

2218 F/2TDHHP-204

INDEX

1 General 3

2 Mechanics 3

2.1 General 3
2.2 Connections 3

3 Operating Data 4

3.1 Operating Data - Electrical Interface - Input 4
3.2 Electrical Operating Data 5
3.3 Operating Data - Electrical Interface -Output 6
3.4 Electrical Features 7
3.5 Aerodynamic 8
3.6 Sound Data 9

4 Environment 9

4.1 General 9
4.2 Climatic requirements*) 9

5 Safety 10

5.1 Electrical Safety 10
5.2 Approval Tests 10

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

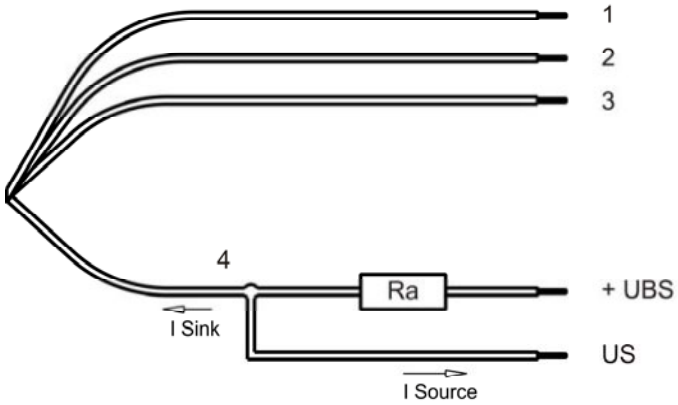
2.1 General

Width	200 mm	
Height	200 mm	
Depth	51 mm	
Diameter	220 mm	
Weight	1,06 kg	
Housing material	Metal	
Impeller material	Plastic	

2.2 Connections

Electrical connection	Wires – Plug (see drawing)	
Length of lead wire Tolerance	475 mm +- 10 mm	
Length of tube Tolerance	200 mm +- 10 mm	
Wire gauge (AWG)	20 22	
Insulation diameter	1,7 mm 1,85 mm	





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

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

Lead wire 1 - 2: AWG20 (Insulation diameter 1,85mm)
Lead wire 3 - 4: AWG22 (Insulation diameter 1,70mm)

3 Operating Data

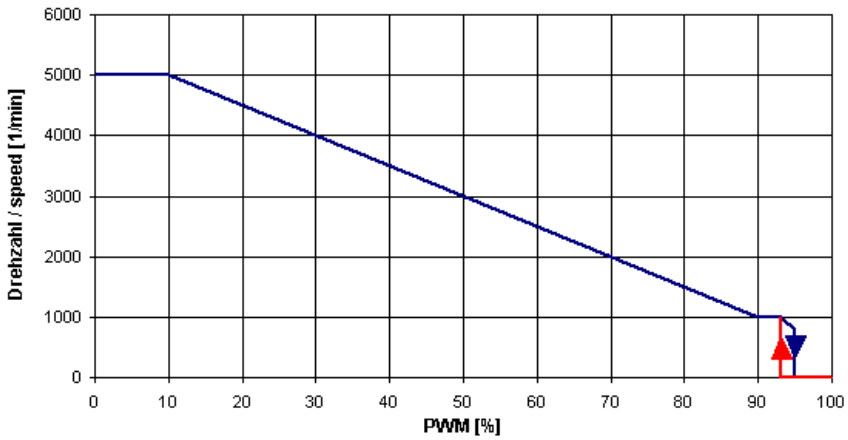
3.1 Operating Data - Electrical Interface - Input

Control input	PWM

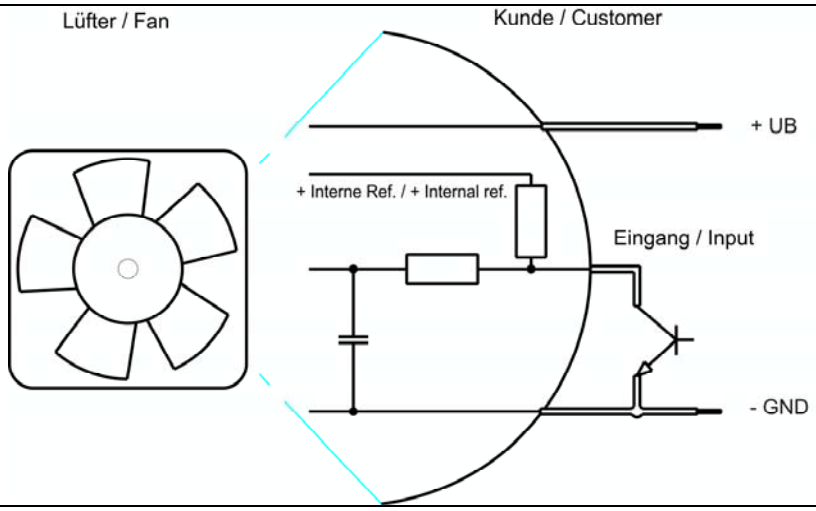
Features

PWM - Frequency		1 kHz - 10 kHz Typical: 2 kHz

Characteristics



Schematics



Transistor requirements:
Vce max. = >12V; Isink max. =>5mA
Vce sat. = <0,15V

Information to the curve:

0% - 10% PWM::	5.000 1/min (corresponding to max. speed)
10% - 90% PWM:	linear decreasing curve
90% - 93% PWM:	1.000 1/min (corresponding to min. speed)
93% - 95% PWM:	linear decreasing curve (comming from 0% PWM)
>95% - 100% PWM:	0 1/min

No sensor break detection. Speed is 0 1/min with open control input.

3.2 Electrical Operating Data

Measurement conditions: Normal air density = 1,2 kg/m3; 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.

Δp = 0: corresp. to free air flow (see section 3.5)
I: corresp. to arithm. mean current value

Name	Condition		
PWM 0001	PWM: 0 %; f: 2 kHz		

Features	Condition	Symbol	Values		
Voltage range	Δp = 0	U	36,0 V		72,0 V
Nominal voltage	Δp = 0	U_N		48,0 V	
Power consumption Tolerance	Δp = 0 PWM 0001	P	42,0 W +- 12,0 %	50,0 W +- 10,0 %	54,0 W +- 10,0 %
Current consumption Tolerance	Δp = 0 PWM 0001	I	1.170 mA +- 12,0 %	1.040 mA +- 10,0 %	740 mA +- 10,0 %
Speed Tolerance	Δp = 0 PWM 0001	n	4.750 1/min +- 5,0 %	5.000 1/min +- 3,0 %	5.000 1/min +- 3,0 %

No sensor break detection. Speed is 0 1/min with open control input.

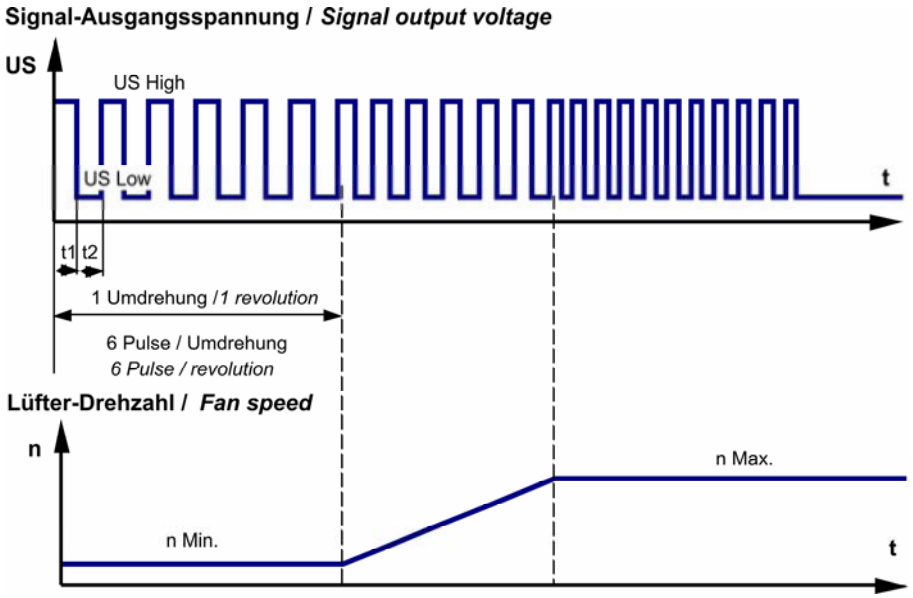
In the fan is an additionally under- and overvoltage control build-in. This switches the power stage and the fan off.
At U <= 32 V and / or U >= 80 V is n= 0 1/min

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

Features	Condition	Symbol	Values		
Voltage range	Δp = 0	U	36,0 V		72,0 V
Nominal voltage	Δp = 0	U_N		48,0 V	
Power consumption Tolerance	Δp = 0 PWM 0002	P	13,5 W +- 10,0 %	13,5 W +- 12,0 %	14,7 W +- 12,0 %
Current consumption Tolerance	Δp = 0 PWM 0002	I	375 mA +- 10,0 %	280 mA +- 12,0 %	205 mA +- 12,0 %
Speed Tolerance	Δp = 0 PWM 0002	n	3.050 1/min +- 5,0 %	3.050 1/min +- 5,0 %	3.050 1/min +- 5,0 %

3.3 Operating Data - Electrical Interface -Output

Tacho type	/2 (Open collector)



$$Ra = \frac{UBS - US\ Low}{I\ Sink}$$

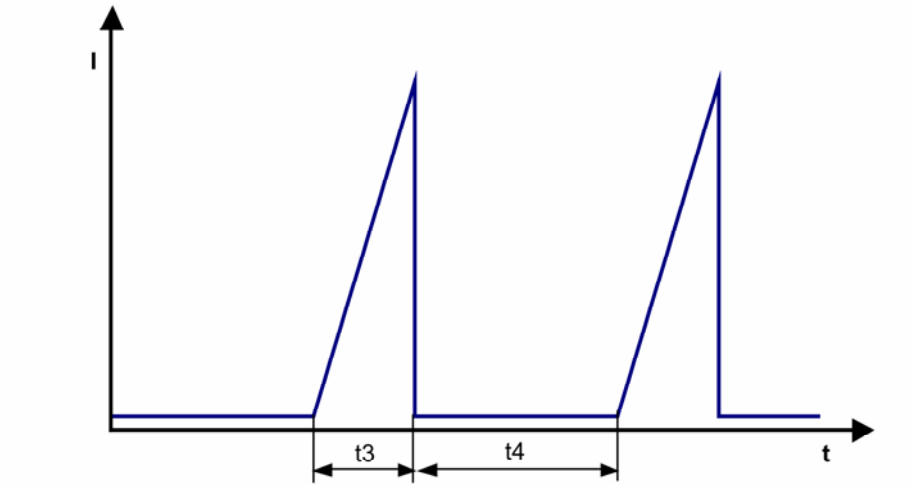
Features	Note	Values
Tacho operating voltage (UBS)		<= 60 V
Tacho signal Low	I sink: 2 mA	<= 0,4 V
Tacho signal High	I source: 0 mA	<= 60 V
Maximum sink current		<= 20 mA
External resistor	External resistor Ra from UBS to US required. All voltages measured to GND.	
Tacho frequency	(6 x n) / 60	500 Hz
Tacho isolated from motor	No	
Slew rate		=> 0,5 V/us

Please note:
At zero speed the tacho signal is at a static HIGH. It will be also HIGH when the fan is still spinning, but the speed control signal is set to zero speed already.
The tacho signal is only activated after the start-up is completed.

Alarm type	None

3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection Max. residual current at Un	P-CH FET IF < 5 mA	
Locked rotor protection	Auto restart	
Locked rotor current at Un	approx. 1.500 mA	
Clock signal t3/t4 at locked rotor	Typical: 3,0 s / 10,0 s	



Internal Fuse:
Littlefuse NANO2(R) FUSE; Very fast acting 451 Series; 6,3 A (045106.3)

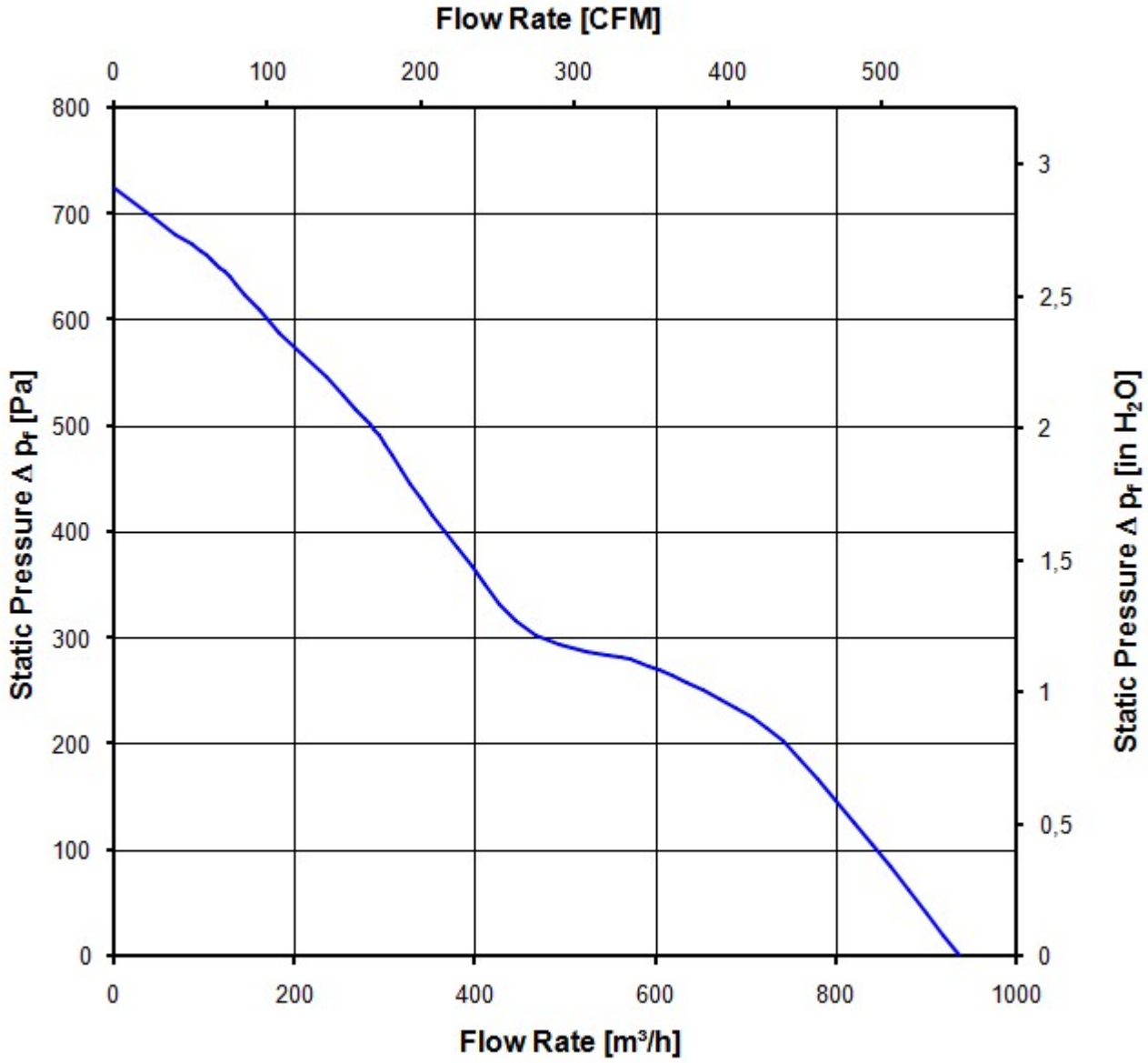
3.5 Aerodynamic

Measurement conditions:	Measured with a double chamber intake rig acc. to DIN EN ISO 5801. Normal air density = 1,2 kg/m3; Temperature 23°C +/- 3°C; In the intake and outlet area should not be any solid obstruction within 0,5 m.

a.) Operation condition:

5.000 1/min at free air flow	PWM 0 %; f: 2 kHz		

Max. free-air flow (Δp = 0 / $\dot{V}$ = max.)	940,0 m3/h	
Max. static pressure (Δp = max. / $\dot{V}$ =0)	725 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:

5.000 1/min at free air flow	PWM 0 %; f: 2 kHz	PWM min.:	PWM max.:

Optimal operating point	910,0 m3/h @ 30 Pa	
Sound power level at the optimal operating point	7,5 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	67,0 dB(A)	

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-20 °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	

*) Permittet 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.

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.	1000 VAC / 1 Min. 1000 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	
Air and leakage distances	1,0 mm / 1,5 mm	
Protection class	I	

5.2 Approval Tests

CE	No
UL	Yes / UL audited by CSA according to 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	Yes / GB 12350 Safety Requirements for small Power Motors

The approval tests are observed to:
Maximal permitted operating voltage (see section 3.1) and max. permitted ambient temperature TU max.

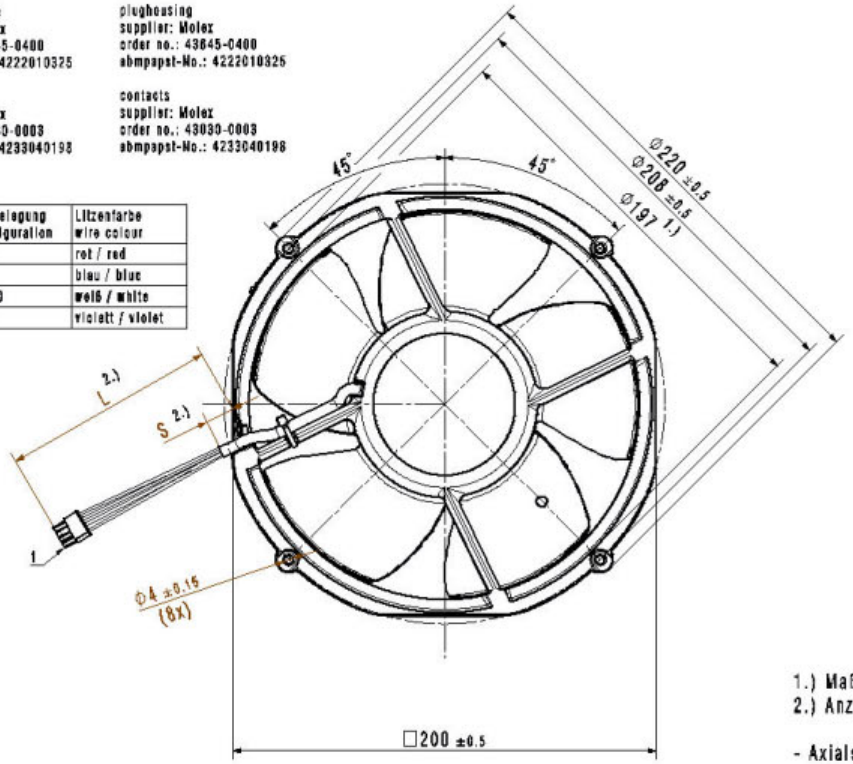
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Lieferant: Molex
Best. Nr.: 43645-0400
ebmpapst-Nr.: 4222010325

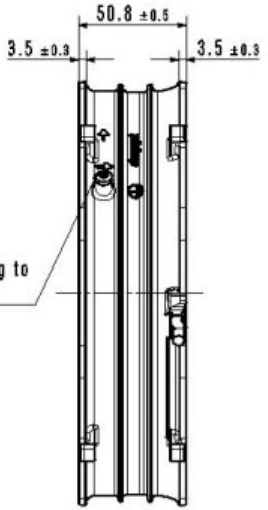
plughousing
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order no.: 43645-0400
ebmpapst-No.: 4222010325

Kontakte
Lieferant: Molex
Best. Nr.: 43030-0003
ebmpapst-Nr.: 4233040198

contacts
supplier: Molex
order no.: 43030-0003
ebmpapst-No.: 4233040198

Steckerbelegung PIN configuration	Litzenfarbe wire colour
1 +UB	rot / red
2 GND	blau / blue
3 TACHO	weiß / white
4 PWM	violett / violet





Schraube: Duo-Taptite nach DIN7500, CM 4x8, Torx
Screw: Duo-Taptite according to DIN7500, CM4x8, Torx

1.) Maße für Montageausschnitt
2.) Anzahl und Länge der Litzen / Stecker / Schlauch siehe Produktspezifikation

- Axialspiel der Kugellager mit Feder spielfrei gelagert

1.) measures of mounting cut out
2.) length an number of wires / plug / tube see product specification

- ball bearing without clearance by a pre-load spring

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