Product Data Sheet 9295420228

VWS0184FULDZ

2218F/2TDH5P-228

ebmpapst

The engineer's choice

2218F/2TDH5P-228 (9295420228) ebmpapst Datasheet FansCo sales@fansco.com www.fansco.com

GREEN TECH

2218F/2TDH5P-228

INDEX

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	

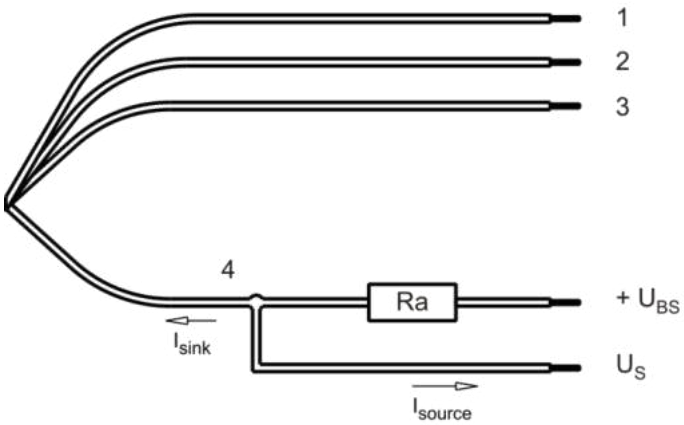
2 Mechanics

2.1 General

Width	200 mm	
Height	200 mm	
Depth	51 mm	
Diameter	220 mm	
Mass	1,06 kg	
Housing material	Metal	
Impeller material	Plastic	
Rotor protrusion max.	2,2 mm	

2.2 Connections

Electrical connection	Wires - Plug	
Lead wire length Tolerance	L = 755 mm +- 10 mm	
Tube length Tolerance	S = 10 mm +- 2,0 mm	
Plug	See drawing	
Contact	See drawing	



Wire	Color	Operation	Plug connection	Wire size	Insulation diameter
1	red	+ UB	Pin 4	AWG 18	2,2 mm
2	blue	- GND	Pin 1	AWG 18	2,2 mm
3	violet	PWM	Pin 2	AWG 20	2,05 mm
4	white	Tacho	Pin 3	AWG 20	2,05 mm

3 Operating Data

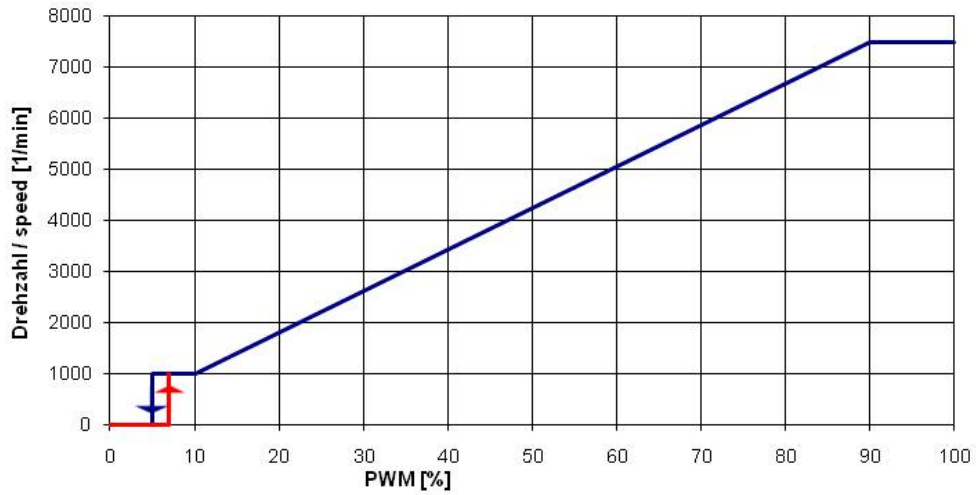
3.1 Electrical Interface - Input

Control input	PWM

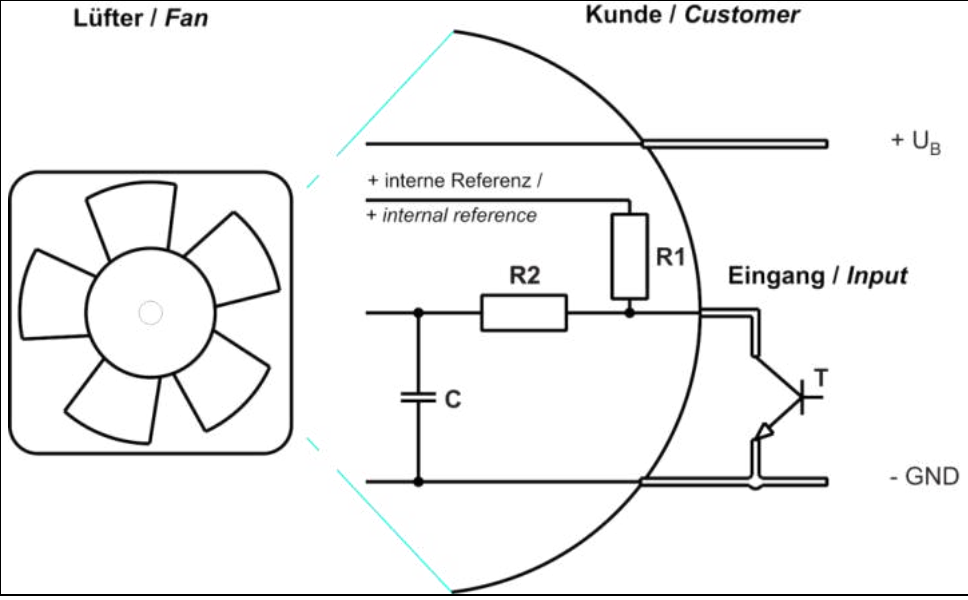
Features

Inpute type	Open collector	
PWM - Frequency		1 kHz - 10 kHz typical: 2 kHz

Characteristics



Schematics



The shown pull-up resistor R1 to the internal reference voltage (+5V) has 4.7kOhm.

Transistor requirements:
Vce max. >= 12V; Isink max. >=5mA; Vce sat. <= 0,15V

Speed control:
By pulse width modulation (PWM) 0...100%
Open collector in relation to signal-ground.

Information to the curve:
0 % - <7% PWM: 0 1/min
7 % PWM: 1.000 1/min (Fan on, comming from 0% PWM)
7 % - 10% PWM: 1.000 1/min (corresponding to min. speed)
10 % - 90% PWM: linear increasing curve
90 % - 100% PWM: 7.500 1/min (corresponding to max. speed)
7 % - >5 % PWM: linear decreasing curve (comming from 100% PWM)
5 % PWM: 800 1/min or 0 1/min (Fan off, comming from 100% PWM)

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.

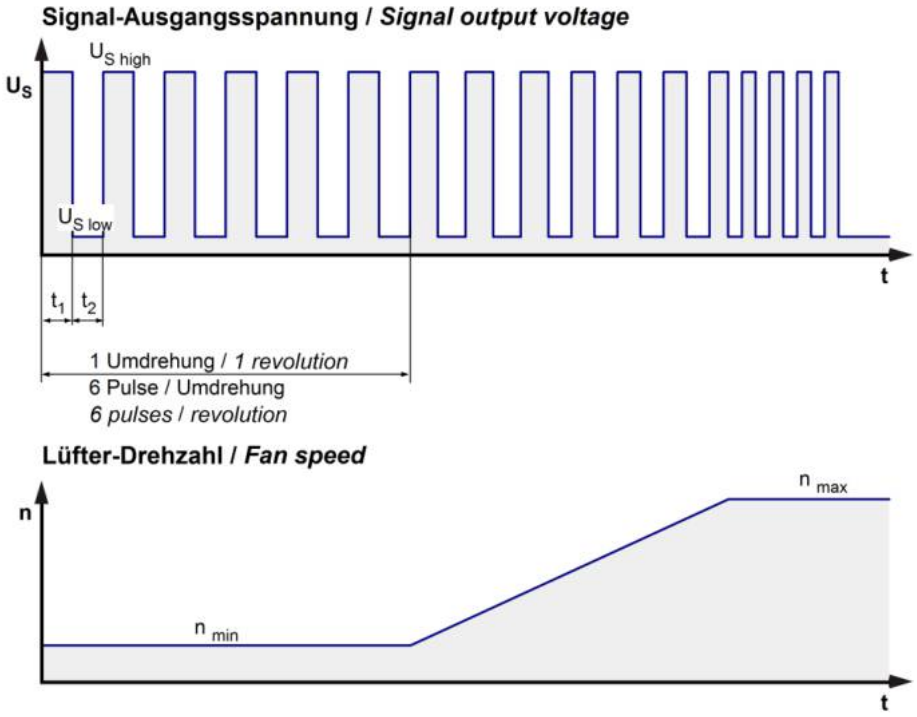
$\Delta p = 0$: corresp. to free air flow (see chapter aerodynamics)
I: corresp. to arithm. mean current value

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

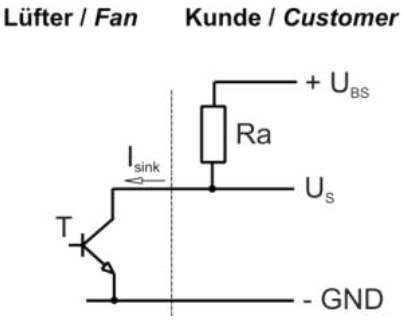
Features	Condition	Symbol	Values		
Voltage range		U	52 V		56 V
Nominal voltage		U_N		54 V	
Power consumption Tolerance	$\Delta p = 0$ PWM 0010	P	158 W +- 12 %	162 W +- 10 %	160 W +- 10 %
Current consumption Tolerance	$\Delta p = 0$ PWM 0010	I	3.000 mA +- 10 %	3.000 mA +- 10 %	2.900 mA +- 10 %
Speed Tolerance	$\Delta p = 0$ PWM 0010	n	7.500 1/min +- 5 %	7.500 1/min +- 3 %	7.500 1/min +- 3 %
Starting current consumption				<= 3.500 mA	

3.3 Electrical Interface - Output

Tacho type	/2 (open collector)



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



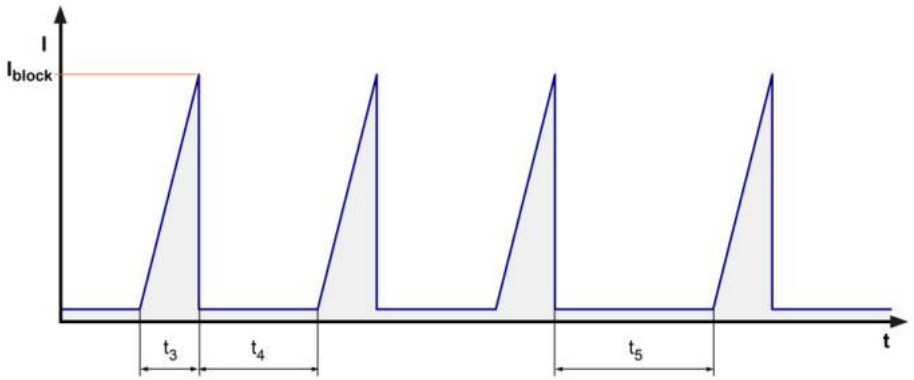
Features		Note	Values
Tacho operating voltage	U_{BS}		<= 60 V
Tacho signal Low	$U_{S\,low}$	I sink: 2 mA	<=0,4 V
Tacho signal High	$U_{S\,high}$	I source: 0 mA	<=60 V
Maximum sink current	I_{sink}		<= 20 mA
External resistor		External resistor Ra from UBS to US required. All voltages measured to GND.	
Tacho frequency		(6 x n) / 60	750 Hz @ 7.500 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	None	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	I_{block} approx. 2.500 mA	
Clock signal at locked rotor Extended Downtime	t_3 / t_4 typical: 3,0 s / 10,0 s t_5: 40 s after 4 start-up tests	
Internal fuse	Littelfuse NANO2 > Very Fast-Acting > 451/453 Series 12A / 75V (Art.No.: 0451012.MRL)	
Voltage control *)	Fan turns on at U_B > 34 V or < 78 V Fan turns off at U_B < 32 V or > 80 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 Data According ErP Directive

Installation / Efficency category	A / static
Speed control	integrated
Specific ratio	1,00463
Target overall efficiency 2015	30,2 %
Overall efficiency	50,0 %
Efficiency grade	40
Power input	278 W
Speed	7.540 1/min

All values measured in optimum energy efficiency point.

Productiondatecode is printed on the fan label.

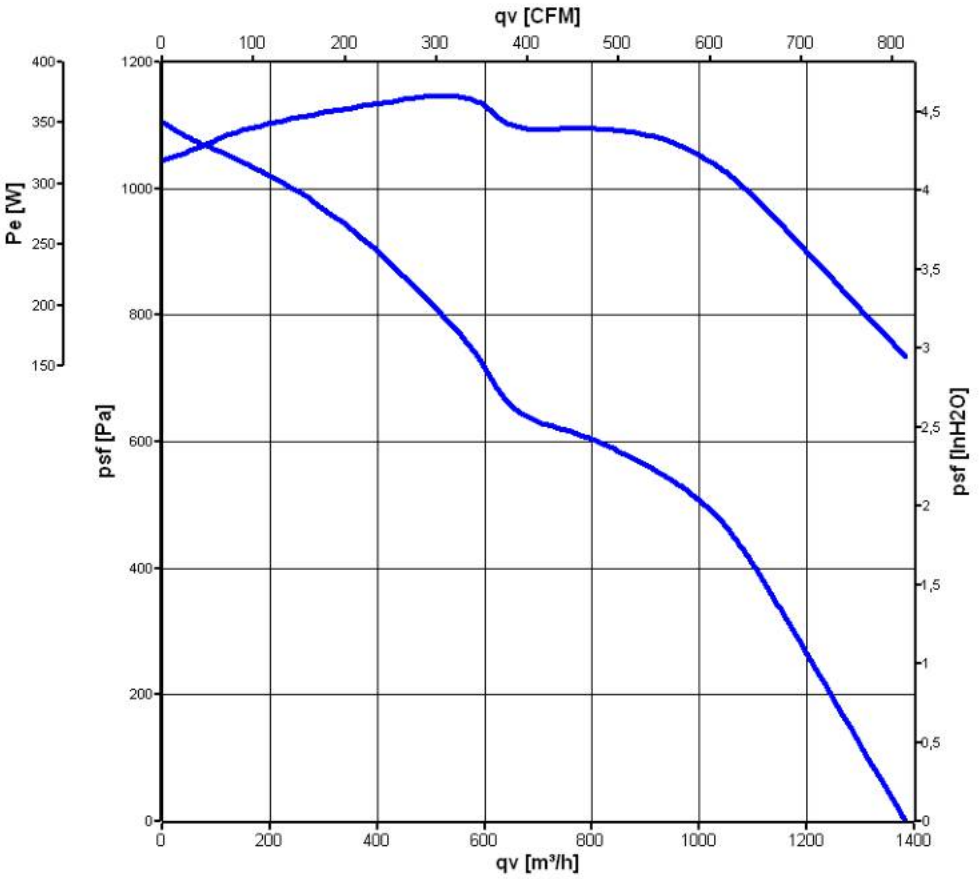
3.6 Aerodynamics

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:

7.500 1/min at free air flow	PWM 100 %; f: 2 kHz		

Max. free-air flow (Δp = 0 / $\dot{V}$ = max.)	1.383 m3/h	
Max. static pressure (Δp = max. / $\dot{V}$ =0)	1.100 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 semianchoic chamber with a background noise level of Lp(A) < 5 dB(A) For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

7.500 1/min at free air flow	PWM 100 %; f: 2 kHz		

Optimal operating point	1.125 m3/h @ 334 Pa	
Sound power level at the optimal operating point	8,6 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	75 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	

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.

4.3 Mechanical Requirements

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

Note according EMI:

Class A is in some sectors not fulfilled.

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. 1700 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	I	

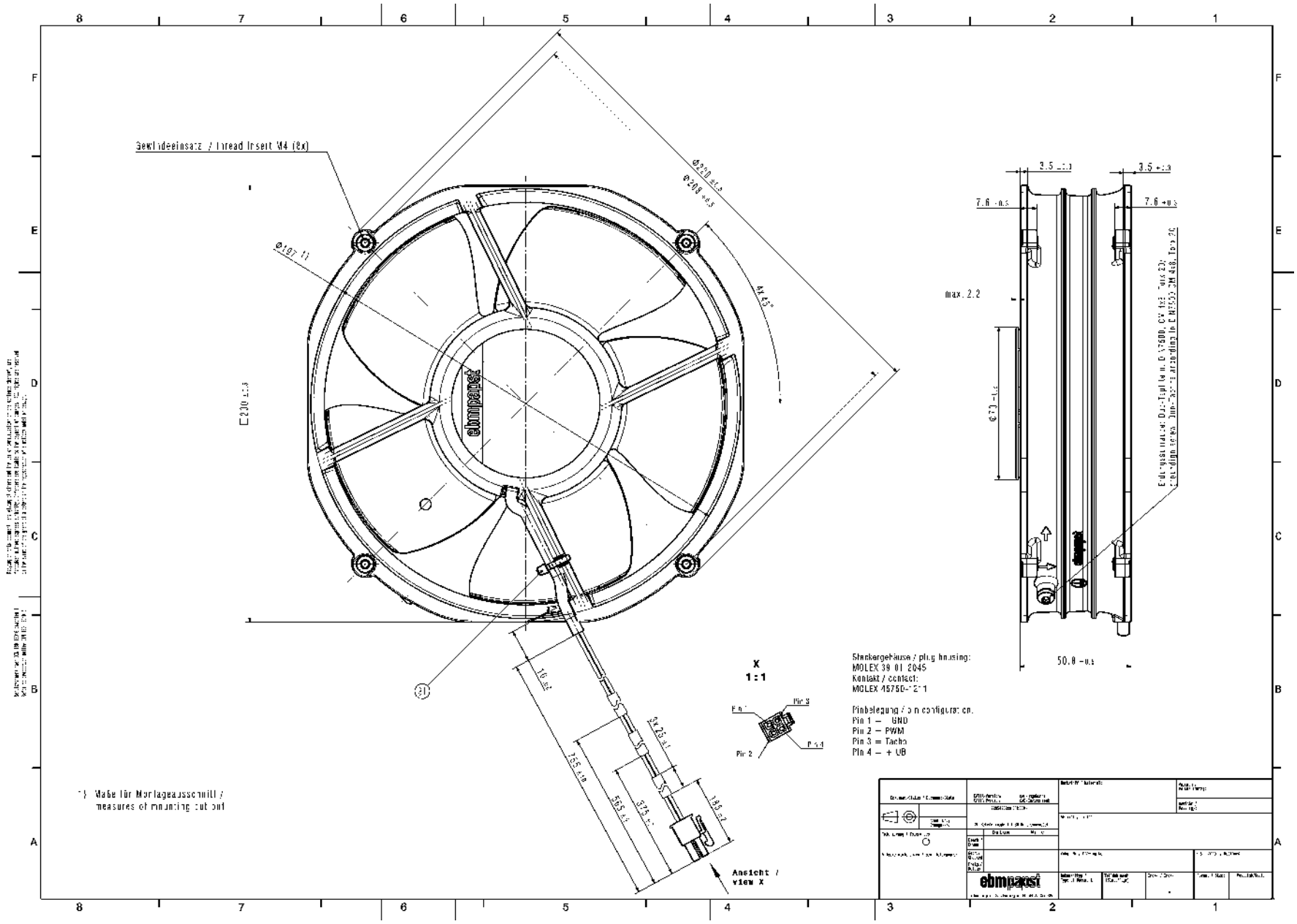
5.2 Approval Tests

CE	EC Declaration of Conformity	No
EAC	Eurasian Conformity	Yes
UL	Underwriters Laboratories	Yes / UL507, Electric Fans E38324
VDE	Association for Electrical, Electronic and Information Technologies	No
CSA	Canadian Standards Association	Yes / CSA audited by UL according to 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	60.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	102.500 h	


Gewindeeinsatz / thread insert M4 (8x)
Ø210 ±0.3
Ø208 ±0.5
Ø197.11
45°
□230 ±0.3
ebmpapst
3.5 +0.3
3.5 +0.3
7.6 -0.5
7.6 +0.5
max. 2.2
50.8 -0.5
Steckergehäuse / plug housing:
MOLEX 39 01 2045
Kontakt / contact:
MOLEX 45750-2211
Pinbelegung / pin configuration:
Pin 1 = GND
Pin 2 = PWM
Pin 3 = Tacho
Pin 4 = + VB
X
1:1
Pin 3
Pin 2
Pin 4
Ansicht / view X
*) Maße für Montageausschnitt / measures of mounting cut out
ebmpapst