Product Data Sheet **8315100369**
VWLG200FJLVZ
2214F/2TDH4PU

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2214F/2TDH4PU

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1 General

Fan type	Axial	
Rotating direction looking at rotor	Counterclockwise - reversible	
Airflow direction	Air outlet over struts	
Bearing system	Stainless steel bearing	
Mounting position - shaft	Any	

2 Mechanics

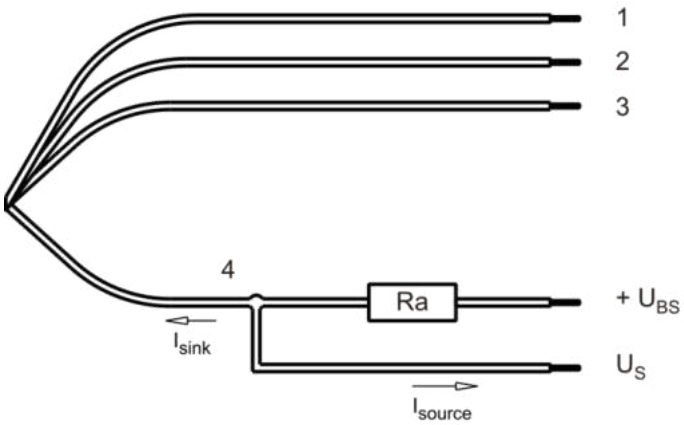
2.1 General

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

2.2 Connections

Electrical connection	Wires - Plug	
Lead wire length Tolerance	See drawing	
Plug	See drawing	
Contact	See drawing	





Wire	Color	Operation	Plug connection	Wire size	Insulation diameter
1	red	+ UB	Pin 1	AWG 20	2,05 mm
2	blue	- GND	Pin 2	AWG 20	2,05 mm
3	violet	PWM	Pin 3	AWG 22	1,7 mm
4	white	Tacho	Pin 4	AWG 22	1,7 mm

3 Operating Data

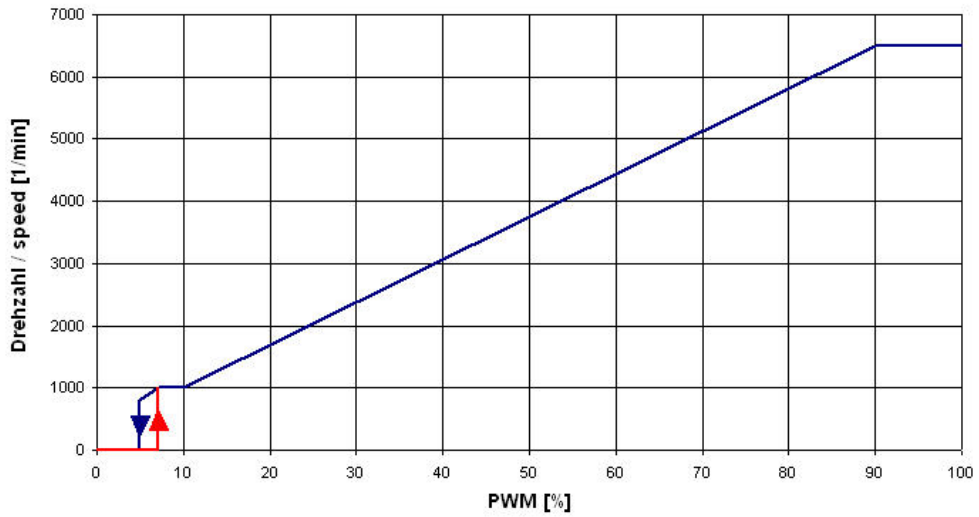
3.1 Electrical Interface - Input

Control input	PWM

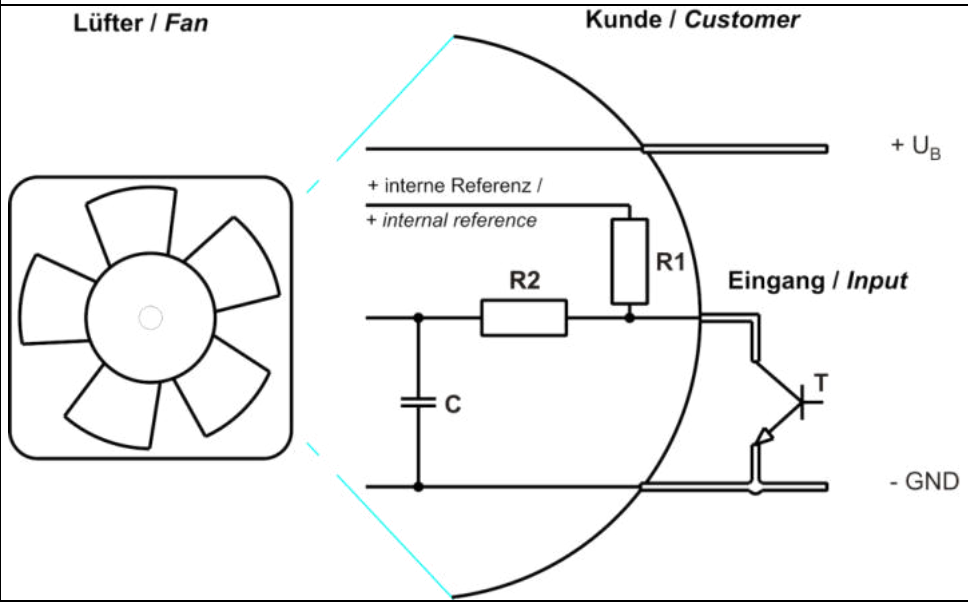
Features

Inpute type	Open collector	
PWM - Frequency		1 kHz - 10 kHz typical: 2 kHz

Characteristics



Schematics



The internal pull-up resistor R1 has 4.7kΩ and is connected to the reference voltage (+5V)
0% - <5% PWM: 0 1/min
7% PWM: 1.000 1/min (Fan on, comming from 0% PWM)
7% - 10% PWM: 1.000 1/min (corresponding to min. speed)
10% - 90% PWM: linear increasing curve

90% - 100% PWM: 5.000 1/min (corresponding to max. speed)
7% - >5% PWM: linear decreasing curve (comming from 100% PWM)
5% PWM: 800 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/m3; Temperature 23°C +/- 3°C; Motor axis horizontal; warm-up time before measuring 5 minutes. In the intake and outlet area should not be any solid obstruction within 0,5 m.

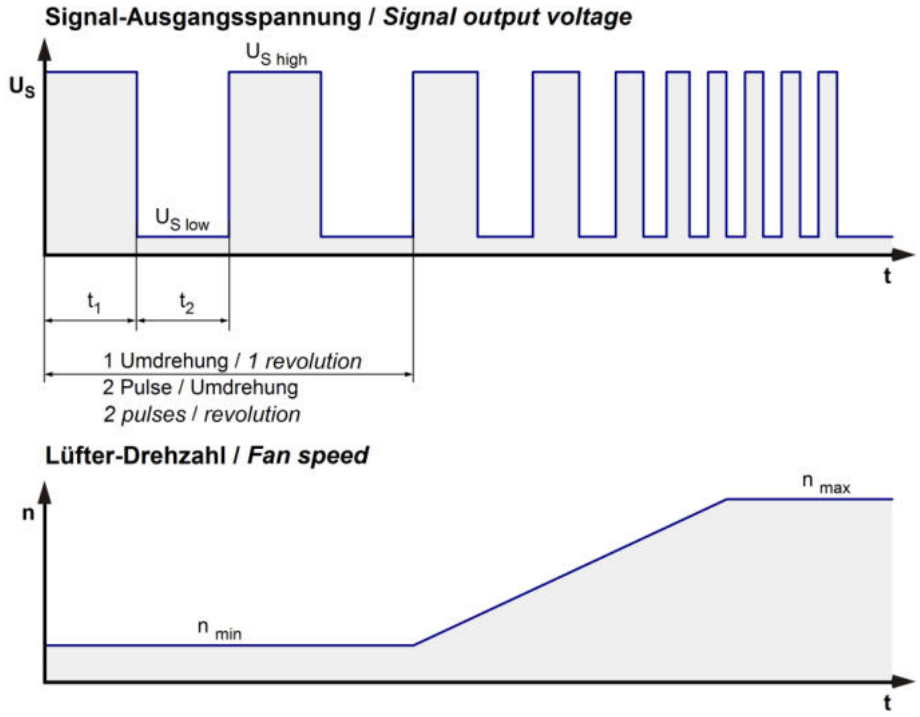
$\Delta p = 0$: corresp. to free air flow (see chapter aerodynamics)
I: corresp. to arithm. mean current value

Name	**Condition**		
PWM 0001	PWM: 95 %; f: 2 kHz		

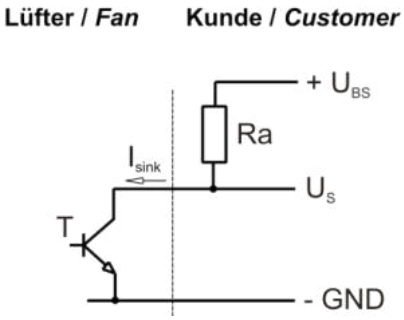
Features	**Condition**	**Symbol**	**Values**		
Voltage range		U	16 V		32 V
Nominal voltage		U_N		24 V	
Power consumption Tolerance	$\Delta p = 0$ PWM 0010	P	54 W +- 10 %	108 W +- 10 %	108 W +- 10 %
Current consumption Tolerance	$\Delta p = 0$ PWM 0010	I	3.400 mA +- 10 %	4.500 mA +- 10 %	3.400 mA +- 10 %
Speed Tolerance	$\Delta p = 0$ PWM 0010	n	5.100 1/min +- 5 %	6.500 1/min +- 3 %	6.500 1/min +- 3 %
Starting current consumption				<= 6.500 mA	

3.3 Electrical Interface - Output

Tacho type	/2 (open collector)



$$Ra = \frac{U_{BS} - U_{S\,low}}{I_{sink}}$$



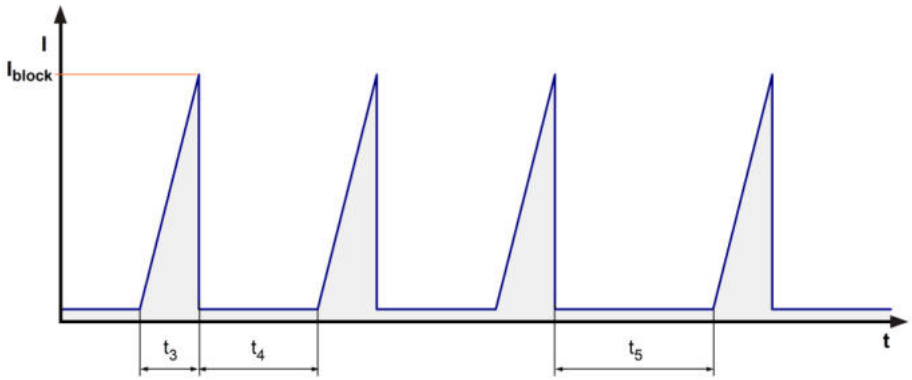
Features		Note	Values
Tacho operating voltage	U_{BS}		<= 32 V
Tacho signal Low	$U_{S\,low}$	I sink:	<= 0,4 V
Tacho signal High	$U_{S\,high}$	I source: 0 mA	<=32 V
Maximum sink current	I_{sink}		<= 20 mA
External resistor		External resistor Ra from UBS to US required. All voltages measured to GND.	
Tacho frequency		(2 x n) / 60	217 Hz @ 6.500 1/min
Tacho isolated from motor		No	
Slew rate			=> 0,5 V/us

n = revolutions per minute (1/min)

3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection Max. residual current at U_N	N-CH FET I_F < 5 mA	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	I_{block} approx. 1.600 mA	
Clock signal at locked rotor Extended Downtime	t_3 / t_4 typical: 3 s / 10 s t_5: 40 s after 4 start-up tests	
Internal fuse	Littelfuse NANO2 > Very Fast-Acting > 451/453 Series 10A / 125V (Art.No.: 0451010.MRL)	
Voltage control *)	Fan turns on at U_B > 14 V or < 34 V Fan turns off at U_B < 12 V or > 36 V	

*) This fan has an undervoltage and overvoltage control circuit integrated which turns the motor off if the voltage is out of range.



This fan has a startup delay of 2 seconds after applying supply voltage.

Each startup (t3) hast two steps. Positioning of the rotor (ca. 3-4s) and the actual startup (~3s).

When several fans are operated together (in a fan tray) and one fan starts after the other and the starting current is eventually limited, it can happen that the not yet operated fan is driven in reverse by the counter pressure. This can lead to a failure of the first start-up. The fan detects this and makes another start with an increased current.

Start-up current @ 24V (I = 1A/div ; t=2s/div)
Locked rotor current @ 24V (I = 500mA/div ; t = 5s/div)
Running current @ 24V (I = 500mA/div ; t = 1ms/div)

3.5 Aerodynamics

Measurement conditions:	Measured with a double chamber intake rig. 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. 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:

at free air flow	

3.6 Sound Data

Measurement conditions:	Sound pressure level: 1 meter distance between microphone and the air intake. Measured in a semianechoic chamber with a background noise level of Lp(A) < 5 dB(A) For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

at free air flow	

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-20 °C	
Max. permitted ambient temperature TU max.	75 °C	
Min. permitted storage temperature TL min.		
Max. permitted storage temperature TL max.		

4.2 Climatic Requirements

IP-protection type (certified)	IP 68 (for fan only, not for connector if applicable) **)	
Humidity requirements	humid temperature, cyclic; according to DIN EN 60068-2-38, 10 cycle and condensation water check; according to DIN EN ISO 6270-2, 14 days	
Salt fog requirements	None	

Permitted application area:
The product is for the use in partial sheltered rooms or open, roofed areas. Direct exposure to water is allowed provided that this does not prevent the normal operation. Saline ambient conditions must be avoided.

Pollution degree 3 (according DIN EN 60664-1)
It occurs conductive pollution or dry non-conductive pollution which becomes conductive due to condensation.

**) The specification of the IP protection refers to the conditions mentioned in certification of the fan. The above mentioned short description of the protection scope is not final. For detailed information of the respective protection scope and definitions, see certification as well as DIN EN 60529 (protection by housings) and ISO 20653 (for vehicles) with the letter K.

Short description of the IP-protection type:
Solid particle Protection: Dust tight.
Protection against deliberate contact: Protected against contact to hazardous parts with a wire.
Protection against water: The fan test according to IP68 (Based on IEC 60529), is conducted in non-operating mode. The fan is tested by a complete immersion in water for a period of 2h at a water-level of 1,2m. Electrical connections are not immersed since they are customer specific.

Please require severity levels and specification parameters from the responsible development departments.

4.3 EMC

Kind	**Radiated Emission; 30 MHz - 1000 MHz (with PE)**
According	DIN EN 55032:2016-02
Ceck accuracy / Limit	Class B
Result	Below limit Class B

Kind	**Radiated Emission; 30 MHz - 1000 MHz (without PE)**
According	DIN EN 55032:2016-02
Ceck accuracy / Limit	Class B
Result	Below limit Class B

Kind	**Electrostatic Discharge Immunity Test**
According	DIN EN 61000-4-2:2001-12
Ceck accuracy / Limit	Contact Discharge +/- 4 kV; Air Discharge +/- 8 kV
Result	B: The monitored function may deviate from designed performance to a specified level during exposure to a disturbance or revert to a fail safe mode or operation, but shall return to normal operation after the disturbance is removed.

5 Safety

5.1 Electrical Safety

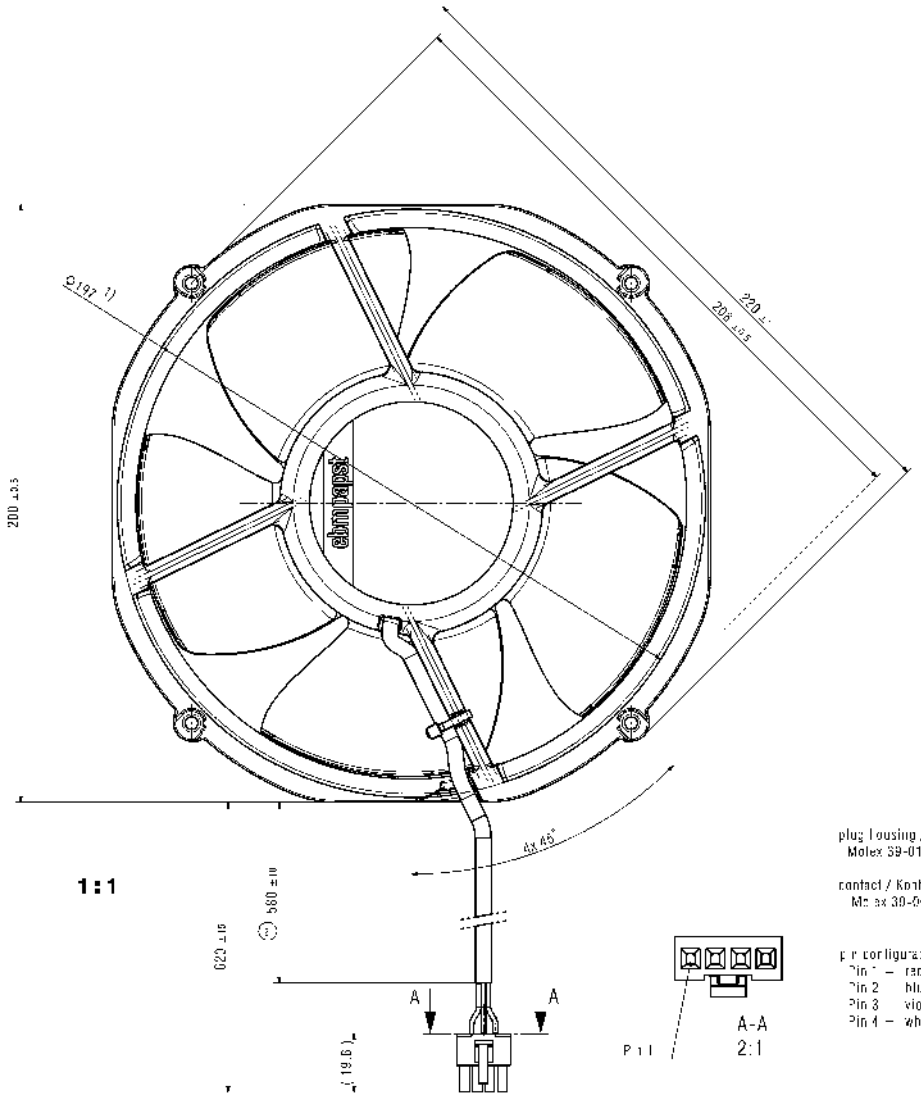
Dielectric strength DIN EN 62368 and DIN EN 60335 A.) Type test Measuring conditions: After 48h of storage at 95% R.H. and 25°C. No arcing or breakdown is allowed! All connections together to ground. B.) Routine test Measuring conditions: At indoor climate. No arcing or breakdown is allowed! All connections 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	No
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 62368 - Audio/video, information and communication technology equipment
CSA	Canadian Standards Association	No
CCC	China Compulsory Certification	Not applicable

6 Reliability

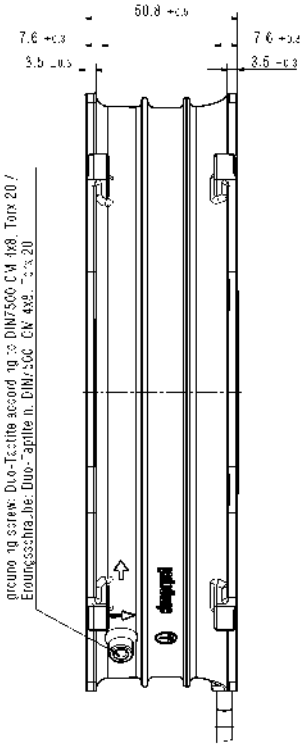
6.1 General



plug housing / Steckergehäuse
Molex 39-01-4041

contact / Kontakt
Molex 39-00-0073

pin configuration / Pinbelegung
Pin 1 – red / rot (–)
Pin 2 blue / blau (GND)
Pin 3 violet / violett (PWM)
Pin 4 – white / weiss (Tacho)



1) Maße für Montageausschnitt / measures of mounting cut out

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