

Product Data Sheet 424 J/2HP

**ebmpapst**

The engineer's choice



424 J/2HP

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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	

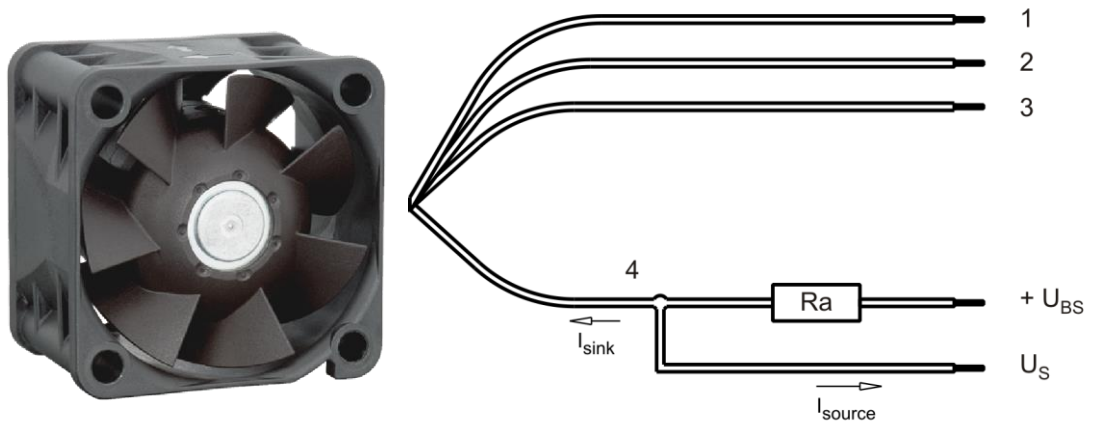
**2 Mechanics**

**2.1 General**

Width	40,0 mm	
Height	40,0 mm	
Depth	28,0 mm	
Mass	0,045 kg	
Housing material	Plastic	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	Wire outlet corner: 40 Ncm Remaining corners: 60 Ncm	
Screw size	ISO 4762 - M3 degreased, without an additional brace and without washer	

**2.2 Connections**

Electrical connection	Wires	
Lead wire length	L = 310 mm	
Tolerance	+ - 10,0 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 28	0,90 mm
2	blue	- GND	AWG 28	0,90 mm
3	violet	PWM	AWG 28	0,90 mm
4	white	Tacho	AWG 28	0,9 mm

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 Electrical Interface - Input

Control input	PWM
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#### Features

Input type	Open collector	
PWM - Frequency		1 kHz - 30 kHz typical: 25 kHz
Max. voltage for logic "Low"		0,2 V
Maximum source current	short circuit current	$\leq 1$ mA

<p><b>Characteristics</b></p>	<table border="1"> <caption>Approximate data from the speed vs PWM graph</caption> <thead> <tr> <th>PWM [%]</th> <th>Drehzahl / speed [1/min]</th> </tr> </thead> <tbody> <tr><td>0</td><td>5000</td></tr> <tr><td>10</td><td>5000</td></tr> <tr><td>20</td><td>5000</td></tr> <tr><td>30</td><td>6500</td></tr> <tr><td>40</td><td>8000</td></tr> <tr><td>50</td><td>9500</td></tr> <tr><td>60</td><td>11000</td></tr> <tr><td>70</td><td>12500</td></tr> <tr><td>80</td><td>14000</td></tr> <tr><td>90</td><td>15500</td></tr> <tr><td>100</td><td>17000</td></tr> </tbody> </table>	PWM [%]	Drehzahl / speed [1/min]	0	5000	10	5000	20	5000	30	6500	40	8000	50	9500	60	11000	70	12500	80	14000	90	15500	100	17000
PWM [%]	Drehzahl / speed [1/min]																								
0	5000																								
10	5000																								
20	5000																								
30	6500																								
40	8000																								
50	9500																								
60	11000																								
70	12500																								
80	14000																								
90	15500																								
100	17000																								
<p><b>Schematics</b></p>	<p><b>Lüfter / Fan</b>      <b>Kunde / Customer</b></p> <p>+ UB</p> <p>+ interne Referenz / + internal reference</p> <p>R2      R1</p> <p><b>Eingang / Input</b></p> <p>C      T</p> <p>- GND</p>																								

### 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 chapter aerodynamics)

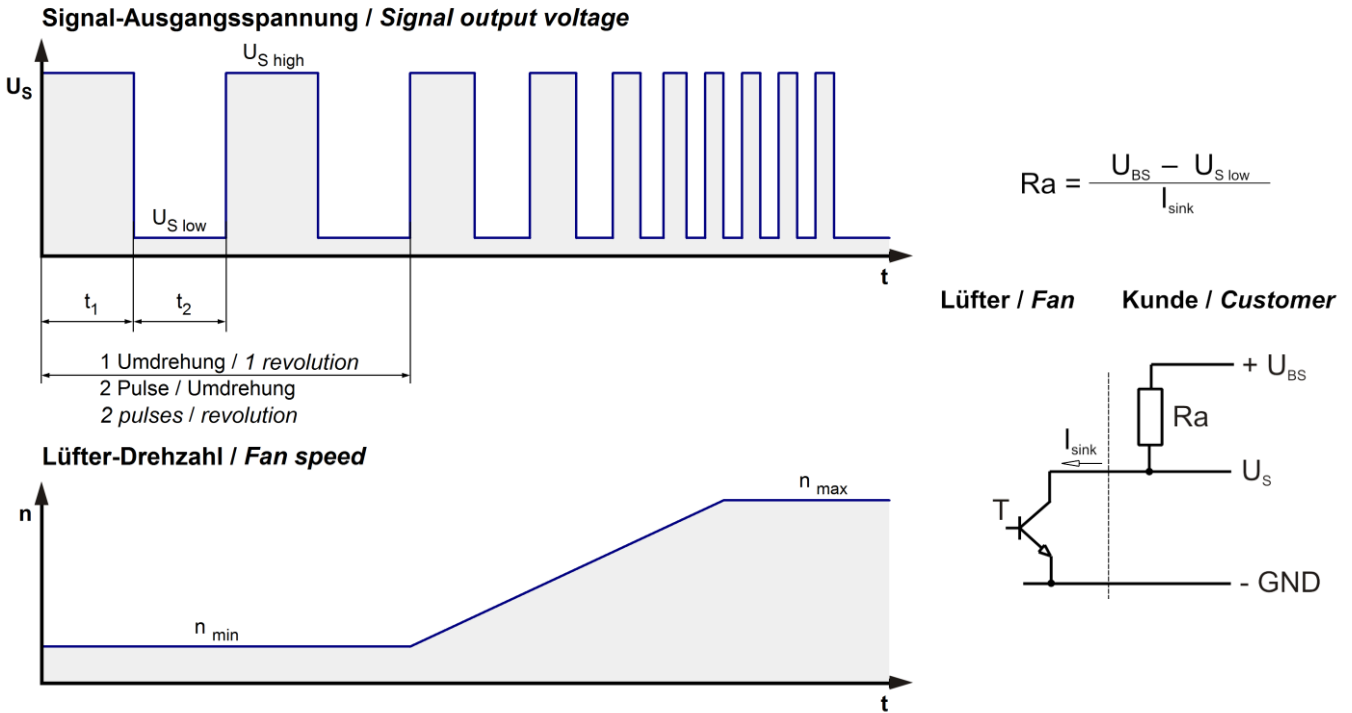
I: corresp. to arithm. mean current value

Name	Condition
PWM 0001	PWM: 100 %; f: 25 kHz

Features	Condition	Symbol	Values		
Voltage range		U	16 V		26,4 V
Nominal voltage		$U_N$		24,0 V	
Power consumption	$\Delta p = 0$	P	3,1 W	6,9 W	8,3 W
Tolerance	PWM 0010		+/- 20 %	+/- 15 %	+/- 15 %
Current consumption	$\Delta p = 0$	I	195 mA	287 mA	315 mA
Tolerance	PWM 0010		+/- 20,0 %	+/- 15 %	+/- 15 %
Speed	$\Delta p = 0$	n	12.700 1/min	17.250 1/min	18.500 1/min
Tolerance	PWM 0010		+/- 15 %	+/- 10 %	+/- 10 %
Starting current consumption				<= 900 mA	

### 3.3 Electrical Interface - Output

Tacho type	/2 (open collector)
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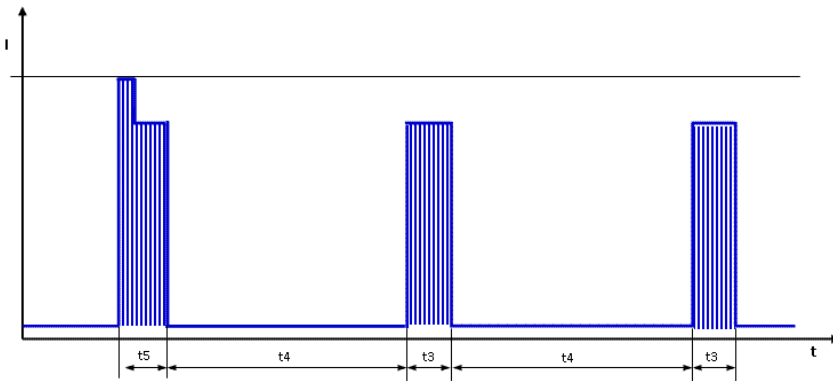


Features	Note	Values
Tacho operating voltage	$U_{BS}$	$\leq 15\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$15\text{ V}$
Maximum sink current	$I_{sink}$	$\leq 4\text{ mA}$
External resistor	External resistor $R_a$ from $U_{BS}$ to $U_S$ required. All voltages measured to GND.	
Tacho frequency	$(2 \times n) / 60$	
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\text{ V/us}$

$n$  = revolutions per minute (1/min)

### 3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	Rectifying diode	
Max. residual current at $U_N$	$I_F \leq 5\text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at $U_N$	$I_{block}$ approx. 900 mA	
Clock signal at locked rotor	$t_3 / t_4$ typical: 0,45 s / 4,5 s	



First pulse  $t_5$  typical 0.7s (0.5 .. 1.0s) followed by  $t_4$ . Afterwards cyclical  $t_3/t_4$ .

### 3.5 Aerodynamics

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. 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.

a.) Operation condition:

17.250 1/min at free air flow	PWM 100 %; f: 25 kHz		
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Max. free-air flow ( $\Delta p = 0 / \dot{V} = \text{max.}$ )	38,0 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \text{max.} / \dot{V} = 0$ )	530 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 chapter aerodynamics.

a.) Operation condition:

17.250 1/min at free air flow	PWM 100 %; f: 25 kHz		
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Optimal operating point	26,0 m <sup>3</sup> /h @ 164 Pa	
Sound power level at the optimal operating point	6,6 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	54,0 dB(A)	

## 4 Environment

### 4.1 General

Min. permitted ambient temperature TU min.	-20 °C	
Max. permitted ambient temperature TU max.	65 °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

severity level	stationary use		
1	storage / transportation	Random vibration not in use IEC 60068-2-64 Frequency range / ASD  $G_{RMS}$ Axes of vibration	Random vibration 5 - 20 Hz : 1,0 m <sup>2</sup> / s <sup>3</sup> 20 - 500 Hz : - 3 dB / Oct 0,91 G 3



		Test duration	3 x 5 h
storage / transportation	Bump not in use IEC 60068-2-29 Shock spectrum Acceleration Duration Number of bumps (+X, -X, -Y, +Y, -Z, +Z) Total bumps		Bump half sine 18 G 6 ms 100 in each direction 600
stationary use	Random vibration in use IEC 60068-2-64 Frequency range / ASD  $G_{RMS}$ Axes of vibration Test duration		Random vibration 5 - 20 Hz : $2,0 \text{ m}^2 / \text{s}^3$ 20- 150 Hz : - 3 dB / Oct 0,83 G 3 3 x 5 h
stationary use	Bump in use IEC 60068-2-29 Shock spectrum Acceleration Duration Number of bumps (+X, -X, -Y, +Y, -Z, +Z) Total bumps		Bump half sine 5 G 11 ms 100 in each direction 600

**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.	500 VAC / 1 Min.  850 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 / 1,2 mm	
Protection class	III	

**5.2 Approval Tests**

CE	EC Declaration of Conformity	Yes
EAC	Eurasian Conformity	Yes
UL	Underwriters Laboratories	Yes / 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	Not applicable

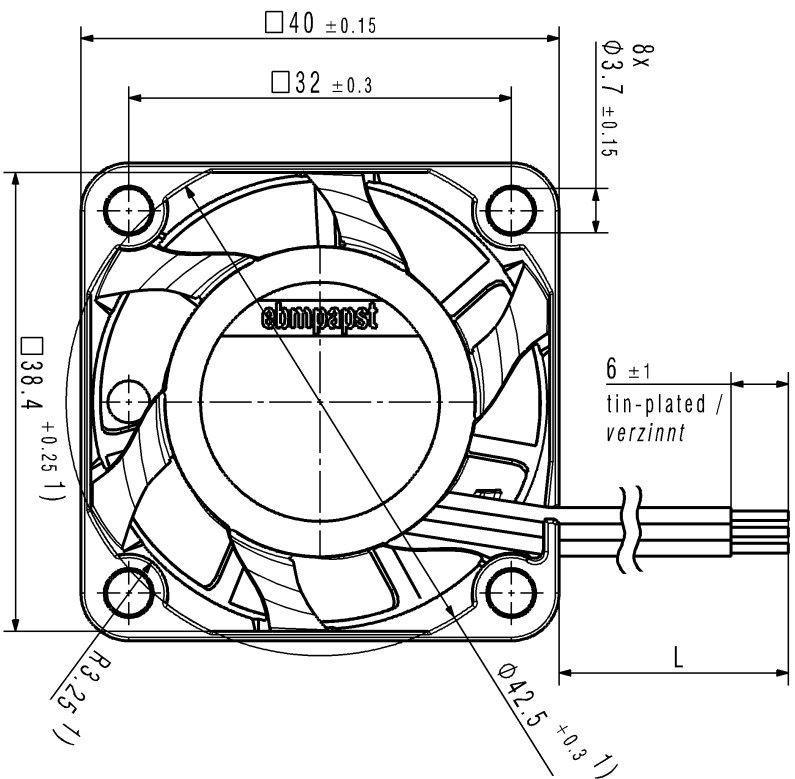
**6 Reliability**

**6.1 General**

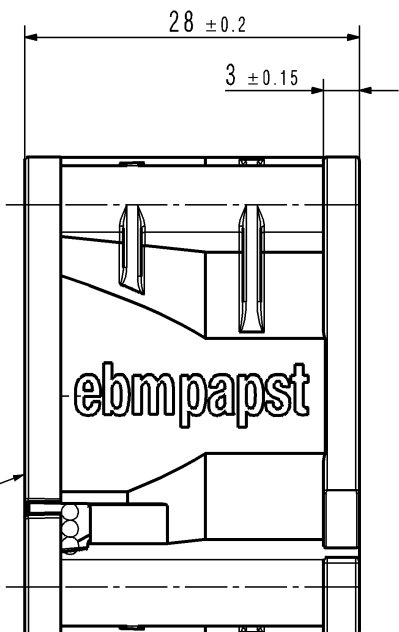
Life expectancy L10 at TU = 40 °C	60.000 h	
Life expectancy L10 at TU max.	32.500 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	102.500 h	

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Refer to protection notice DIN ISO 16016!



1) Maße für Montagewand / Dimensions for assembly wall  
- mit Feder spielfrei axial verspannt / tensioned without axial clearance by spring  
- Anzahl und Länge der Litzen siehe Produktspezifikation Blatt 1  
*Number and length of the wires see design specification sheet 1 /*



Sup-Status/State Art.-Nr. / Change-No.		CAD-System-Version/ CAD-Environment 9291908002 07A000		Werkstoff / Material:  Volumen / Volume (m <sup>3</sup> ):	
		3D-Referenzmodell / 3D-Referenzmodell Datum Name		Artikel / Title:  Gewicht / Mass (g):	
Tolerierung / Tolerances:		3D-Referenzmodell / 3D-Referenzmodell Datum Name		Zeich.-Nr. / Drawing No.:	
Allgemeintoleranzen / Gen. Tolerances:		Bearb. / Drumn Datum Name		Efs-f.Zöng- / Repladress:	
Freig. / Released		Gepr. / Checked		Dokumenttyp / Type of Document	
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