Product Data Sheet | 2218F/17TDHHO-221



2218F/17TDHHO-221

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1 General

Fan type	Fan	
Rotational direction looking at rotor	counterclockwise	
Airflow direction	Air outlet over struts	
Bearing system	Ball bearing	
Mounting position	any	

2 Mechanics

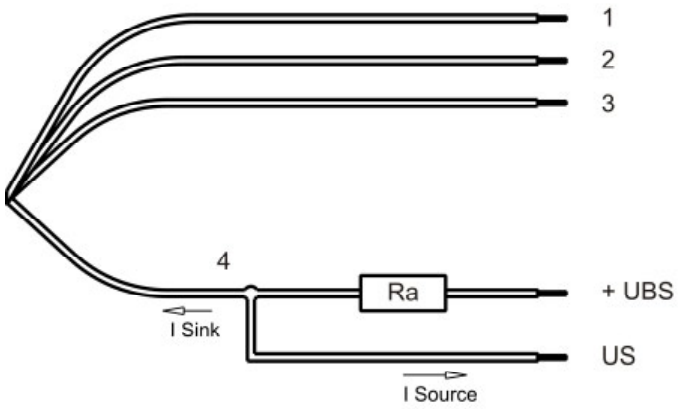
2.1 General

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

2.2 Connections

Electrical connection	Wires - Plug		
Length of lead wire Tolerance	L = 460 mm +- 10 mm		
Wire gauge (AWG)	20	22	
Insulation diameter	2,05 mm	1,70 mm	
Contact	see drawing		





	Colour	Operation
Wire 1	red	+ UB
Wire 2	blue	- GND
Wire 3	violet	CONTR
Wire 4	white	Alarm

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

Lead wire 1 - 2: AWG20 (Insulation diameter 2,05 mm)
Lead wire 3 - 4: AWG22 (Insulation diameter 1,70 mm)

3 Operating Data

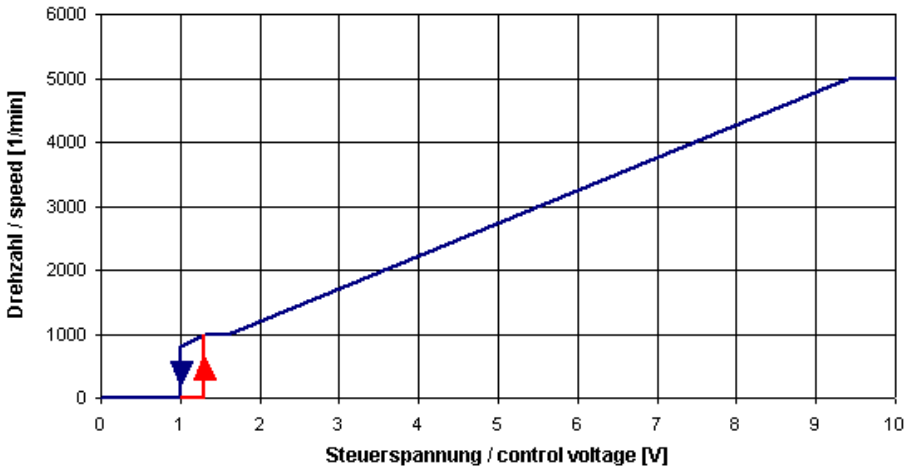
3.1 Operating Data - Electrical Interface - Input

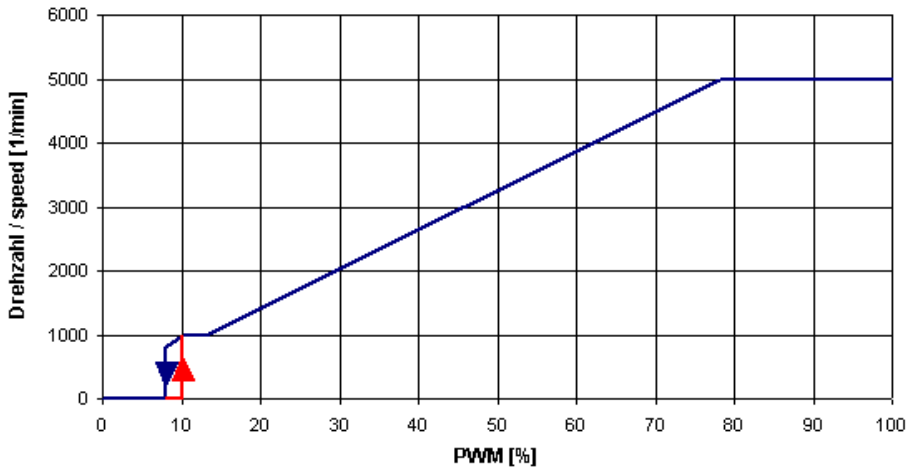
Control input	Analog

Features

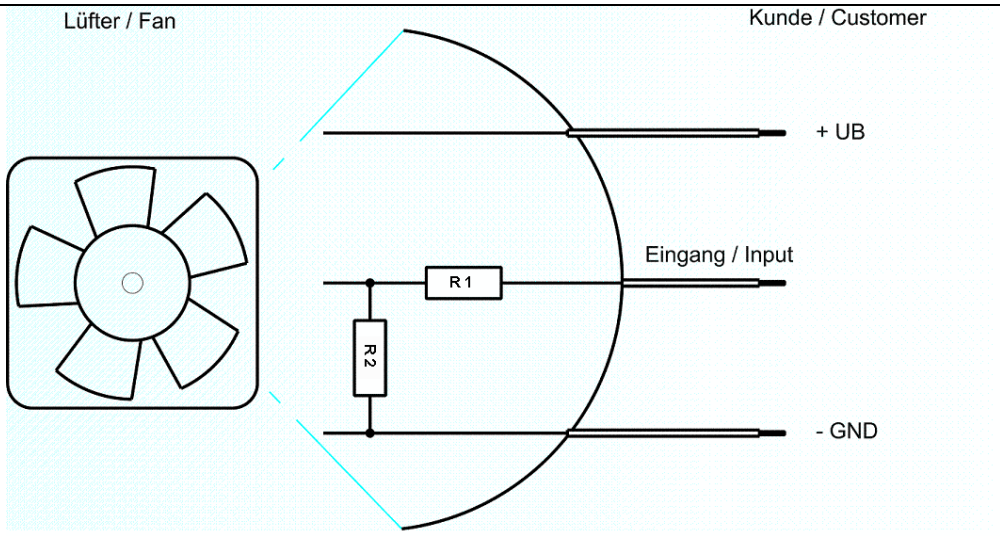
PWM - Frequency		1 kHz - 10 kHz Typical: 2 kHz
Inpute voltage range		0 V - 10 V

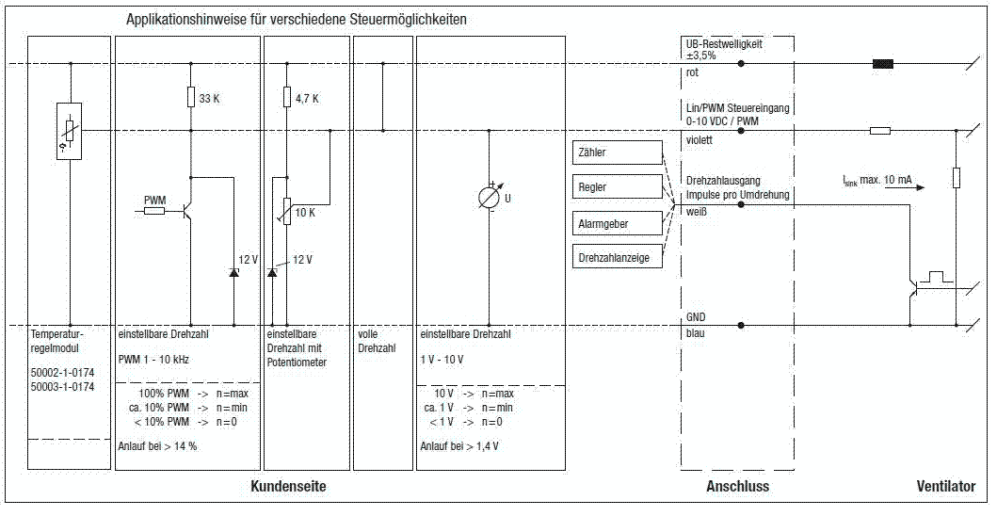
Characteristics





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 resistance 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)

or:

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°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.

$\Delta p = 0$: corresp. to free air flow (see section 3.5)
I: corresp. to arithm. mean current value

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

Features	Condition	Symbol	Values		
Voltage range	$\Delta p = 0$	U	36,0 V		72,0 V
Nominal voltage	$\Delta p = 0$	U_N		48,0 V	
Power consumption Tolerance	$\Delta p = 0$ U Contr. 0001	P	43,0 W +- 12,0 %	50,0 W +- 12,0 %	52,0 W +- 12,0 %
Current consumption Tolerance	$\Delta p = 0$ U Contr. 0001	I	1.200 mA +- 12,0 %	1.040 mA +- 12,0 %	720 mA +- 12,0 %
Speed Tolerance	$\Delta p = 0$ U Contr. 0001	n	4.800 1/min +- 5,0 %	5.000 1/min +- 3,0 %	5.000 1/min +- 3,0 %

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

Built into the fan is an additional under- and overvoltage control, which switches the power stage and the fan off if the following conditions are reached.
At U <= 32 V and / or U >= 80 V is n= 0 1/min

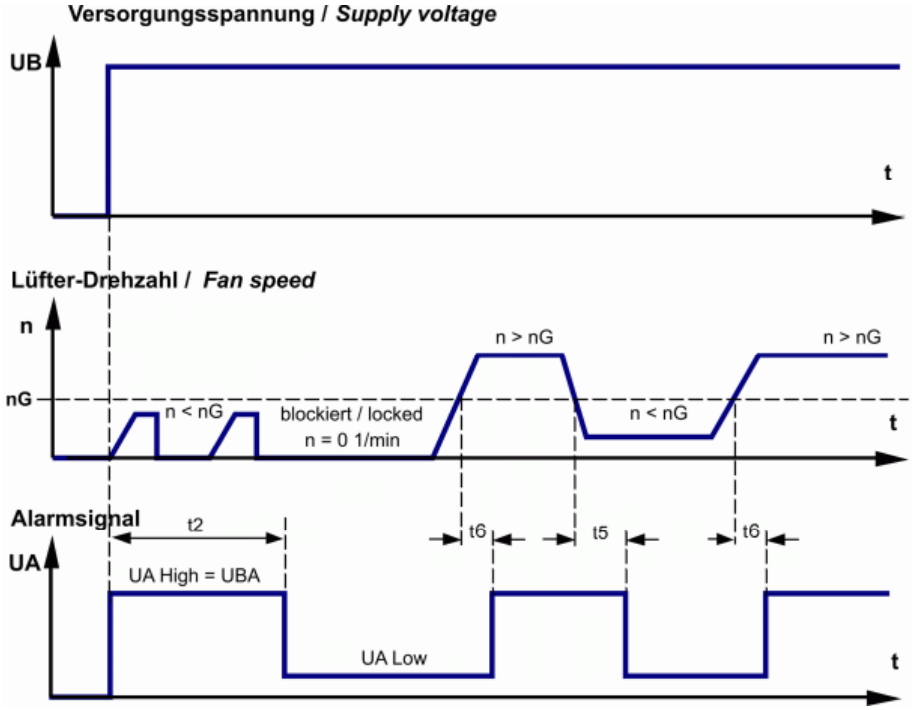
Name	Condition		
U Contr. 0002	U Contr.: 5 V		

Features	Condition	Symbol	Values		
Voltage range	Δp = 0	U	36,0 V		72,0 V
Nominal voltage	Δp = 0	U_N		48,0 V	
Power consumption Tolerance	Δp = 0 U Contr. 0002	P	11,5 W +- 10,0 %	12,0 W +- 12,0 %	13,1 W +- 12,0 %
Current consumption Tolerance	Δp = 0 U Contr. 0002	I	320 mA +- 10,0 %	250 mA +- 12,0 %	180 mA +- 12,0 %
Speed Tolerance	Δp = 0 U Contr. 0002	n	2.850 1/min +- 5,0 %	2.850 1/min +- 5,0 %	2.950 1/min +- 5,0 %

3.3 Operating Data - Electrical Interface -Output

Tacho type	None

Alarm type	/17 (high = ok, Open collector)

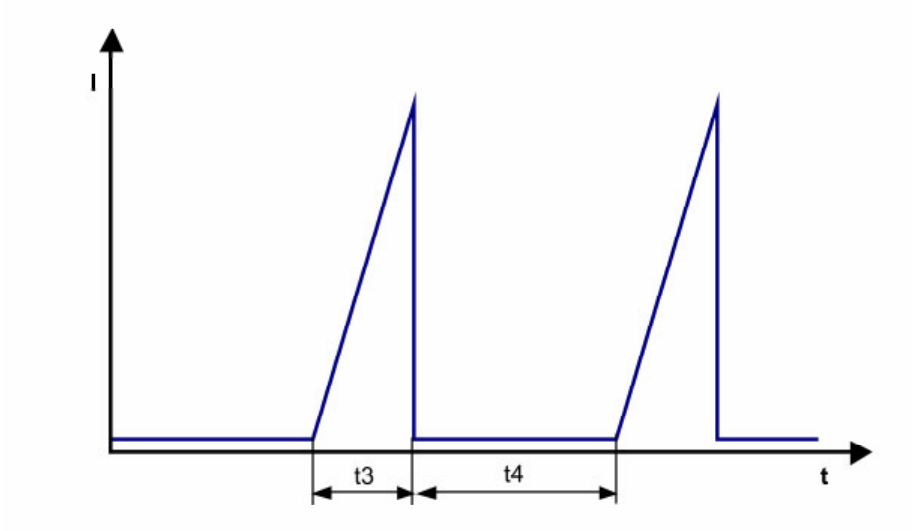


$$Ra = \frac{UBA - UA\ Low}{I\ Sink}$$

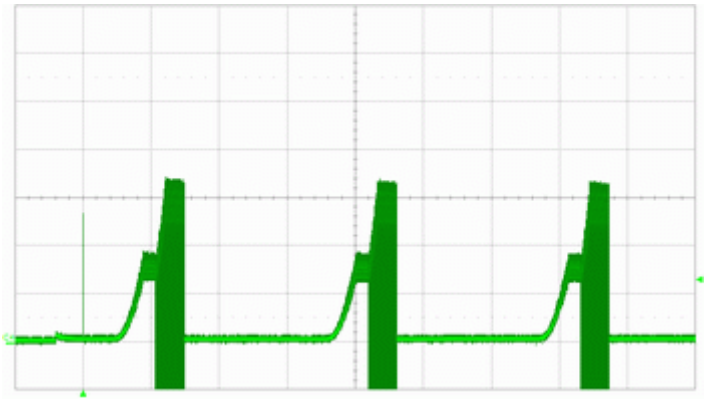
Features	Note	Values
Alarm operating voltage (UBA)		<= 60 V
Alarm signal Low *)	I sink: 2 mA	<= 0,4 V
Alarm signal High *)	I source: 0 mA	60 V
Maximum sink current		20 mA
External resistor	External resistor Ra from UBA to UA required. All voltage measured to GND.	
Alarm start-up delay time (t2)		20 s
Alarm delay time (t5)		5 s
Alarm trip speed limit of the nominal Speed (nG%)		62 %
Alarm at sense failure	No	
Alarm latch	No	
Alarm isolated from motor	No	

3.4 Electrical Features

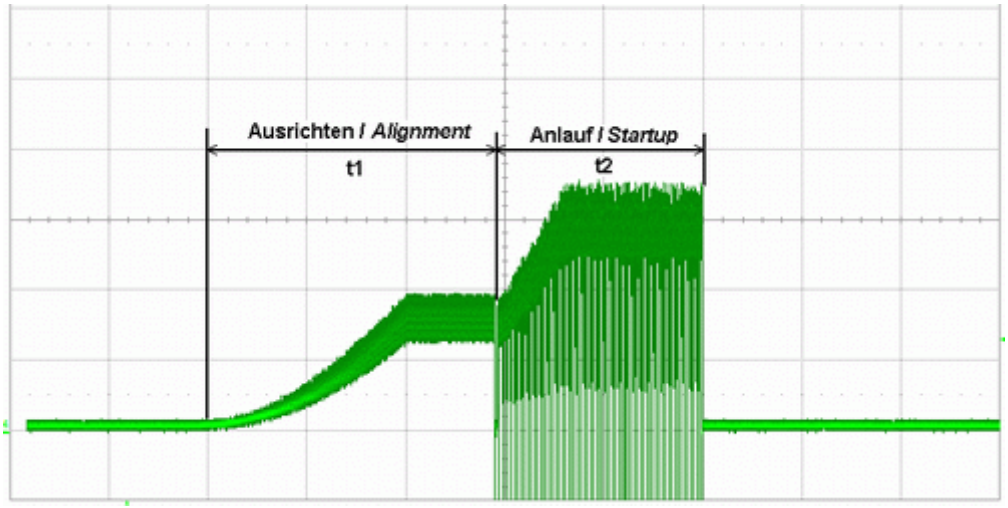
Electronic function	Speed-Controlled	
Reversed polarity protection Max. residual current at Un	P-CH FET IF < 5 mA	
Locked rotor protection	Auto restart	
Locked rotor current at Un	approx. 1.700 mA	
Clock signal t3/t4 at locked rotor	Typical: 5 s / 10 s	



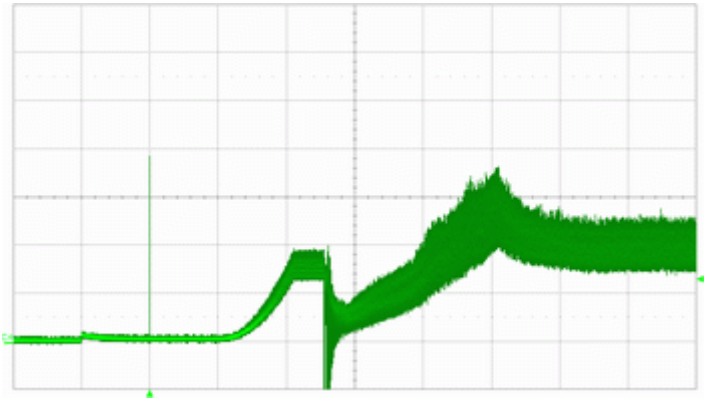
The locked rotor current is measured as peak current at nominal voltage.
Afer 4 unsuccessfull start up trys the fan will be turned off for 40 seconds.



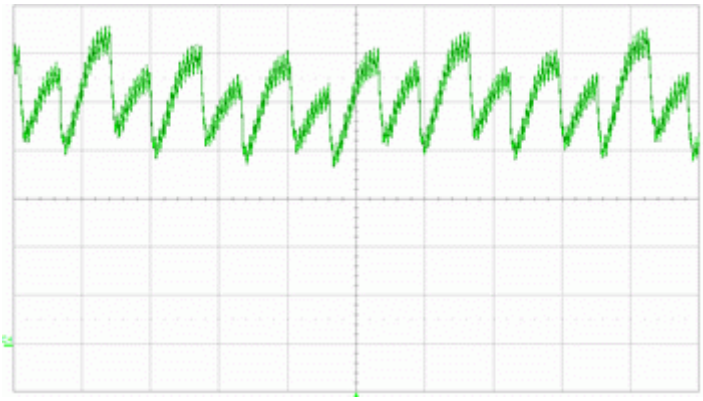
Locked rotor current @ 48 V (I = 500mA/div ; t = 5s/div)



Startup duration t3: The duration of the startup consists of two parts. Alignment of the rotor t1 = 3s and the startup itself t2 = 2s



Start-up current @ 48 V (I = 500mA/div ; t = 2s/div)



Running current @ 48 V (I = 200mA/div ; t = 1ms/div)

Internal Fuse:
Littelfuse NANO2(R) FUSE; Very fast acting 451 Series; 6,3 A (Art.-Nr.: 045106.3RL)

Inrush current limiter:
This fan is equipped with an inrush current limiter to reduce the charging current of the internal capacitor. By this circuit the fan gets a start-up delay of 2 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 6,6 uF.

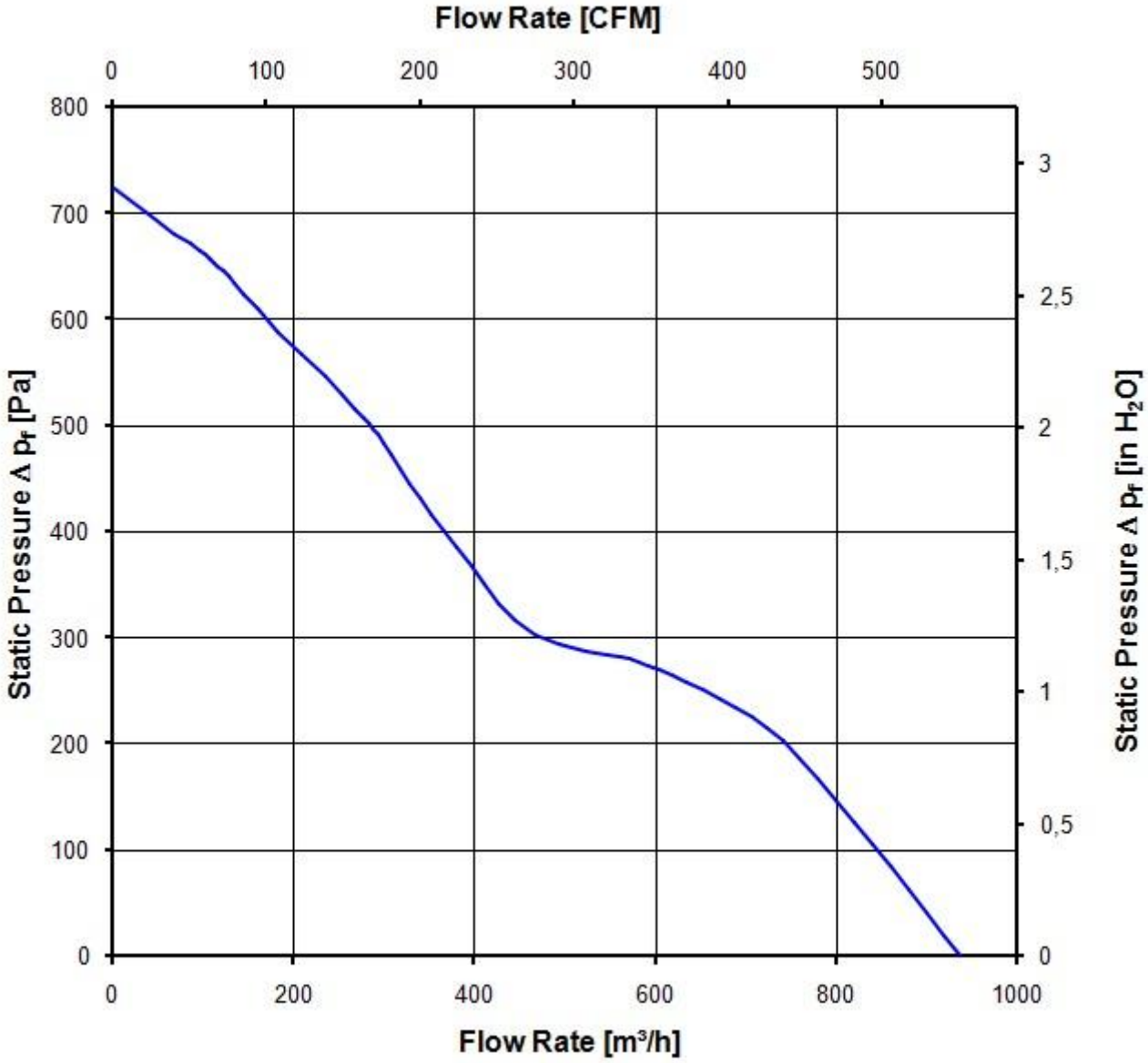
3.5 Aerodynamic

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. 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:

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

Max. free-air flow (Δp = 0 / $\dot{V}$ = max.)	940,0 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 section 3.5

a.) Operation condition:

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

Optimal operating point	910,0 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 °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*)

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

*) Permittet 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.

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.	 1000 VAC / 1 Min. 1000 VAC / 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	I	

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 60950 (VDE 0805) - Information technology equipment
CSA	Canadian Standards Association	Yes / C22.2 No. 113 Fans and Ventilators
CCC	China Compulsory Certification	Yes / GB 12350 Safety Requirements for small Power Motors

6 Reliability

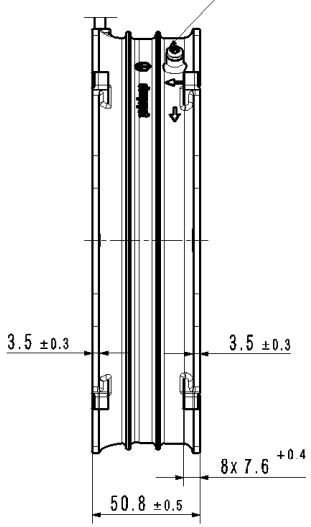
6.1 General

Life expectancy L10 at TU = 40 °C	85.000 h	
Life expectancy L10 at TU max.	42.500 h	
Life expectancy L10 IPC (40 °C)	142.500 h	

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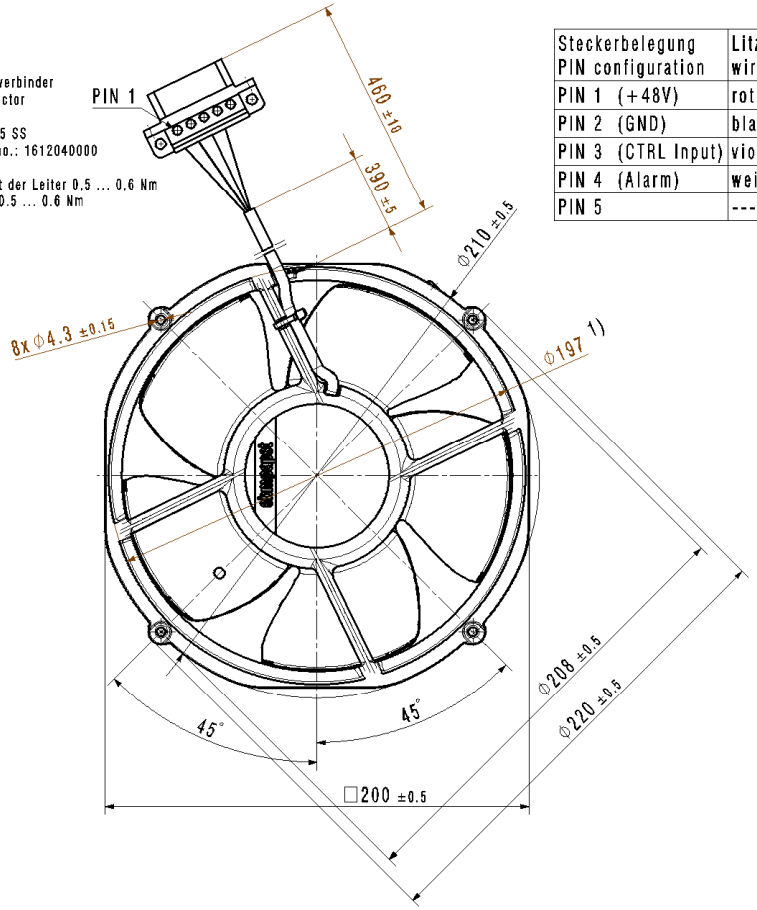
Schutzvermerk nach DIN 34 beachten !
Refer to protection notice DIN 34 !

Schraube: Duo-Taptite DIN7500 CM4x8 Torx
Screw: Duo-Taptite DIN7500 CM4x8 Torx



Leiterplattensteckverbinder
PCB plug-in connector
Weidmüller
Typ / type: STV S 5 SS
Best.-Nr. / order no.: 1612040000

Anzugsdrehmoment der Leiter 0.5 ... 0.6 Nm
tightening torque 0.5 ... 0.6 Nm



Steckerbelegung PIN configuration	Litzenfarbe wire colour
PIN 1 (+48V)	rot / red
PIN 2 (GND)	blau / blue
PIN 3 (CTRL Input)	violett / violet
PIN 4 (Alarm)	weiß / white
PIN 5	---

1) Maße für Montageausschnitt
2) Anzahl und Länge der Litzen sowie Länge des Schlauches siehe Produktspezifikation
3) nur, wenn in Stückliste enthalten

- Axialspiel der Kugellager mit Feder spielfrei gelagert

1) measures of mounting cut out
2) length and number of wires and length of tube see product specification
3) only if included in bill of material

- ball bearing without clearance by a pre-load spring

SAP-Status/State	Aend.-Nr./ Change-No.	CATIA-System-Version/ CATIA-System-Version	CAD-Umgebung/ CAD-Environment	Werkstoff / Material:	Volumen / Volume (mm³):
		9290420221 CPR000-			Gewicht / Mass (g):
		3D-Referenzmodell / 3D-Referencemodel		Artikel / Title:	
Tolerierung / Tolerances:		Datum	Name		
	Bearb./ Drawn				
Allgemeintoleranzen / Gen. Tolerances:	Gepr./ Checked			Zchg.-Nr./ Drawing No:	Ers.f.Zchg. / Replaces:
	Freig./ Release				
ebmpapst ebm-papst St.Georgen GmbH & Co KG				Dokumenttyp / Type of Document	Teildokument (Blatt/Page) / Index / Index / Format / Size: / Maßstab/Scale