



The engineer's choice

**ebmpapst**

6224 N/2P-208

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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	

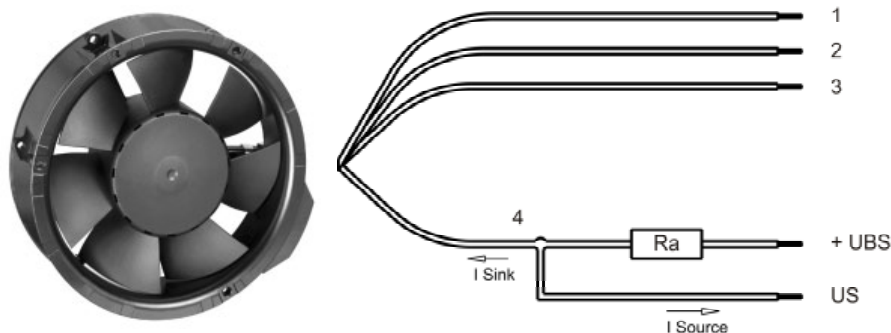
## 2 Mechanics

### 2.1 General

Depth	51,0 mm	
Diameter	172,0 mm	
Weight	0,780 kg	
Housing material	Metal	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	wire outlet corner: 600 Ncm remaining corners: 600 Ncm	
Screw size	ISO 4762 - M4 degreased, without an additional brace and without washer	

### 2.2 Connections

Electrical connection	Wires - Plug	
Length of lead wire		
Tolerance		
Wire gauge (AWG)	22	
Insulation diameter	1,70 mm	
Contact	see drawing	



Wire	Colour	Operation
Wire 1	red	+ UB
Wire 2	blue	- GND
Wire 3	violet	PWM
Wire 4	white	Tacho

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

### 3 Operating Data

#### 3.1 Operating Data - Electrical Interface - Input

Control input	PWM
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#### Features

Inpute type	Open collector
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<b>Characteristics</b>	
<b>Schematics</b>	

**Note:**

Speeds adjusted by decreasing set point.

**Speed control:**

0... 100% PWM; f: 2 kHz; open collector

Alternatively: Resistor to GND (33 mW) 0... ∞ kOhm

or

Alternatively: Control voltage 0... 5 V (Condition 2 mA sink < 0,15 V) Attention internal pull up 4k7 at 5 V (Vcc)

**Transistor requirements:**

V CE sat < 0,15 V; V CE max. 12 V; I sink max. 5 mA

### 3.2 Electrical Operating Data

Measurement conditions: Normal air density = 1,2 kg/m<sup>3</sup>; 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
PWM 0001	PWM: 100 %; f: 2 kHz

Features	Condition	Symbol	Values		
Voltage range	$\Delta p = 0$	U	12,0 V		32,0 V
Nominal voltage	$\Delta p = 0$	$U_N$		24,0 V	
Power consumption	$\Delta p = 0$	P	4,0 W	11,3 W	12,2 W
Tolerance	PWM 0001		+/- 17,5 %	+/- 12,5 %	+/- 15,0 %
Current consumption	$\Delta p = 0$	I	335 mA	470 mA	380 mA
Tolerance	PWM 0001		+/- 17,5 %	+/- 12,5 %	+/- 15,0 %
Speed	$\Delta p = 0$	n	1.850 1/min	2.850 1/min	2.850 1/min
Tolerance	PWM 0001		+/- 12,5 %	+/- 7,5 %	+/- 10,0 %
Inrush current				7.000 mA	

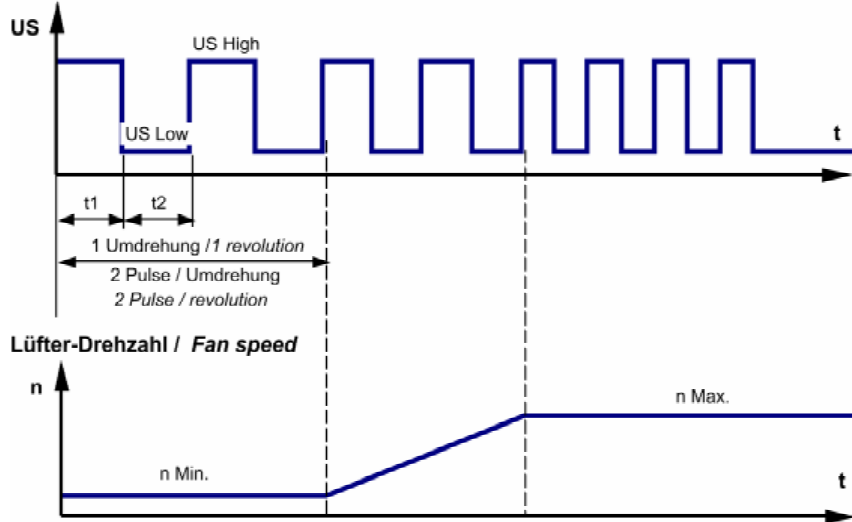
Name	Condition
PWM 0002	PWM: 50 %; f: 2 kHz

Features	Condition	Symbol	Values		
Voltage range	$\Delta p = 0$	U	12,0 V		32,0 V
Nominal voltage	$\Delta p = 0$	$U_N$		24,0 V	
Power consumption	$\Delta p = 0$	P	2,8 W	3,25 W	3,8 W
Tolerance	PWM 0002		+/- 17,5 %	+/- 12,5 %	+/- 15,0 %
Current consumption	$\Delta p = 0$	I	230 mA	135 mA	120 mA
Tolerance	PWM 0002		+/- 17,5 %	+/- 12,5 %	+/- 15,0 %
Speed	$\Delta p = 0$	n	1.490 1/min	1.500 1/min	1.510 1/min
Tolerance	PWM 0002		+/- 12,5 %	+/- 7,5 %	+/- 10,0 %

3.3 Operating Data - Electrical Interface -Output

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



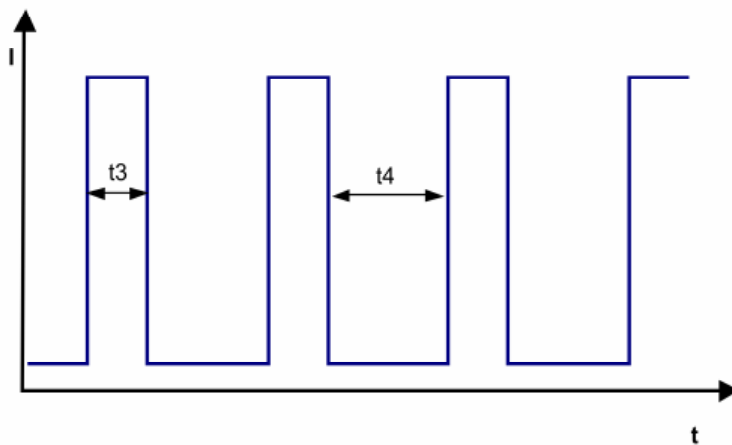
$$R_a = \frac{U_{BS} - U_{S\ Low}}{I_{Sink}}$$

Features	Note	Values
Tacho operating voltage (UBS)		<= Max.: 32 V
Tacho signal Low	I sink: 2 mA	<= 0,4 V
Tacho signal High	I source: 0 mA	
Maximum sink current		<= 20 mA
External resistor	External resistor Ra from UBS to US required. All voltages measured to GND.	
Tacho frequency	(2 x n) / 60	
Tacho isolated from motor	No	
Slew rate		=> 0,5 V/us

Alarm type	None
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### 3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	Rectifying diode	
Max. residual current at $U_n$	$I_F \leq 10 \text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at $U_n$	approx. 2.000 mA	
Clock signal $t_3/t_4$ at locked rotor	Typical: 0,5 s / 5 s	



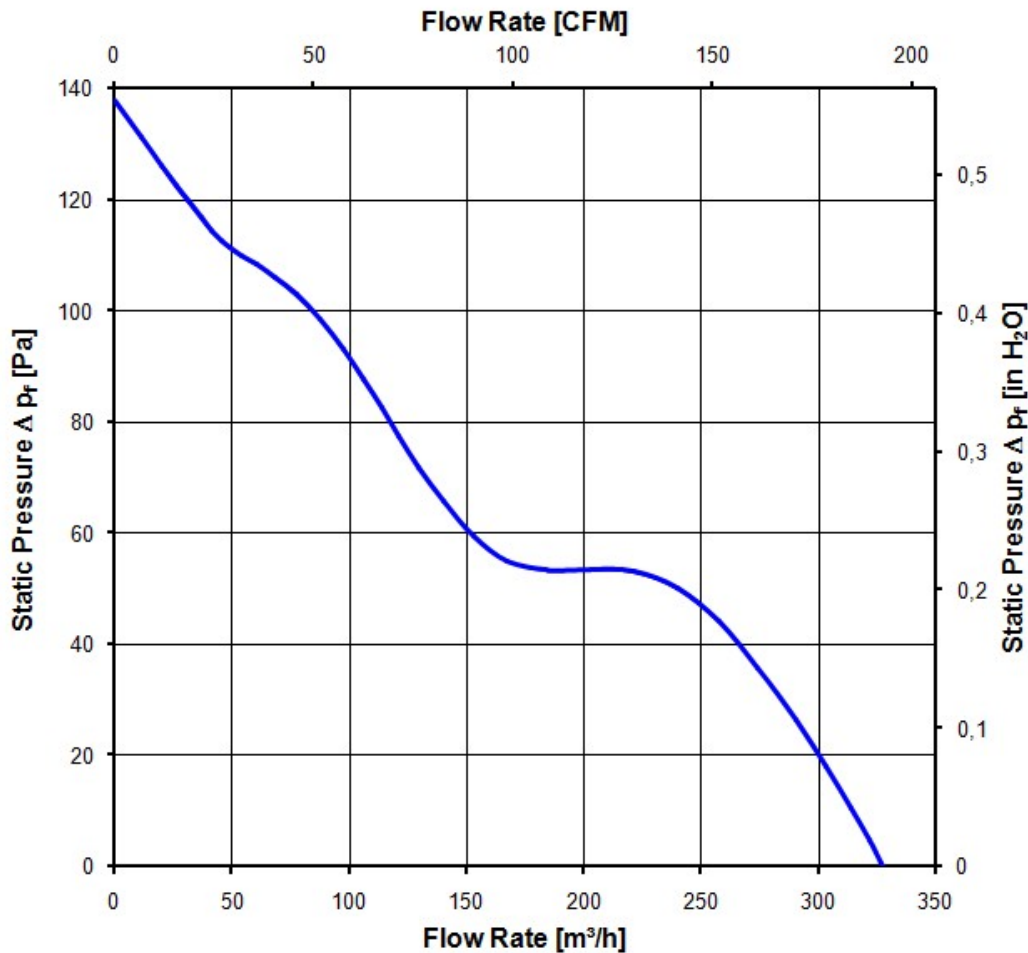
**3.5 Aerodynamic**

Measurement conditions: Measured with a double chamber intake rig acc. to DIN EN ISO 5801.  
 Normal air density = 1,2 kg/m<sup>3</sup>; 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:

2.850 1/min at free air flow	PWM 100 %; f: 2 kHz		
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Max. free-air flow ( $\Delta p = 0 / \dot{V} = \text{max.}$ )	330,0 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \text{max.} / \dot{V} = 0$ )	138 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  $L_p(A) < 5 \text{ dB(A)}$   
 For further measurement conditions see section 3.5

a.) Operation condition:

2.850 1/min at free air flow	PWM 100 %; f: 2 kHz	PWM min.:	PWM max.:
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Optimal operating point	245,0 m3/h @ 54 Pa	
Sound power level at the optimal operating point	5,7 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	50,0 dB(A)	

## 4 Environment

### 4.1 General

Min. permitted ambient temperature TU min.	-20 °C	
Max. permitted ambient temperature TU max.	72 °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. Please require severity levels and specification parameters from the responsible development departments

## 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.	500 VAC / 1 Min.	
B.) Routine test Measuring conditions: At indoor climate. No arcing or breakdown is allowed! All connections together to ground.	500 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 / 1,2 mm	
Protection class	III	

### 5.2 Approval Tests

CE	Yes
UL	Yes / UL507, Electric Fans
VDE	Yes / Approval acc. to EN 60950 (VDE 0805) - Information technology equipment
CSA	Yes / C22.2 No. 113 Fans and Ventilators
CCC	No

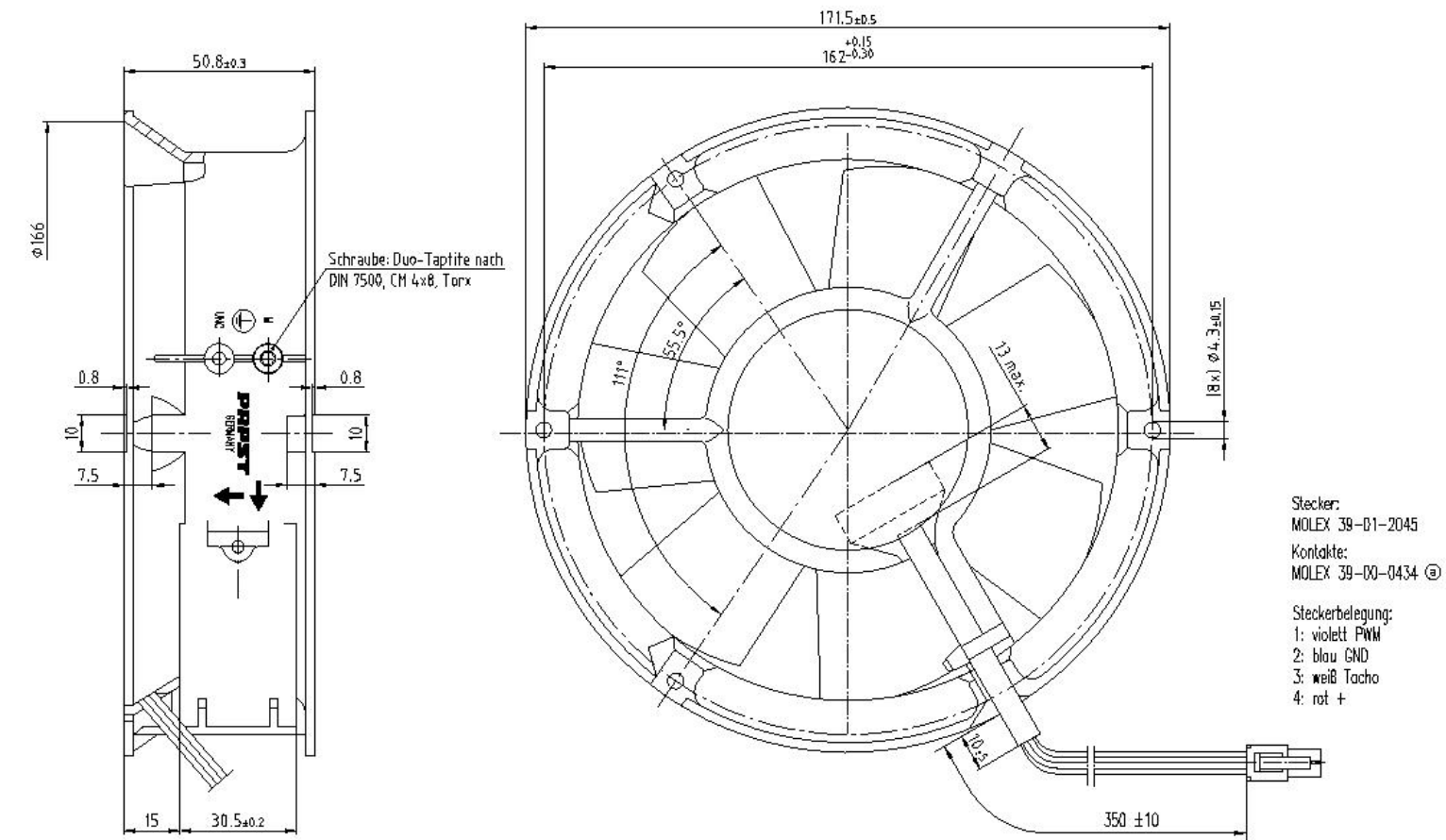
## 6 Reliability

### 6.1 General

Life expectancy L10 at TU = 40 °C	80.000 h	
Life expectancy L10 at TU max.	37.500 h	
Life expectancy L10 Delta (40 °C)	157.500 h	

Copies of this document, and parts of it, may be used for the construction of the machine, provided that the user is not liable for any damage or injury resulting from the use of the machine.


Schrittmotor nach DIN ISO 10101 (M16) bezugslos



Stecker:  
 MOLEX 39-01-2045  
 Kontakte:  
 MOLEX 39-00-0434 ②  
 Steckerbelegung:  
 1: violett PWM  
 2: blau GND  
 3: weiß Tacho  
 4: rot +

Anzahl und Länge der Litzen siehe Bv-BL.1

Axialspiel: mit Feder spielfrei verspannt

Tolerierung: DIN 7167 Allgemeintoleranzen: DIN ISO 2768-mK-E		Artikel: _____ Maßstab: _____								
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