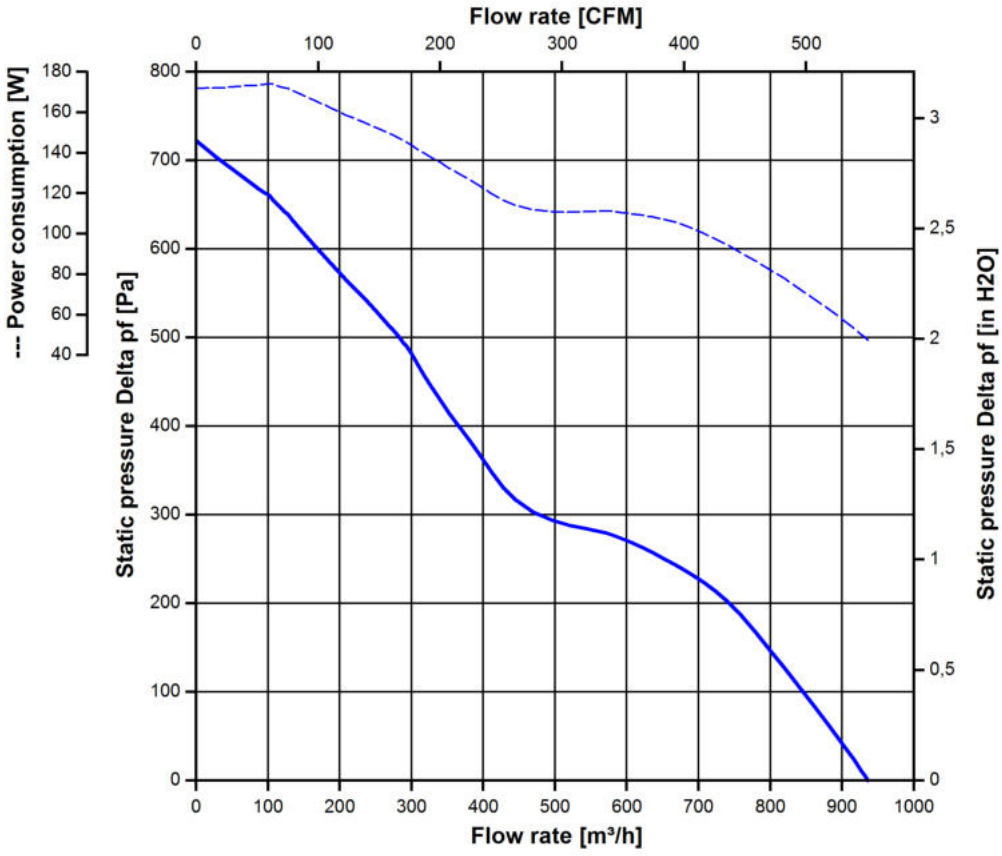
3.5 Aerodynamics

Measurement conditions:	Measured with a double chamber intake rig acc. to DIN EN ISO 5801. Normal air density = 1,2 kg/m3; Temperature 23℃ +/ - 3℃; 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:

5.000 1/min at free air flow	U Contr. 10 V		

Max. free-air flow (Δp = 0 / $\dot{V}$ = max.)	940 m3/h	
Max. static pressure (Δp = max. / $\dot{V}$ =0)	725 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:

5.000 1/min at free air flow	U Contr. 10 V		

Optimal operating point	910 m3/h @ 30 Pa	
Sound power level at the optimal operating point	7,5 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	67,0 dB(A)	

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-20 ℃	
Max. permitted ambient temperature TU max.	70 ℃	
Min. permitted storage temperature TL min.	-40 ℃	
Max. permitted storage temperature TL max.	80 ℃	

4.2 Climatic Requirements

Humidity requirements	humid heat, constant; according to DIN EN 60068-2-78, 14 days	
Water exposure	None	
Dust requirements	None	
Salt fog requirements	None	

Permitted application area:
The product is intended for use in sheltered rooms with controlled temperature and controlled humidity. Directly exposure to water must be avoided.

Pollution degree 1 (according DIN EN 60664-1)
There is either no pollution or it occurs only dry, non-conductive pollution. The pollution has no negative impact.

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

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℃. 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℃ measured with U=500 VDC for 1 min.	RI > 10 MOhm	
Clearance / creepage distance	1,0 mm / 1,2 mm	
Protection class	III	

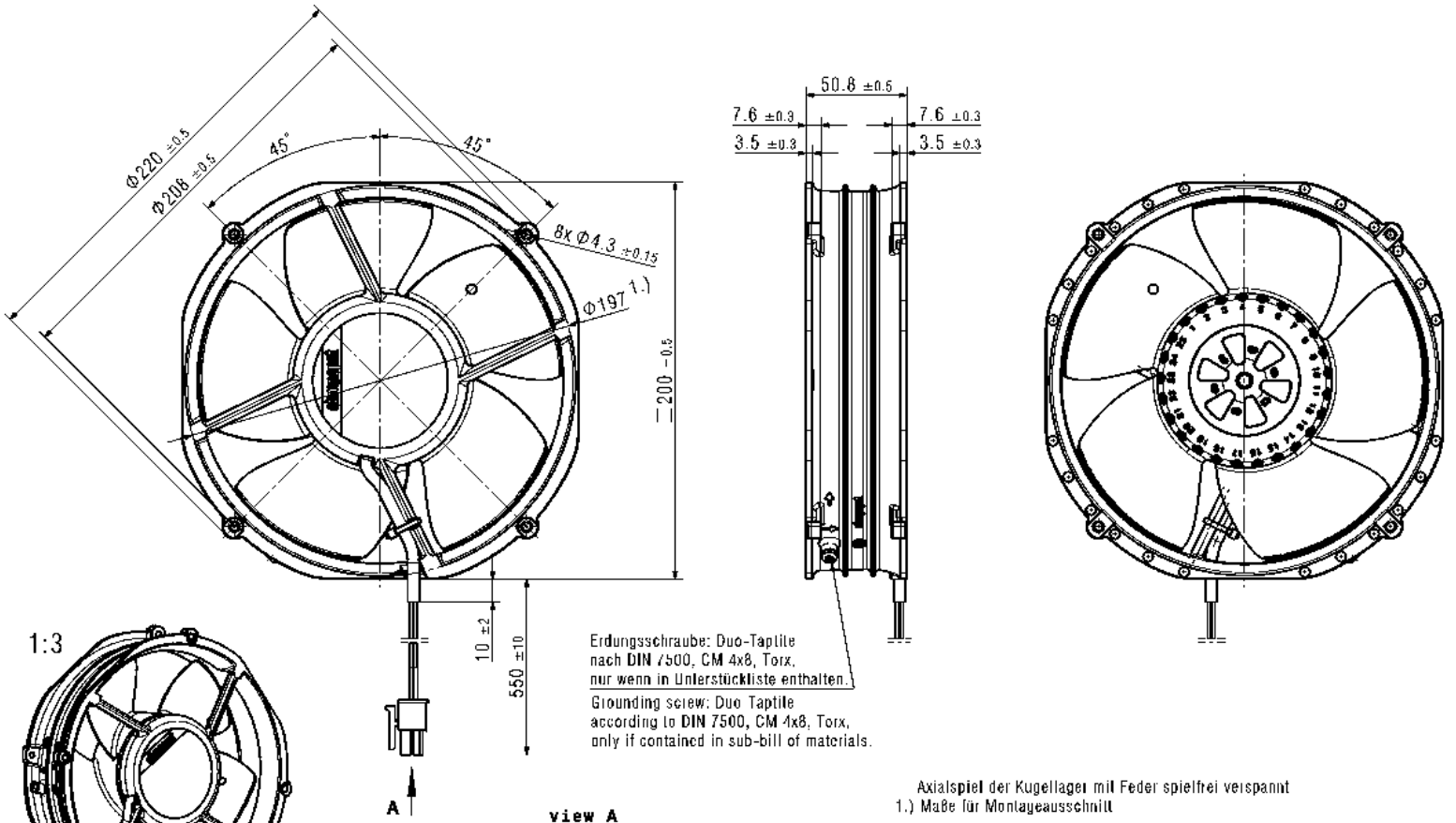
5.2 Approval Tests

CE	EC Declaration of Conformity	No
EAC	Eurasian Conformity	Yes
UL	Underwriters Laboratories	Yes / UL audited by CSA according to 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 / C22.2 No. 113 Fans and Ventilators
CCC	China Compulsory Certification	Not applicable

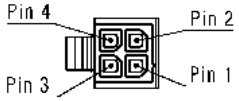
6 Reliability

6.1 General

Life expectancy L10 at TU = 40 ℃	85.000 h	
Life expectancy L10 at TU max.	42.500 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 ℃	142. 500 h	



view A



Steckergehäuse / plug housing
Molex 43025-0408

Kontakt / contact
Molex 43030-0002 (AWG 22)
Molex 43030-0039 (AWG 18)

Pinbelegung / pin configuration
Pin 1 = schwarz / black (+) (a)
Pin 2 = blau / blue (GND)
Pin 3 = violett / violet (Contrl)
Pin 4 = weiss / white (Tacho)

Axialspiel der Kugellager mit Feder spielfrei verspannt
1.) Maße für Montageausschnitt

- ball bearings without clearance by a pre-loaded spring
1.) measures of mounting cut-out

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