



The engineer's choice

**ebmpapst**

8412 N/2GHP

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**1 General**

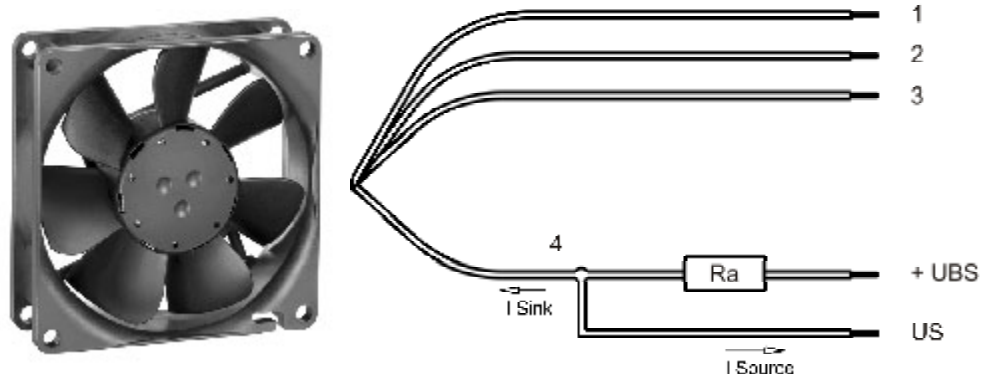
Fan type	Fan	
Rotational direction looking at rotor	counterclockwise	
Airflow direction	Air outlet over struts	
Bearing system	Sleeve bearing	
Mounting position	any	

**2 Mechanics****2.1 General**

Width	80,0 mm	
Height	80,0 mm	
Depth	25,4 mm	
Weight	0,095 kg	
Housing material	Plastic	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	wire outlet corner: 50 Ncm remaining corners: 70 Ncm	
Screw size	ISO 4762 - M4 degreased, without an additional brace and without washer	

**2.2 Connections**

Electrical connection	Wires	
Length of lead wire	L = 310 mm	
Tolerance	+/- 10,0 mm	
Wire gauge (AWG)	26	
Insulation diameter	1,35 mm	
Contact	see drawing	



	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.

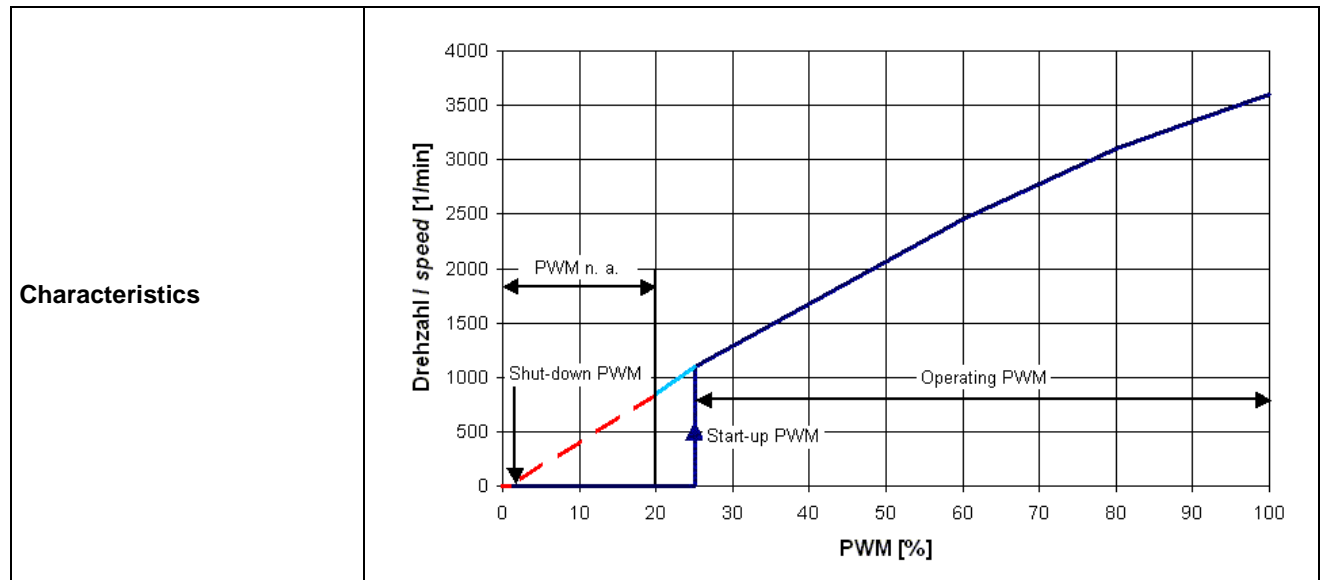
### 3 Operating Data

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

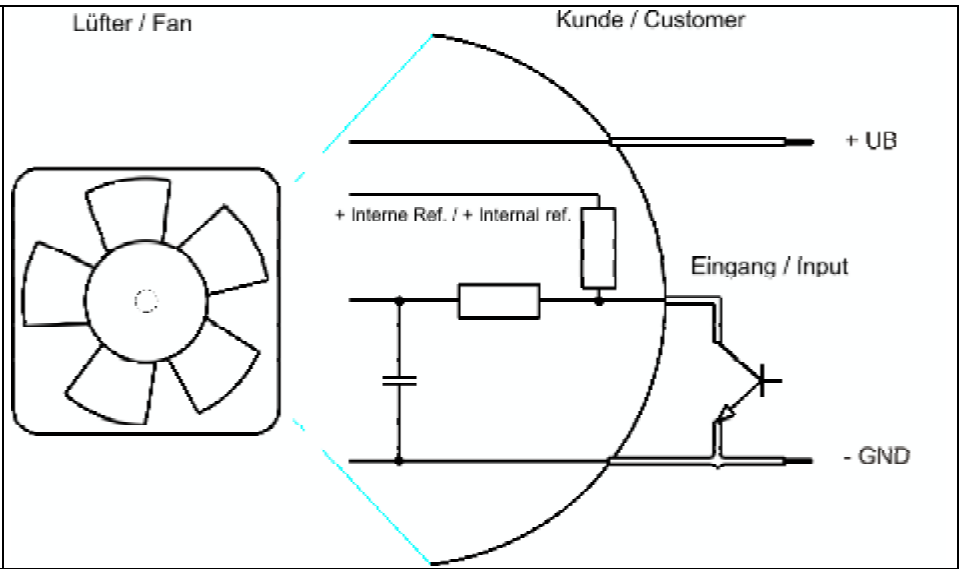
Control input	PWM
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#### Features

Input type	Open collector / TTL	
PWM - Frequency		21 kHz - 28 kHz Typical: 25 kHz
Max. voltage for logic "Low"		0,8 V
Max. voltage for logic "High"	Open circuit voltage	5,25 V
Maximum source current	short circuit current	$\leq 5$ mA
4 wire startup condition	PWM duty cycle	$> 25$ %
4 wire operation condition after startup	PWM duty cycle	20 % - 100 %
Shutdown condition	PWM duty cycle	$< 1$ %
Typical time until warm restart	After shutdown by PWM	$\sim 1,2$ s



Schematics



### 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: 25 kHz

Features	Condition	Symbol	Values		
Voltage range	$\Delta p = 0$	U	10,8 V		13,2 V
Nominal voltage	$\Delta p = 0$	$U_N$		12,0 V	
Power consumption	$\Delta p = 0$	P	2,4 W +/- 17,5 %	3,0 W +/- 12,5 %	3,7 W +/- 15,0 %
Tolerance	PWM 0001				
Current consumption	$\Delta p = 0$	I	220 mA +/- 17,5 %	250 mA +/- 12,5 %	280 mA +/- 15,0 %
Tolerance	PWM 0001				
Speed	$\Delta p = 0$	n	3.350 1/min +/- 12,5 %	3.600 1/min +/- 7,5 %	3.900 1/min +/- 10,0 %
Tolerance	PWM 0001				
Starting current consumption				335 mA	

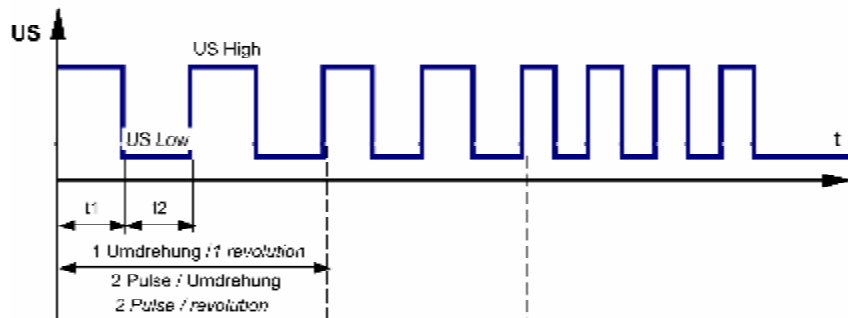
Name	Condition
PWM 0002	PWM: 50 %; f: 25 kHz

Features	Condition	Symbol	Values		
Voltage range	$\Delta p = 0$	U	10,8 V		13,2 V
Nominal voltage	$\Delta p = 0$	$U_N$		12,0 V	
Power consumption	$\Delta p = 0$	P	0,7 W	0,9 W	1,1 W
Tolerance	PWM 0002		+/- 17,5 %	+/- 15,0 %	+/- 15,0 %
Current consumption	$\Delta p = 0$	I	65 mA	75 mA	80 mA
Tolerance	PWM 0002		+/- 17,5 %	+/- 15,0 %	+/- 15,0 %
Speed	$\Delta p = 0$	n	1.750 1/min	1.950 1/min	2.200 1/min
Tolerance	PWM 0002		+/- 12,5 %	+/- 10,0 %	+/- 10,0 %

### 3.3 Operating Data - Electrical Interface -Output

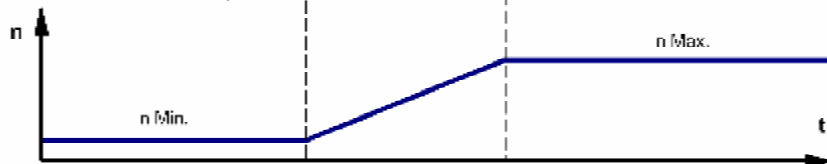
Tacho type	/2 (Open collector)
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Signal-Ausgangsspannung / Signal output voltage



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

Lüfter-Drehzahl / Fan speed





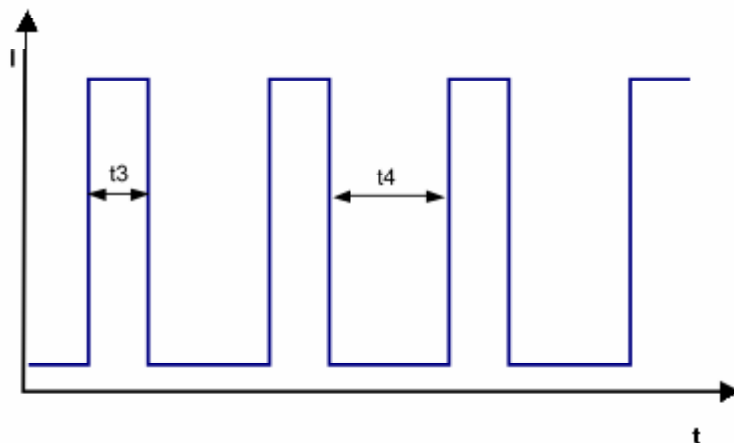
Features	Note	Values
Tacho operating voltage (UBS)		$\leq 28\text{ V}$
Tacho signal Low	I sink: 2 mA	$\leq 0,4\text{ V}$
Tacho signal High	I source: 0 mA	28 V
Maximum sink current		$\leq 4\text{ mA}$
External resistor	External resistor $R_a$ from UBS to US required. All voltages measured to GND.	
Tacho frequency	$(2 \times n) / 60$	120 Hz
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\text{ V/us}$

Alarm type	None
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### 3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	Rectifying diode	
Max. residual current at $U_n$	$I_F \leq 8\text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at $U_n$	approx. 335 mA	
Clock signal $t_3/t_4$ at locked rotor	Typical: 0,27 s / 1,2 s $t_3$ : 0,11 s... 0,67 s $t_4$ : 0,41 s... 3,8 s	



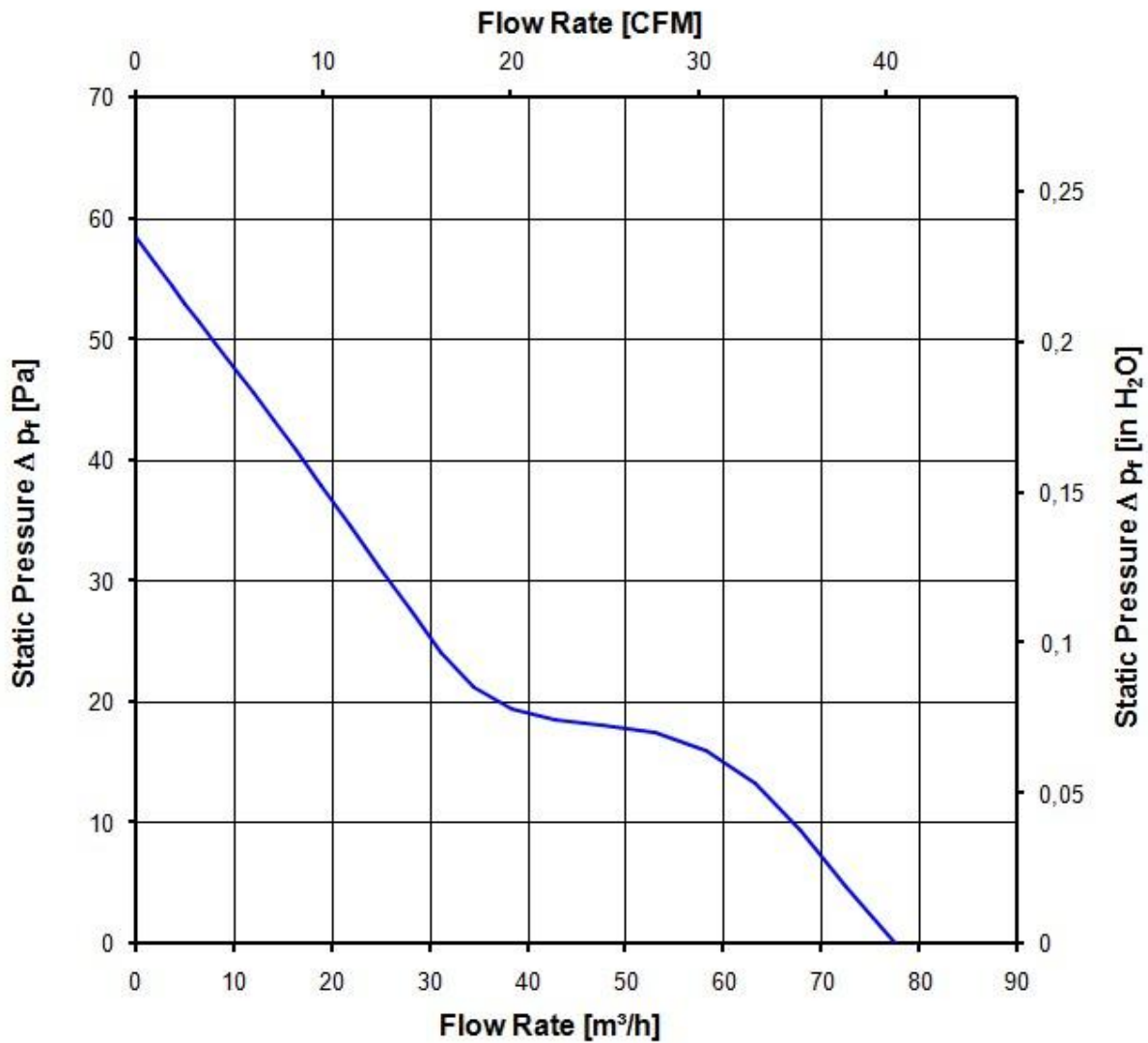
**3.5 Aerodynamic**

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.

a.) Operation condition:

3.600 1/min at free air flow	PWM 100 %; f: 25 kHz		
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Max. free-air flow ( $\Delta p = 0 / \dot{V} = \text{max.}$ )	78,0 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \text{max.} / \dot{V} = 0$ )	58 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:

3.600 1/min at free air flow	PWM 100 %; f: 25 kHz	PWM min.:	PWM max.:
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Optimal operating point	64,0 m <sup>3</sup> /h @ 14 Pa	
Sound power level at the optimal operating point	5,0 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	37,0 dB(A)	

## 4 Environment

### 4.1 General

Min. permitted ambient temperature TU min.	0 °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	
Radiation exposure	None	
Dust requirements	None	
Salt fog requirements	None	
Harmful gas 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. B.) Routine test Measuring conditions: At indoor climate. No arcing or breakdown is allowed! All connections together to ground.	Not applicable  Not applicable	
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	
Air and leakage distances	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	No
CCC	No

The approval tests are observed to:

Maximal permitted operating voltage (see section 3.1) and max. permitted ambient temperature TU max.

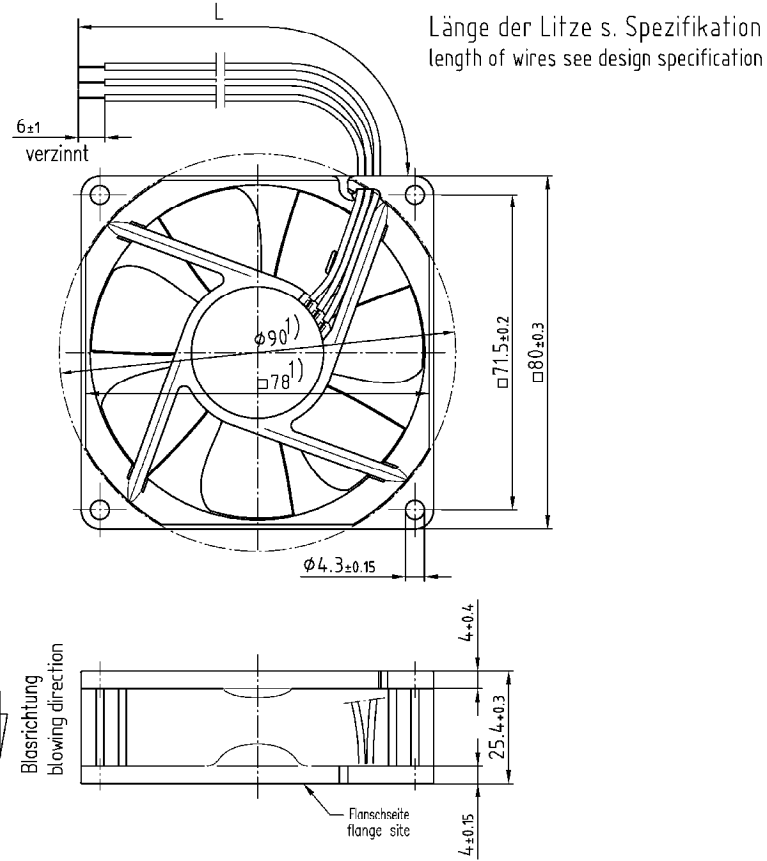
## 6 Reliability

### 6.1 General

Life expectancy L10 at TU = 40 °C	70.000 h	
Life expectancy L10 at TU max.	35.000 h	
Life expectancy L10 Delta (40 °C)	140.000 h	

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- 1) Maße für Montagewand
- Axialspiel bei
- Kugellagerung (K): 0 (mit Federausgleich)
  - Gleitlagerung (G): 0.1 - 0.9

- 1) dimensions for assembly wall
- axial clearance by
- ball bearing (K): 0 (with spring compensation)
  - sleeve bearing (G): 0.1 - 0.9

SAP-Status/State	Artid.-Nr./Change-No.	AutoCAD-System-Version	ebmpapst	Werkstoff/Material:	Volumen/Volume (mm <sup>3</sup> )
		AutoCAD-System-Version	CAD-Umgebung/ CAD-Environment		Gewicht/Mass (g):
		Datum/Date	Name/Name	Artikel/Title	
		Bearb./ Drawn			
		Gepr./ Checked			
Tolerierung/Tolerances:		Freig./ Released			
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