

**Product Data Sheet**

**9295414391**  
VWS0143XULCS  
6448/2TDHHP

**ebmpapst**

The engineer's choice



6448/2TDHHP

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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	

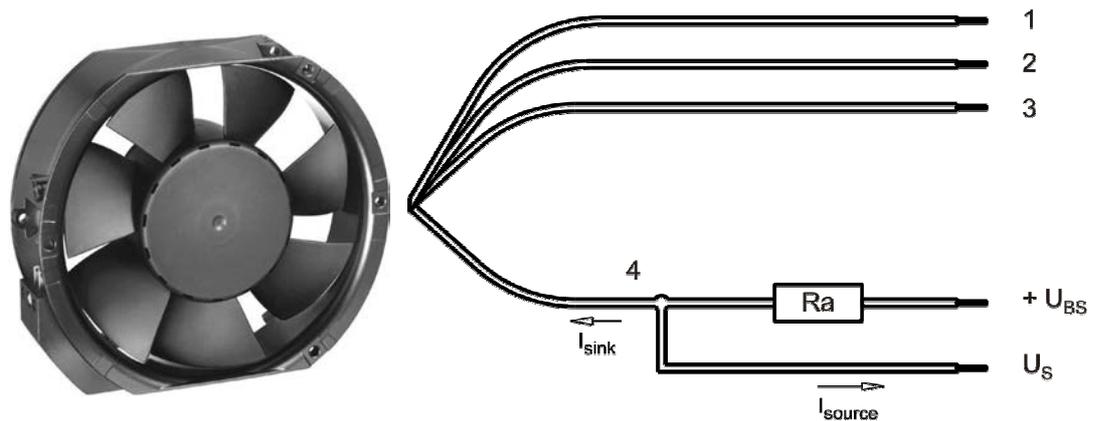
2 Mechanics

2.1 General

Width	150,0 mm	
Depth	51,0 mm	
Diameter	172,0 mm	
Mass	0,780 kg	
Housing material	Metal	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	Wire outlet corner: 260 Ncm Remaining corners: 260 Ncm	
Screw size	ISO 4762 - M4 degreased, without an additional brace and without washer	

2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 365 mm	
Tolerance	+/- 10,0 mm	
Tube length	S = 15 mm	
Tolerance	+/- 5,0 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		typical: 2 kHz

<p><b>Characteristics</b></p>	
<p><b>Schematics</b></p>	

PWM input transistor requirements:  
 $U_{CEmax.} \Rightarrow 12\text{ V}$ ;  $I_{Sink\ max.} > 5\text{ mA}$ ;  $U_{CEsat.} < 0,15\text{ V}$

**Speed control:**

By Puls width modulation (PWM) 0 ... 100%  
 Open collector in relation to signal-ground

f = 2kHz +-20%

**Information to the curve:**

0% - <=12% PWM: 0 1/min  
 13% - 90% PWM: linear increasing curve  
 90% - 100% PWM: 7.500 1/min (corresponding to max. speed)  
 13% PWM: 800 1/min (Fan on, comming from 0% PWM)  
 11% PWM: 600 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/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 %;

\*\*)

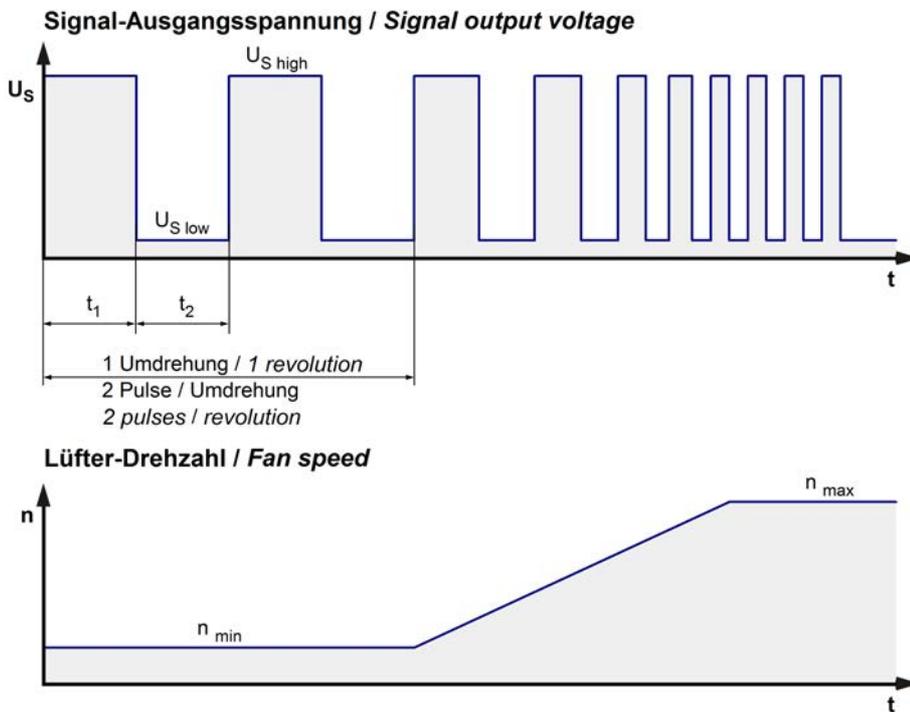
**To note inrush current @ U nom:**

The internal electrolytic capacitor 220uF/75V has inrush current limitation, the existing peak depends on ceramic capacitor 100nF.

Features	Condition	Symbol	Values		
Voltage range		U	36 V		72 V
Nominal voltage		U <sub>N</sub>		48 V	
Power consumption	$\Delta p = 0$	P	162 W	160 W	169,2 W
Tolerance	PWM 0010		+/- 15 %	+/- 15 %	+/- 15 %
Current consumption	$\Delta p = 0$	I	4.500 mA	3.300 mA	2.350 mA
Tolerance	PWM 0010		+/- 15 %	+/- 15 %	+/- 15 %
Speed	$\Delta p = 0$	n	7.500 1/min	7.500 1/min	7.500 1/min
Tolerance	PWM 0010		+/- 10 %	+/- 10 %	+/- 10 %

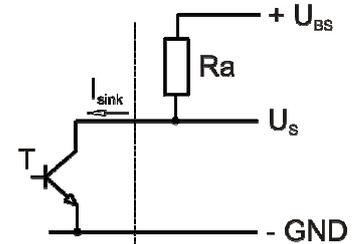
3.3 Electrical Interface - Output

Tacho type	/2 (open collector)
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$$R_a = \frac{U_{BS} - U_{S\ low}}{I_{sink}}$$

Lüfter / Fan      Kunde / Customer

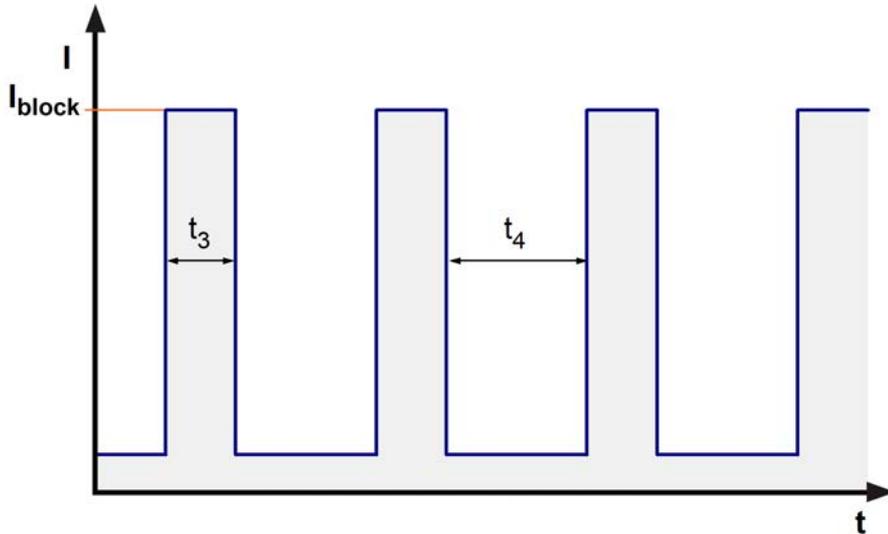


Features	Note	Values
Tacho operating voltage	$U_{BS}$	$\leq 60\ V$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\ V$
Tacho signal High	$U_{S\ high}$	$I\ source: 0\ mA$
Maximum sink current	$I_{sink}$	$\leq 20\ mA$
External resistor	External resistor $R_a$ from $U_{BS}$ to $U_S$ required. All voltages measured to GND.	
Tacho frequency	$(2 \times n) / 60$	
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\ V/\mu s$

n = revolutions per minute (1/min)

3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	P-CH FET	
Max. residual current at $U_N$	$I_F \leq 20$	
Locked rotor protection	Auto restart	
Locked rotor current at $U_N$	$I_{block}$	
Clock signal at locked rotor	$t_3 / t_4$ typical: 0,5 s / 10,0 s	



**Internal Fuse:**

Littlefuse NANO2(R) FUSE; Very fast acting 451 Series; 7 A (Art.-Nr.: 451007)

3.5 Data According ErP Directive

Installation / Efficiency category	A / static
Speed control	integrated
Specific ratio	1,00398
Target overall efficiency 2015	29,2 %
Overall efficiency	37,5 %
Efficiency grade	40
Power input	198,7 W
Speed	7.480 1/min

All values measured in optimum energy efficiency point.

Productiondatecode is printed on the fan label.

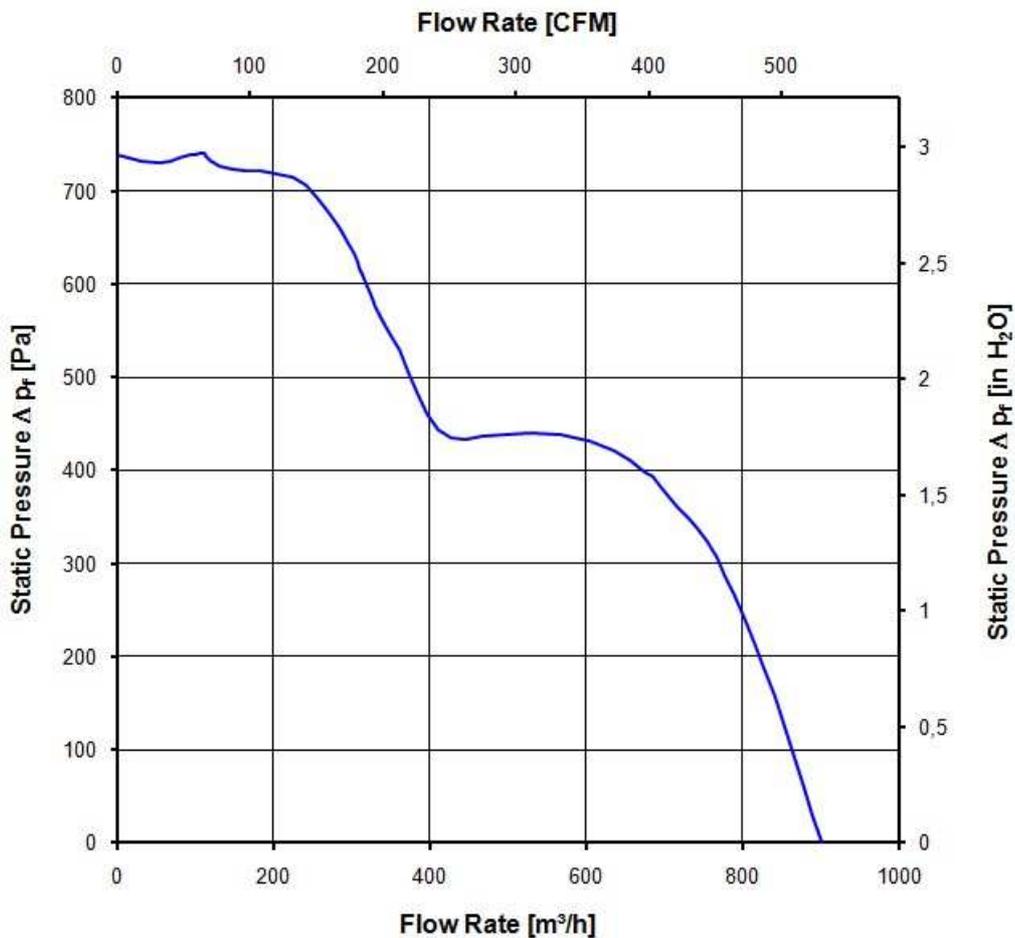
### 3.6 Aerodynamics

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

7.500 1/min at free air flow	PWM 100 %;		
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Max. free-air flow ( $\Delta p = 0 / \dot{V} = \text{max.}$ )	900,0 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \text{max.} / \dot{V} = 0$ )	740 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  $L_p(A) < 5 \text{ dB(A)}$   
For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

7.500 1/min at free air flow	PWM 100 %;		
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Optimal operating point	655,0 m <sup>3</sup> /h @ 362 Pa	
Sound power level at the optimal operating point	8,7 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	80,0 dB(A)	

## 4 Environment

### 4.1 General

Min. permitted ambient temperature TU min.	-20 °C	
Max. permitted ambient temperature TU max.	60 °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.	1000 VAC / 1 Min.	
B.) Routine test Measuring conditions: At indoor climate. No arcing or breakdown is allowed! All connections together to ground.	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	Yes
EAC	Eurasian Conformity	Yes
UL	Underwriters Laboratories	Yes / UL507, Electric Fans E38324
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	Yes / GB 12350 Safety Requirements for small Power Motors

The approval tests are observed to:

U approval max.: 72,0 V @ TU approval max.: 65,0 °C

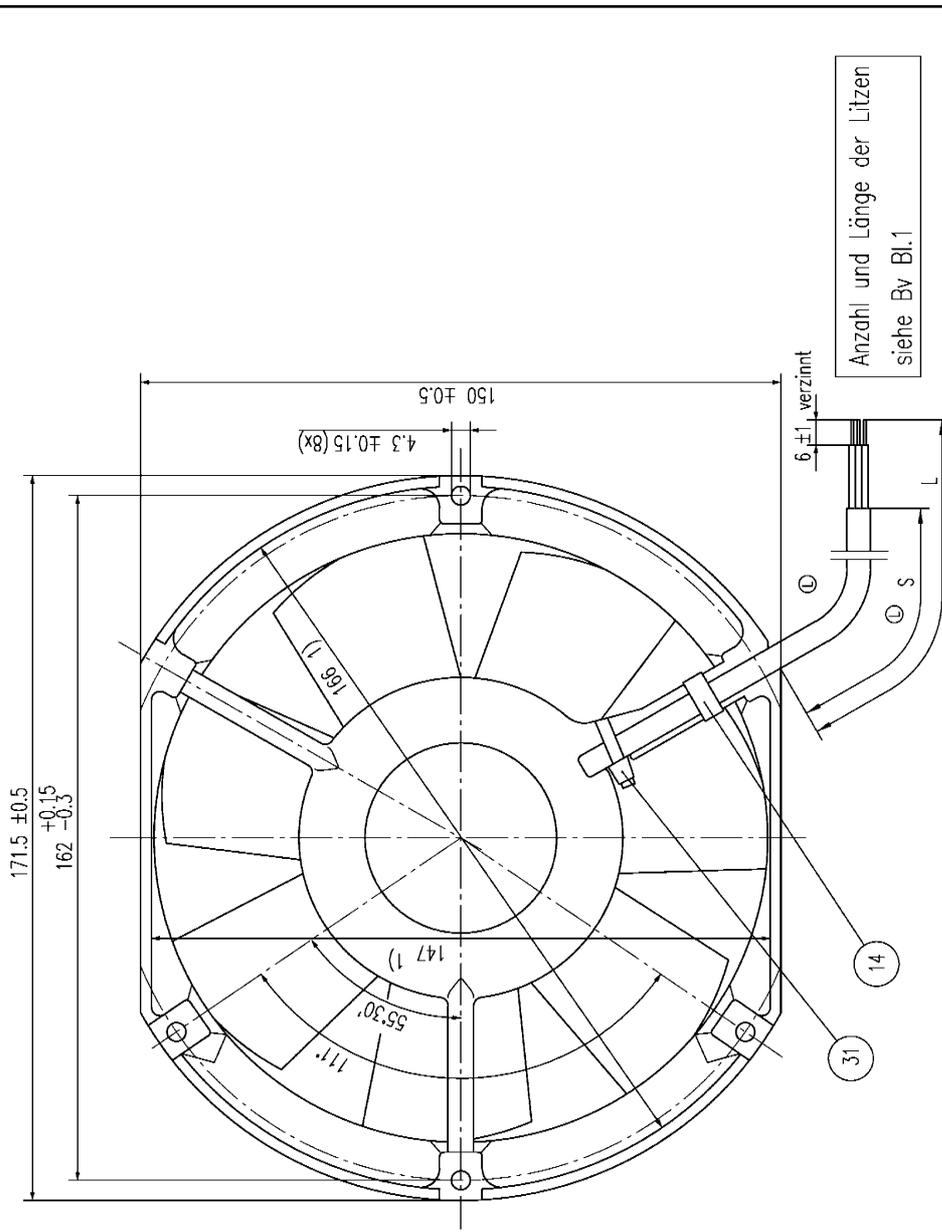
## 6 Reliability

### 6.1 General

Life expectancy L10 at TU = 40 °C	70.000 h	
Life expectancy L10 at TU max.	45.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	117.500 h	

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Anzahl und Länge der Litzen  
siehe Bv Bl.1

Tolerierung Allgemeintoleranzen: DIN ISO 2768-mK		DIN 7167		Material	
Bezeichnung	Name	Artikel		Blatt	
Datum	Name	Zug-Nr.		Blatt	
Index	Aend.-Nr.	Zug-Nr.		Blatt	
Gegruert u. zur Verwendung freigegeben von an		Ers. Zugh.		A3	
DIN ISO 2768-mK		PAPST		PAPST-MOTOREN GmbH & Co KG D-18127 Str. Georgen Germany	

- 1) Maße für Montagewand
  - 2) nur wenn in Stückliste enthalten
- Axialspiel: mit Feder spielfrei verspannt