**Product Data Sheet** **8315100330**
VWLG200FJLUS
2214F/2TDHHOU-
00330

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**2214F/2TDHHOU-00330**

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## 1 General

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

## 2 Mechanics

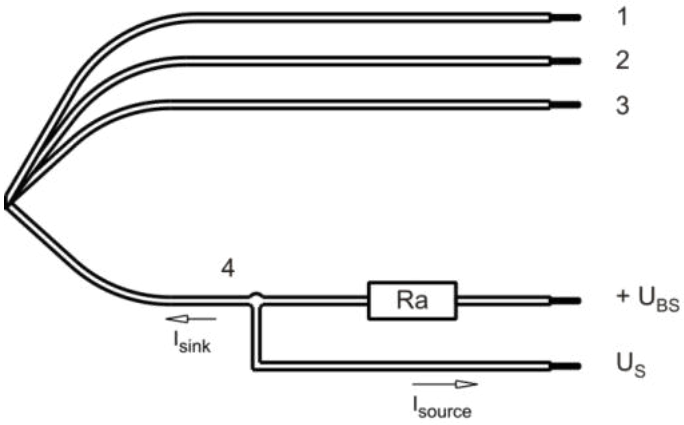
### 2.1 General

| | | |
|---|---|---|
| Width | 200 mm | |
| Height | 200 mm | |
| Depth | 51,0 mm | |
| Diameter | 220 mm | |
| Mass | 1,0 kg | |
| Housing material | Metal | |
| Impeller material | Plastic | |

### 2.2 Connections

| | | |
|---|---|---|
| Electrical connection | Wires | |
| Lead wire length<br>Tolerance | L = 400 mm<br>+- 10 mm | |
| Tube length<br>Tolerance | S = 10 mm<br>+- 2,0 mm | |






| Wire | Color | Operation | Wire size | Insulation diameter |
|---|---|---|---|---|
| 1 | red | + UB | AWG 20 | 2,05 mm |
| 2 | blue | - GND | AWG 20 | 2,05 mm |
| 3 | violet | CONTR | AWG 22 | 1,35 mm |
| 4 | white | Tacho | AWG 22 | 1,35 mm |

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

## 3 Operating Data

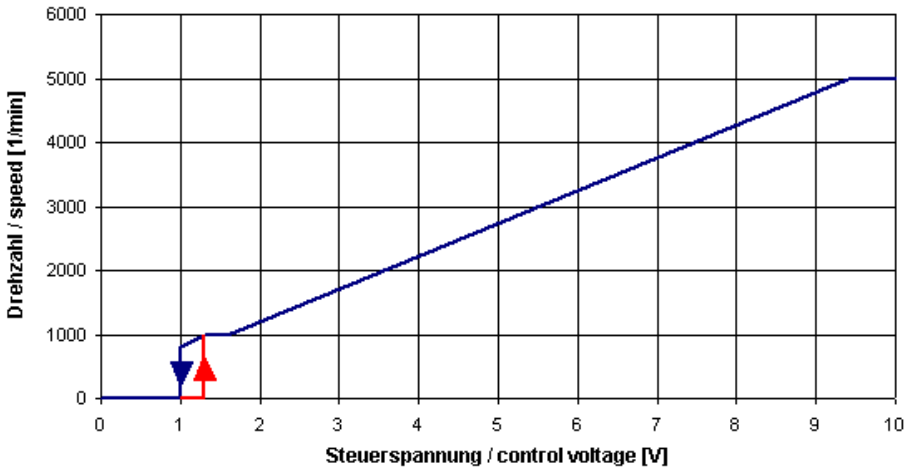
### 3.1 Electrical Interface - Input

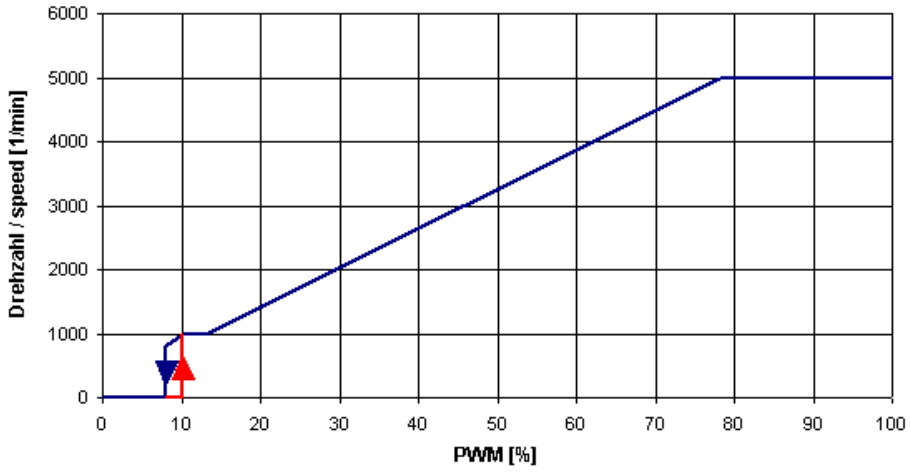
| | |
|---|---|
| Control input | O Input |

**Features**

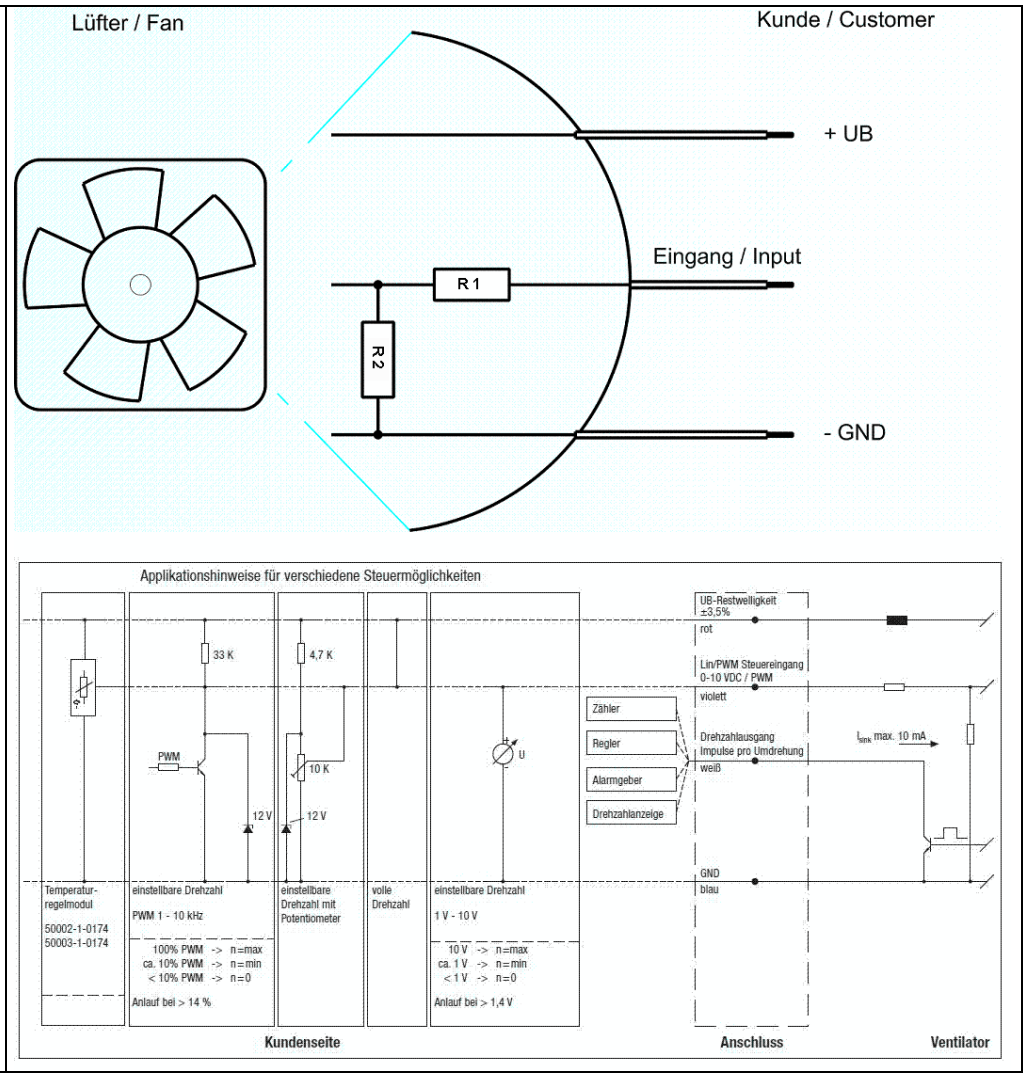
| | | |
|---|---|---|
| Inpute type | Active PWM | |
| PWM - Frequency | | 1 kHz - 10 kHz<br>typical: 2 kHz |
| Input voltage range | | 0 V - 10 V |

**Characteristics**



**Schematics**




**Input voltage divider:**
R1 = 47 kOhm
R2 = 36 kOhm
For protection: There is parallel to R2 a 5,1 V Z-Diode

**Speed control:**
By pulse-width modulation (active PWM) 0 ... 100%
with switching transistor in emitter circuit and collector resistor to 12 V
Frequency = 2 kHz (1 - 10 kHz)

**Information to the curve PWM:**

| | |
|---|---|
| 0% - <10% PWM: | 0 1/min |
| 10% PWM: | 1.000 1/min (Fan on, comming from 0% PWM) |
| 10% - 13% PWM: | 1.000 1/min (corresponding to min. speed) |
| 13% - 78% PWM: | linear increasing curve |
| 78% - 100% PWM: | 5.000 1/min (corresponding to max. speed) |
| 10% - >8% PWM: | linear decreasing curve (comming from 100% PWM) |
| 8% PWM: | 800 1/min or 0 1/min (Fan off, comming from 100% PWM) |

oder:

**Speed control:**

By analog voltage 0 - 10 V

**Information to the curve analog:**

| | |
|---|---|
| 0 V - < 1,3 V: | 0 1/min |
| 1,3 V: | 1.000 1/min (Fan on, comming from von 0 V) |
| 1,3 V - 1,6 V: | 1.000 1/min (corresponding to min. speed) |
| 1,6 V - 9,4 V: | linear increasing curve |
| 9,4 V - 10 V: | 5.000 1/min (corresponding to max. speed) |
| 1,3 V - > 1,0 V: | linear decreasing curve (comming from 10 V) |
| 1,0 V: | 800 1/min or 0 1/min (Fan off, comming from 10 V) |

### 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.

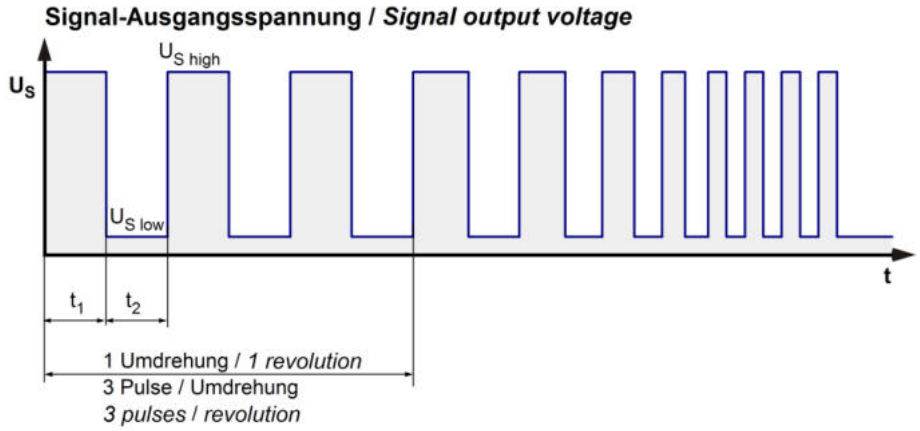
| | |
|---|---|
| Δp = 0: | corresp. to free air flow (see chapter aerodynamics) |
| I: | corresp. to arithm. mean current value |

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

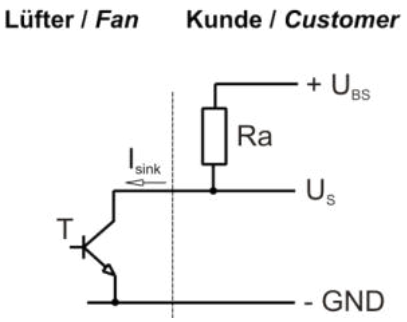
| Features | Condition | Symbol | Values | | |
|---|---|---|---|---|---|
| Voltage range | | U | 16 V | | 36 V |
| Nominal voltage | | $U_N$ | | 24 V | |
| Power consumption<br>Tolerance | Δp = 0<br>0010 | P | 46 W<br>+- 13 % | 48 W<br>+- 10 % | 51 W<br>+- 10 % |
| Current consumption<br>Tolerance | Δp = 0<br>0010 | I | 2.900 mA<br>+- 13 % | 2.000 mA<br>+- 10 % | 1.400 mA<br>+- 10 % |
| Speed<br>Tolerance | Δp = 0<br>0010 | n | 4.900 1/min<br>+- 5 % | 5.000 1/min<br>+- 3 % | 5.000 1/min<br>+- 3 % |

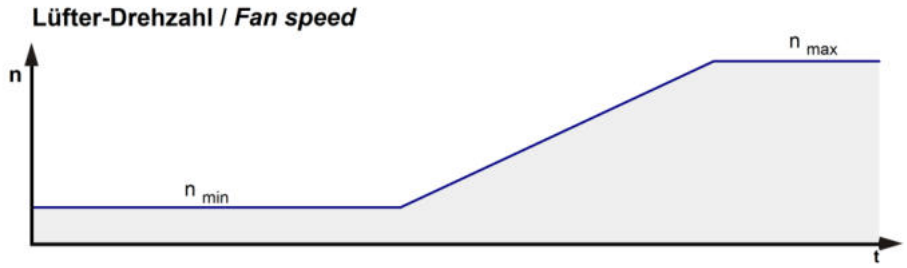
### 3.3 Electrical Interface - Output

| | |
|---|---|
| Tacho type | /2 (open collector) |




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



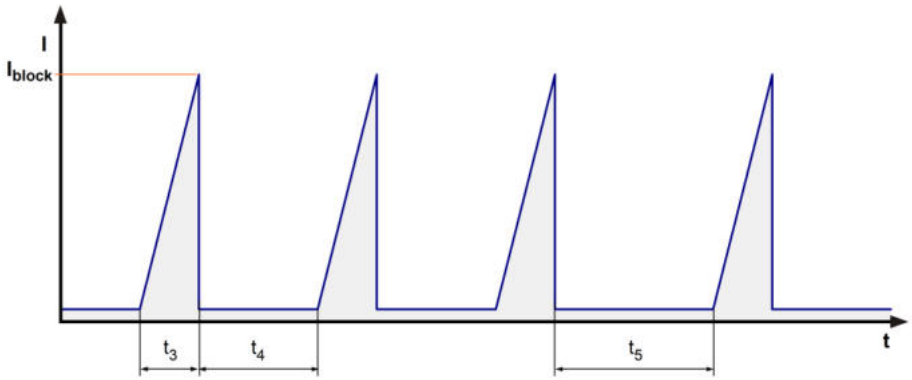

| Features | | Note | Values |
|---|---|---|---|
| Tacho operating voltage | $U_{BS}$ | | <= 36 V |
| Tacho signal Low | $U_{S\,low}$ | I sink: | <= 0,4 V |
| Tacho signal High | $U_{S\,high}$ | I source: 0 mA | <=36 V |
| Maximum sink current | $I_{sink}$ | | <= 20 mA |
| External resistor | | External resistor Ra from UBS to US required. All voltages measured to GND. | |
| Tacho frequency | | (3 x n) / 60 | 250 Hz @ 5.000 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<br>Max. residual current at $U_N$ | N-CH FET<br>$I_F$ < 5 mA | |
| Locked rotor protection | Auto restart | |
| Locked rotor current at $U_N$ | $I_{block}$ approx. 1.500 mA | |
| Clock signal at locked rotor<br>Extended Downtime | $t_3$ / $t_4$ typical: 6 s / 10 s<br>$t_5$: 40 s after 4 start-up tests | |
| Internal fuse | Littelfuse NANO2 > Very Fast-Acting > 451/453 Series<br>10A / 125V (Art.No.: 0451010.MRL) | |
| Voltage control *) | Fan turns on at $U_B$ > 14 V or < 38 V<br>Fan turns off at $U_B$ < 12 V or > 42 V | |

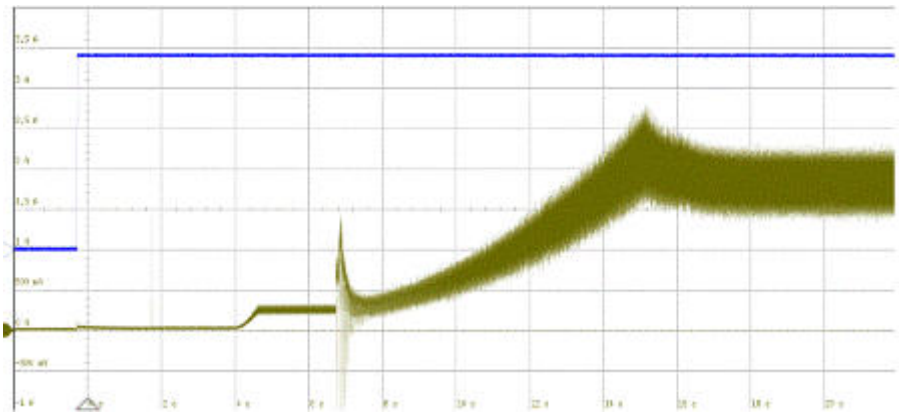
*) This fan has an undervoltage and overvoltage control circuit integrated which turns the motor off if the voltage is out of range.



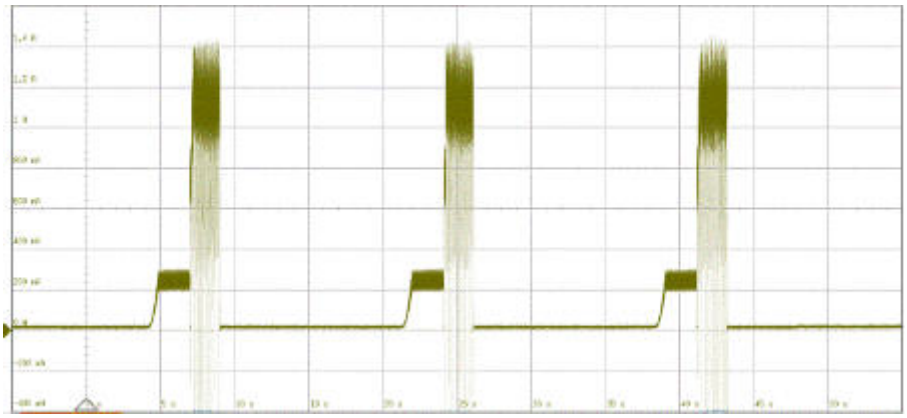

This fan has a startup delay of 2 seconds after applying supply voltage.

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

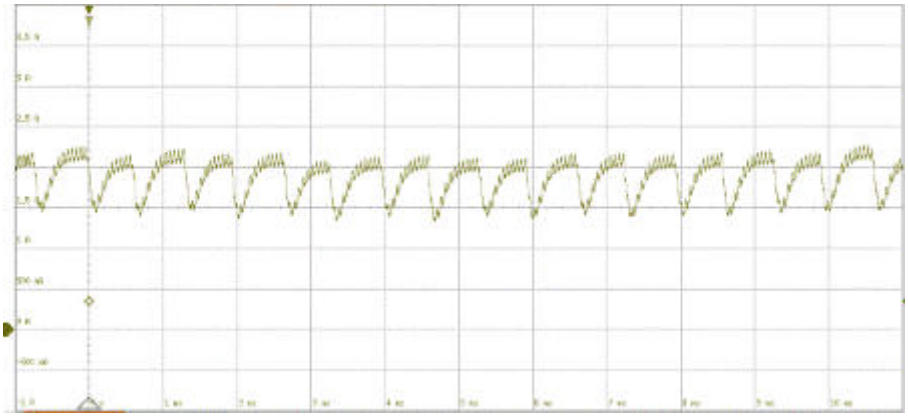
When several fans are operated together (in a fan tray) and one fan starts after the other and the starting current is eventually limited, it can happen that the not yet operated fan is driven in reverse by the counter pressure. This can lead to a failure of the first start-up. The fan detects this and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



Start-up current @ 24V (I = 500mA/div ; t=2s/div)



Locked rotor current @ 24V (I = 200mA/div ; t = 5s/div)



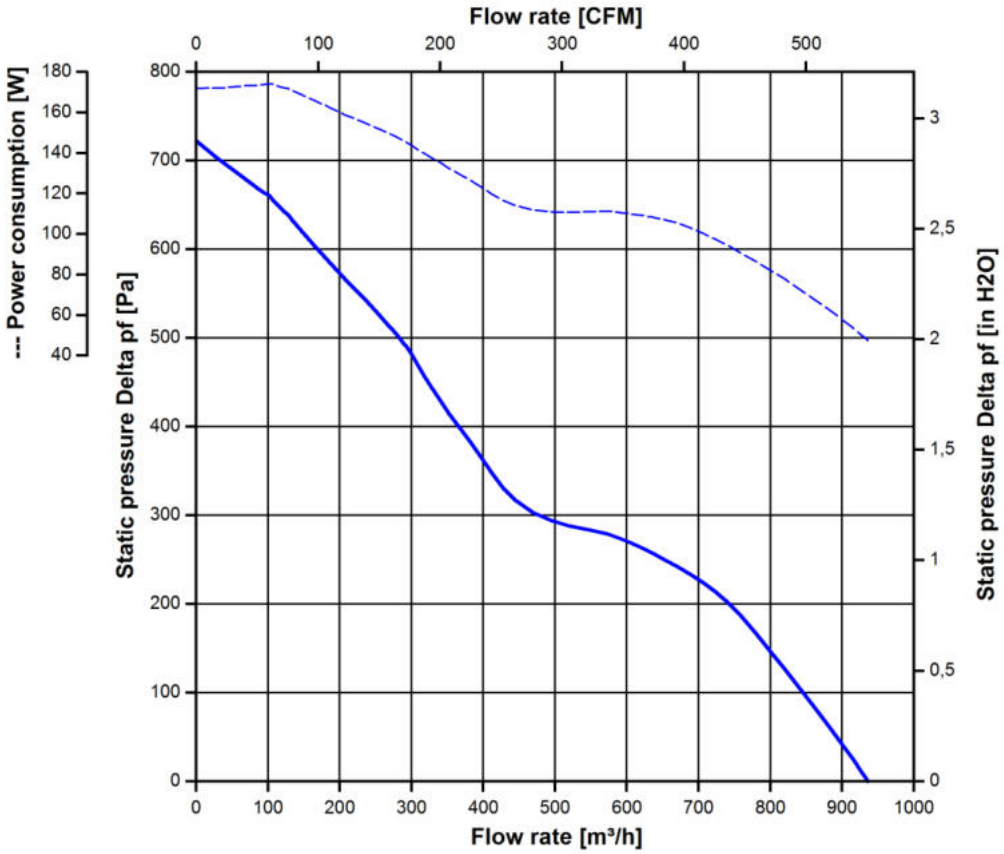
Running current @ 24V (I = 500mA/div ; t = 1ms/div)

### 3.5 Aerodynamics

| | |
|---|---|
| Measurement conditions: | Measured with a double chamber intake rig acc. to DIN EN ISO 5801.<br>Normal air density = 1,2 kg/m3; Temperature 23°C +/- 3°C;<br>In the intake and outlet area should not be any solid obstruction within 0,5 m. Motor shaft horizontal.<br>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. Power consumption of the fan motor when operating at normal voltage is shown. Depending on the operating conditions of the application, the power input may be higher. |

a.) Operation condition:

| | | |
|---|---|---|
| Max. free-air flow (∆p = 0 / $\dot{V}$ = max.) | 940 m3/h | |
| Max. static pressure (∆p = max. / $\dot{V}$ =0) | 725 Pa | |



### 3.6 Sound Data

| | |
|---|---|
| Measurement conditions: | Sound pressure level: 1 meter distance between microphone and the air intake.<br>Sound power level: Acc. to DIN 45635 part 38 (ISO 10302)<br>Measured in a semianechoic chamber with a background noise level of Lp(A) < 5 dB(A)<br>For further measurement conditions see chapter aerodynamics. |

a.) Operation condition:

| | | |
|---|---|---|
| Optimal operating point | 910 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

| | | |
|---|---|---|
| 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.

### 4.3 Mechanical Requirements

| severity level | mobile use | | |
|---|---|---|---|
| 1 | storage / transportation | Random vibration not in use<br>IEC 60068-2-64<br>Frequency range / ASD<br><br>$G_{RMS}$<br>Axes of vibration<br>Test duration | <br>Random vibration<br>5 - 20 Hz : 1,0 $m^2 / s^3$<br>20 - 500 Hz : - 3 dB / Oct<br>0,91 G<br>3<br>3 x 5 h |
| | storage / transportation | Bump not in use<br>IEC 60068-2-29<br>Shock spectrum<br>Acceleration<br>Duration<br>Number of bumps (+X, -X, -Y, +Y, -Z, +Z)<br>Total bumps | <br>Bump<br>half sine<br>18 G<br>6 ms<br>100 in each direction<br>600 |
| | mobile use | Random vibration in use<br>IEC 60068-2-64<br>Frequency range / ASD<br><br><br>$G_{RMS}$<br>Axes of vibration<br>Test duration | <br>Random vibration<br>5 - 20 Hz : 2,0 $m^2 / s^3$<br>20- 150 Hz : - 3 dB / Oct<br>0,83 G<br>3<br>3 x 5 h |
| | mobile use | Shock in use<br>IEC 60068-2-27<br>Shock spectrum<br>Acceleration<br>Duration<br>Number of bumps (+X, -X, -Y, +Y, -Z, +Z)<br>Total bumps | <br>Shock<br>half sine<br>30 G<br>6 ms<br>10 in each direction<br>60 |
| | mobile use | Bump in use<br>IEC 60068-2-29<br>Shock spectrum<br>Acceleration<br>Duration<br>Number of bumps (+X, -X, -Y, +Y, -Z, +Z)<br>Total bumps | <br>Bump<br>half sine<br>5 G<br>11 ms<br>100 in each direction<br>600 |

### 4.4 EMC

| **Kind** | **Radiated Emission; 30 MHz - 1000 MHz** |
|---|---|
| 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 | A: The monitored function operates as designed during and after exposure to a disturbance. |

| **Kind** | **Electromagnetic Field Immunity Test** |
|---|---|
| According | DIN EN 61000-4-3:2006-12 |
| Ceck accuracy / Limit | 10 V/m; 80 - 1000 MHz; AM; m = 0,8; f = 1 kHz; 1%; t = 3 s |
| Result | A: The monitored function operates as designed during and after exposure to a disturbance. |

| **Kind** | **Electrical Fast Transient / Burst Immunity Test** |
|---|---|
| According | DIN EN 61000-4-4:2005-07 |
| Ceck accuracy / Limit | +/- 2 kV on Power Lines; Coupling: POS, NEG, {PE}, ALL, 5 kHz and 100 kHz; 1 min |
| Result | A: The monitored function operates as designed during and after exposure to a disturbance. |

| **Kind** | **Immunity to Conducted Disturbances, Induced by RF-Fields** |
|---|---|
| According | DIN EN 61000-4-6:2001-12 |
| Ceck accuracy / Limit | 10 Vrms; 150 kHz - 80 MHz; AM; m = 0,8; f = 1 kHz; 1%; t = 3 s |
| Result | A: The monitored function operates as designed during and after exposure to a disturbance. |

## 5 Safety

### 5.1 Electrical Safety

| | | |
|---|---|---|
| Dielectric strength<br>DIN EN 62368 and DIN EN 60335<br>A.) Type test<br>Measuring conditions: After 48h of storage at 95% R.H. and 25°C.<br>No arcing or breakdown is allowed!<br>All connections together to ground.<br>B.) Routine test<br>Measuring conditions: At indoor climate.<br>No arcing or breakdown is allowed!<br>All connections together to ground. | 500 VAC / 1 Min.<br><br>850 VDC / 1 Sec. | |
| Isolation resistance<br>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 | |

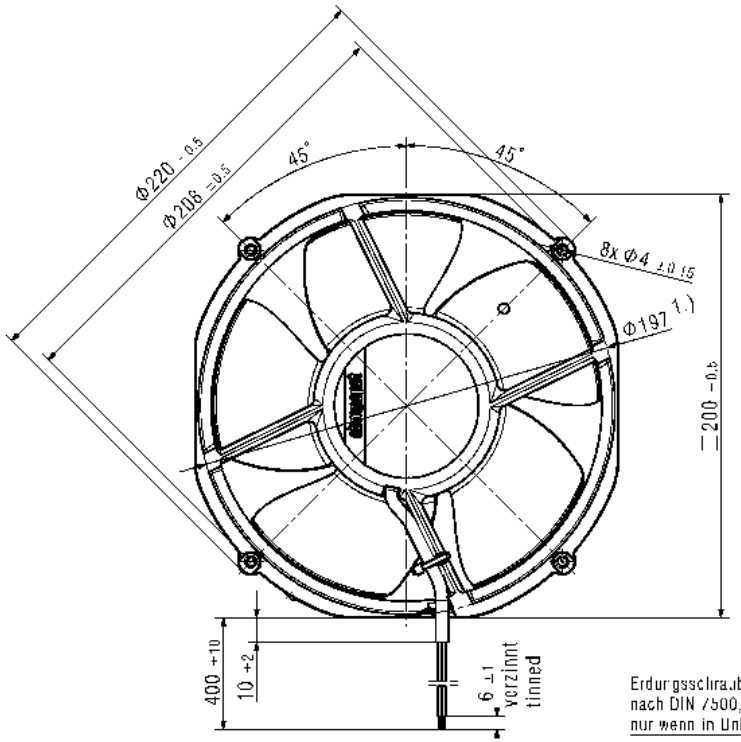
### 5.2 Approval Tests

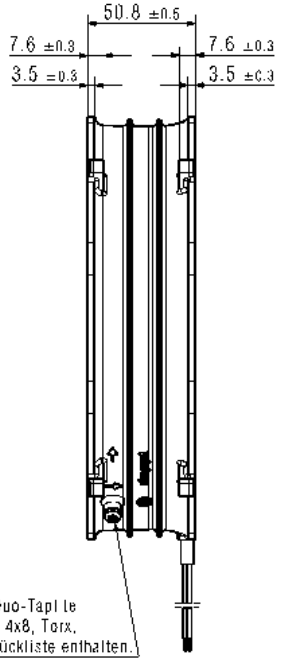
| | | |
|---|---|---|
| CE | EC Declaration of Conformity | No |
| EAC | Eurasian Conformity | Yes |
| UL | Underwriters Laboratories | Yes / UL audited by CSA according to UL507, Electric Fans |
| VDE | Association for Electrical, Electronic and Information Technologies | Yes / Approval acc. to EN 62368 - Audio/video, information and communication technology equipment |
| CSA | Canadian Standards Association | Yes / C22.2 No. 113 Fans and Ventilators |
| CCC | China Compulsory Certification | Not applicable |

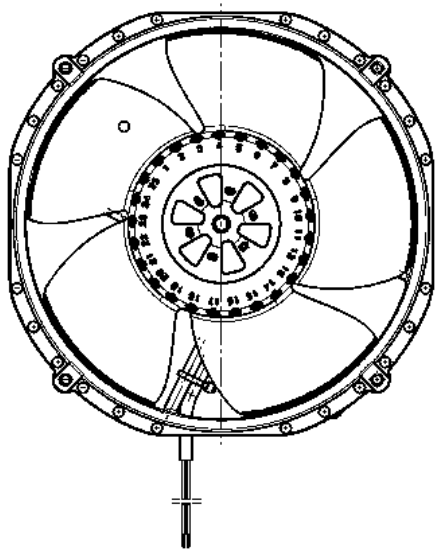
## 6 Reliability

### 6.1 General

| | | |
|---|---|---|
| Life expectancy L10 at TU = 40 °C | 85.000 h | |
| Life expectancy L10 at TU max. | 42.500 h | |
| Life expectancy L10 acc. to IPC 9591 at TU = 40 °C | 142.500 h | |

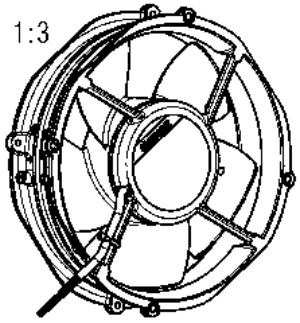


Erdungsschraube: Duo-Taptite
nach DIN 7500, CM 4x8, Torx,
nur wenn in Unterstückliste enthalten.

Grounding screw: Duo Taptite
according to DIN 7500, CM 4x8, Torx,
only if contained in sub-bill of materials.




- Axialspiel der Kugellager mit Feder spielfrei verspannt
1.) Maße für Montageausschnitt
2.) Anzahl und Länge der Litzen sowie Länge des Schlauchs siehe Produktspezifikation

- ball bearings without clearance by a pre-loaded spring
1.) measures of mounting cut-out
2.) length and number of wires and length of tube see product specification

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