

Product Data Sheet 4114 N/2H6P

**ebmpapst**

The engineer's choice



**4114 N/2H6P**

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## 1 General

Fan type	Fan	
Rotating direction looking at rotor	Clockwise	
Airflow direction	Air intake over struts	
Bearing system	Ball bearing	
Mounting position - shaft	Any	

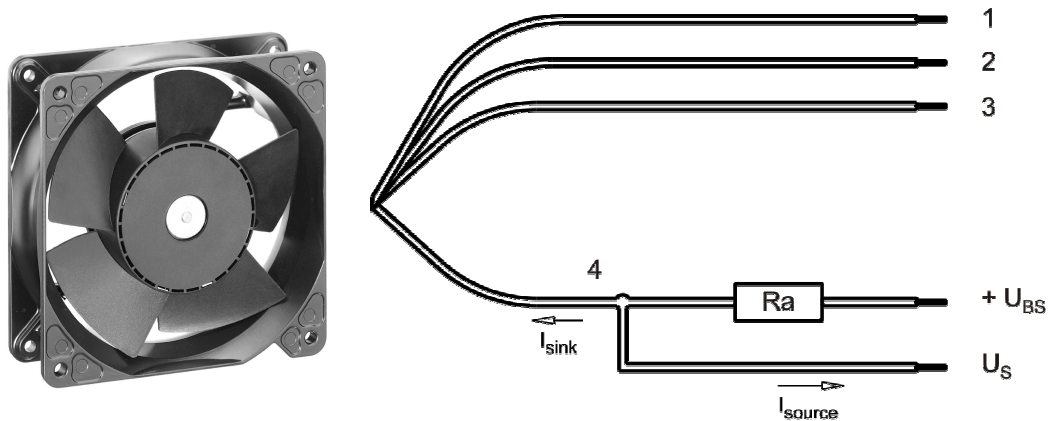
## 2 Mechanics

### 2.1 General

Width	119,0 mm	
Height	119,0 mm	
Depth	38,0 mm	
Mass	0,390 kg	
Housing material	Metal	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	Wire outlet corner: 420 Ncm Remaining corners: 600 Ncm	
Screw size	ISO 4762 - M4 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 22	1,7 mm
2	blue	- GND	AWG 22	1,7 mm
3	violet	PWM	AWG 22	1,7 mm
4	white	Tacho	AWG 22	1,7 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 - 10 kHz typical: 2 kHz

<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>0</td></tr> <tr><td>5</td><td>1000</td></tr> <tr><td>10</td><td>1000</td></tr> <tr><td>20</td><td>2000</td></tr> <tr><td>30</td><td>3000</td></tr> <tr><td>40</td><td>4000</td></tr> <tr><td>50</td><td>5000</td></tr> <tr><td>60</td><td>6000</td></tr> <tr><td>70</td><td>7000</td></tr> <tr><td>80</td><td>8000</td></tr> <tr><td>90</td><td>8500</td></tr> <tr><td>100</td><td>8500</td></tr> </tbody> </table>	PWM [%]	Drehzahl / speed [1/min]	0	0	5	1000	10	1000	20	2000	30	3000	40	4000	50	5000	60	6000	70	7000	80	8000	90	8500	100	8500
PWM [%]	Drehzahl / speed [1/min]																										
0	0																										
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70	7000																										
80	8000																										
90	8500																										
100	8500																										
<p><b>Schematics</b></p>	<p><b>Lüfter / Fan</b>      <b>Kunde / Customer</b></p> <p>+ interne Referenz / + internal reference</p> <p>+ U<sub>B</sub></p> <p>R2      R1      Eingang / Input</p> <p>C      T</p> <p>- GND</p>																										

**Speed control:** 0...100 % PWM; 5 V pull-up, max 2 mA

**Transistor requirements:** V<sub>CEmax.</sub> >12V; I<sub>sink max.</sub> >5mA;  
V<sub>CEsat</sub> <0,15V

### 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: 2 kHz

\*\*)

**To note inrush current @ U nom:**

The internal electrolytic capacitor 120uF / 50V has no resistor or inrush current limitation, essentially the type and length of the connecting cable is limiting the Inrush current.

Features	Condition	Symbol	Values		
Voltage range		U	16 V		30 V
Nominal voltage		U <sub>N</sub>		24 V	
Power consumption	$\Delta p = 0$	P	29 W	65 W	62 W
Tolerance	PWM 0010		+/- 15 %	+/- 15 %	+/- 15 %
Current consumption	$\Delta p = 0$	I	1.810 mA	2.700 mA	2.065 mA
Tolerance	PWM 0010		+/- 15 %	+/- 15 %	+/- 15 %
Speed	$\Delta p = 0$	n	6.400 1/min	8.400 1/min	8.400 1/min
Tolerance	PWM 0010		+/- 10 %	+/- 10 %	+/- 10 %
Starting current consumption				5.000 mA	

3.3 Electrical Interface - Output

Tacho type	/2 (open collector)
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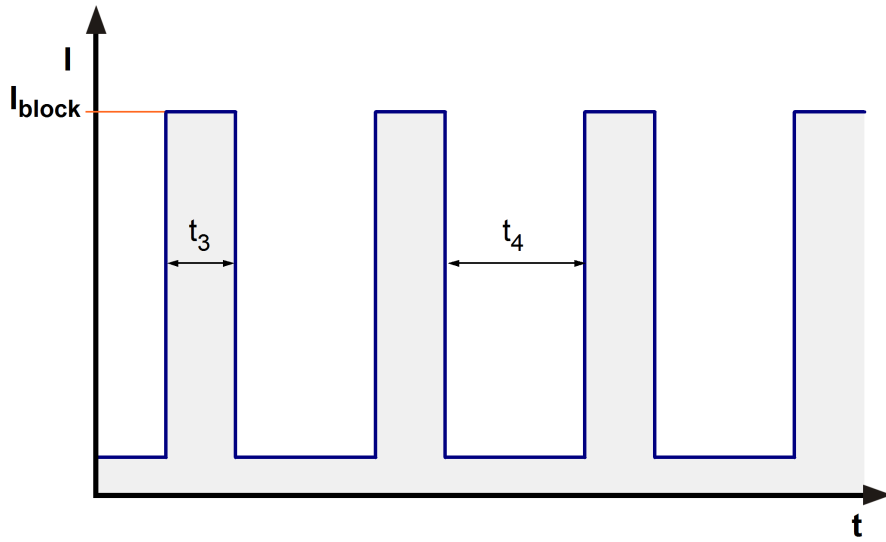


Features	Note	Values
Tacho operating voltage	$U_{BS}$	$\leq 60\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$60\text{ V}$
Maximum sink current	$I_{sink}$	$\leq 10\text{ mA}$
External resistor	External resistor $R_a$ from $U_{BS}$ to $U_S$ required. All voltages 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 $U_N$	$I_F \leq 10\text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at $U_N$	$I_{block}$ approx. $1.850\text{ mA}$	
Clock signal at locked rotor	$t_3 / t_4$ typical: $0,5\text{ s} / 5,0\text{ s}$	



Max. current when decelerate @  $U_{\text{nom}} = 11\text{A}$  ( peak/peak )

### 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;

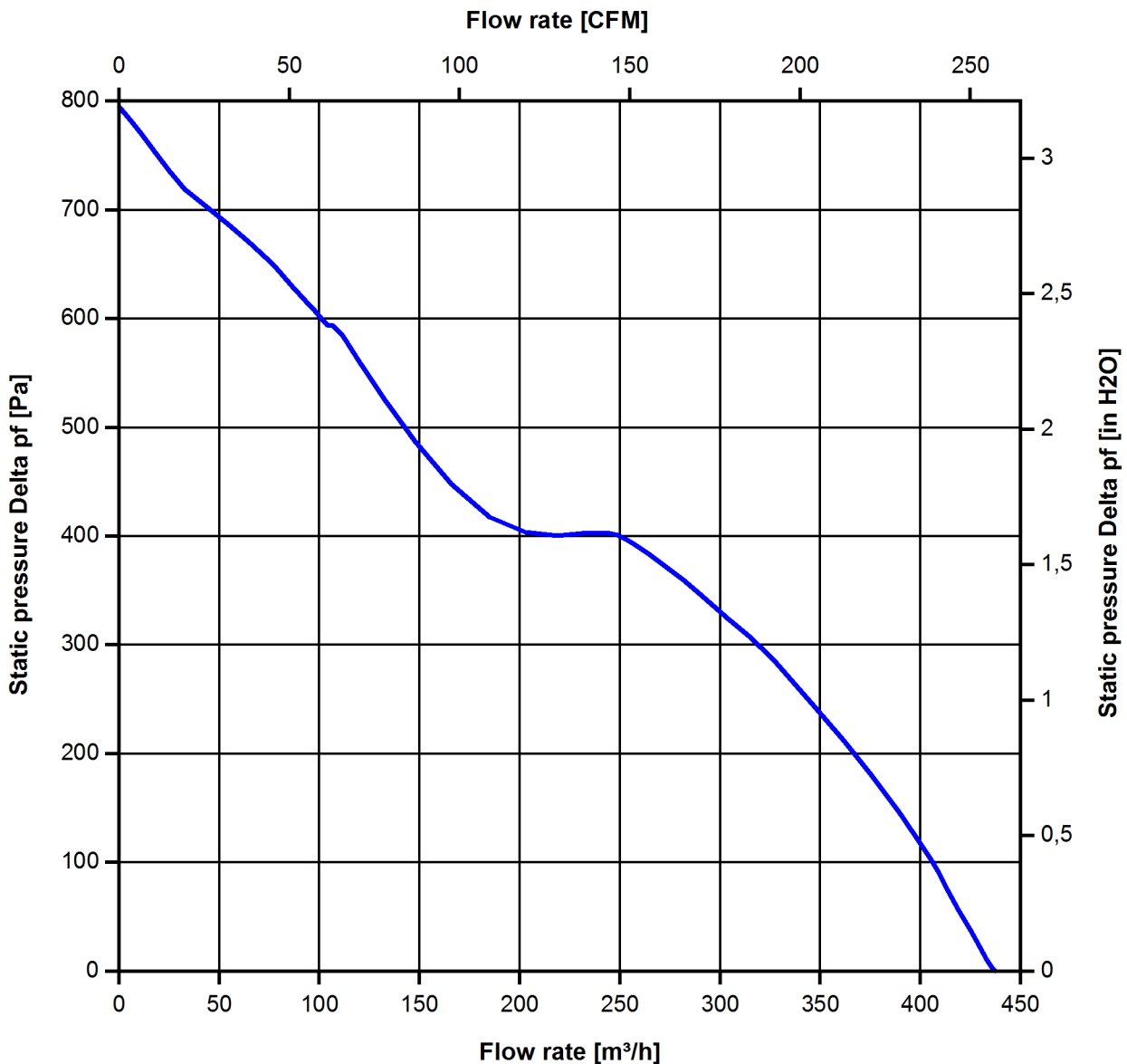
In the intake and outlet area should not be any solid obstruction within 0,5 m. Motor shaft horizontal.

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:

8.400 1/min at free air flow	PWM 100 %; f: 2 kHz		
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Max. free-air flow ( $\Delta p = 0 / \dot{V} = \text{max.}$ )	440 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \text{max.} / \dot{V} = 0$ )	795 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:

8.400 1/min at free air flow	PWM 100 %; f: 2 kHz		
Optimal operating point	335 m <sup>3</sup> /h @ 242 Pa		
Sound power level at the optimal operating point	8,1 bel(A)		
Sound pressure level at free air flow, measured in rubber bands	73,0 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.

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.	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	No
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

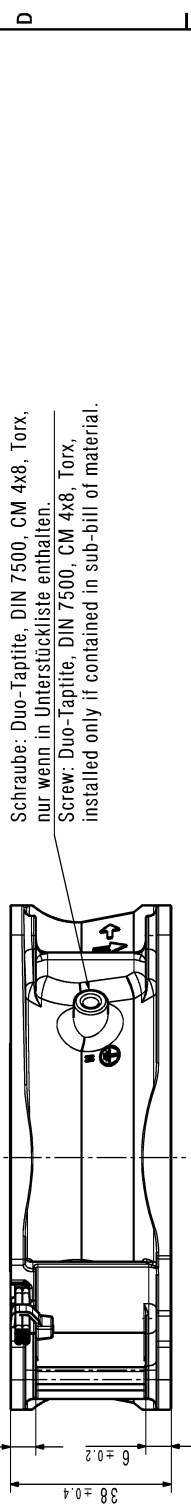
The approval tests are observed to:

U approval max.:30,0 V @ TU approval max.: 65,0 °C

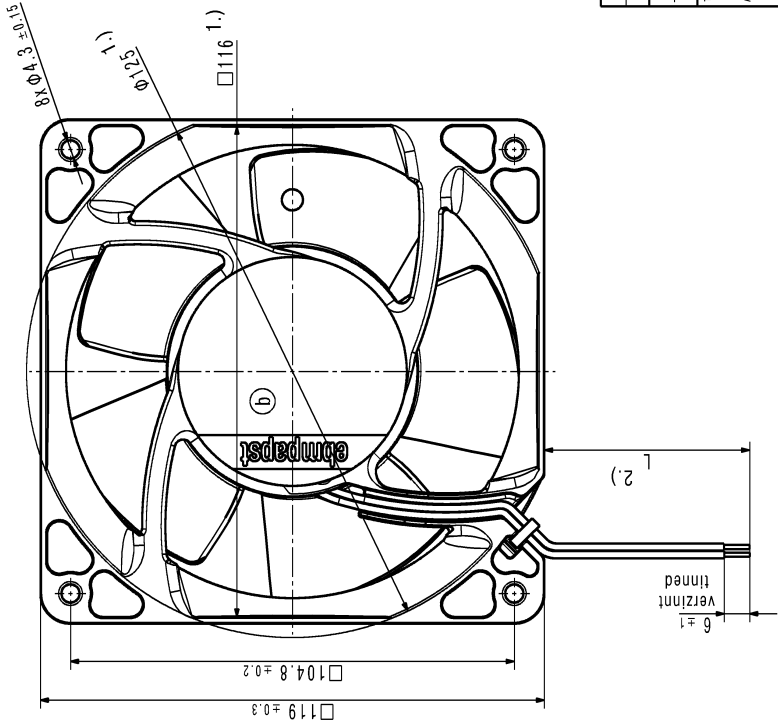
**6 Reliability**

**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	



Schraube: Duo-Tapptite, DIN 7500, CM 4x8, Torx, nur wenn in Unterstückliste enthalten.  
 Screw: Duo-Tapptite, DIN 7500, CM 4x8, Torx, installed only if contained in sub-bill of material.



- 1.) Maße für Montageausschnitt.
- 2.) Anzahl und Länge der Litzen siehe Produktspezifikation.
  - Axialspiel der Kugellager mit Feder spielfrei verspannt.
- 1.) Measures for mounting cut-out.
- 2.) Length and number of wires see design specification.
  - Ball bearings without axial clearance by a pre-loaded spring.

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