**Product Data Sheet** **8315100380**

VWG0138KULCZ

AF172-00380 48V P/2U

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**AF172-00380 48V P/2U**

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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

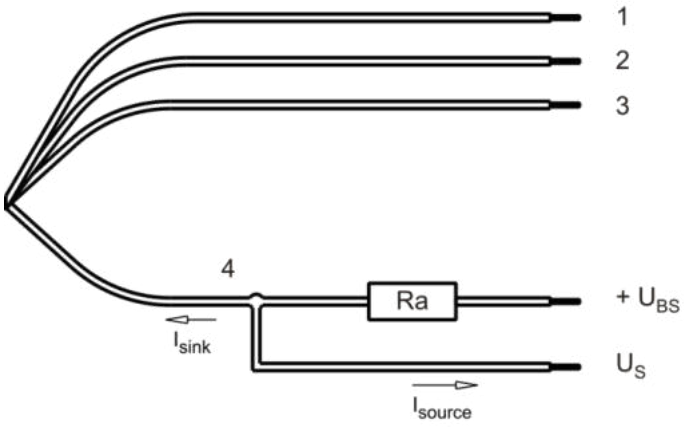
### 2.1 General

| | | |
|---|---|---|
| Width | 150,0 mm | |
| Depth | 51,0 mm | |
| Diameter | 172,0 mm | |
| Mass | 0,86 kg | |
| Housing material | Metal | |
| Impeller material | Plastic | |
| Max. torque when mounted across both mounting flanges<br>Screw size | Wire outlet corner: 190 Ncm<br>Remaining corners: 190 Ncm<br>ISO 4762 - M4 degreased, without an additional brace and without washer | |

### 2.2 Connections

| | | |
|---|---|---|
| Electrical connection | Wires - Plug | |
| Lead wire length<br>Tolerance | L = 330 mm<br>+- 10,0 mm | |
| Tube length<br>Tolerance | S = 15 mm<br>+- 10 mm | |
| Plug | See drawing | |
| Contact | See drawing | |






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

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

## 3 Operating Data

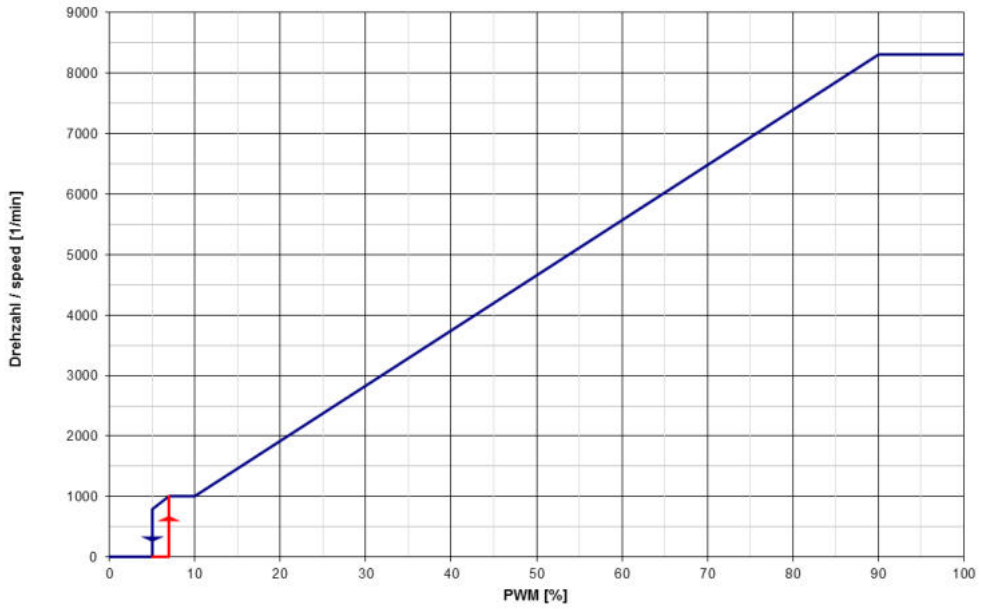
### 3.1 Electrical Interface - Input

| | |
|---|---|
| Control input | PWM |

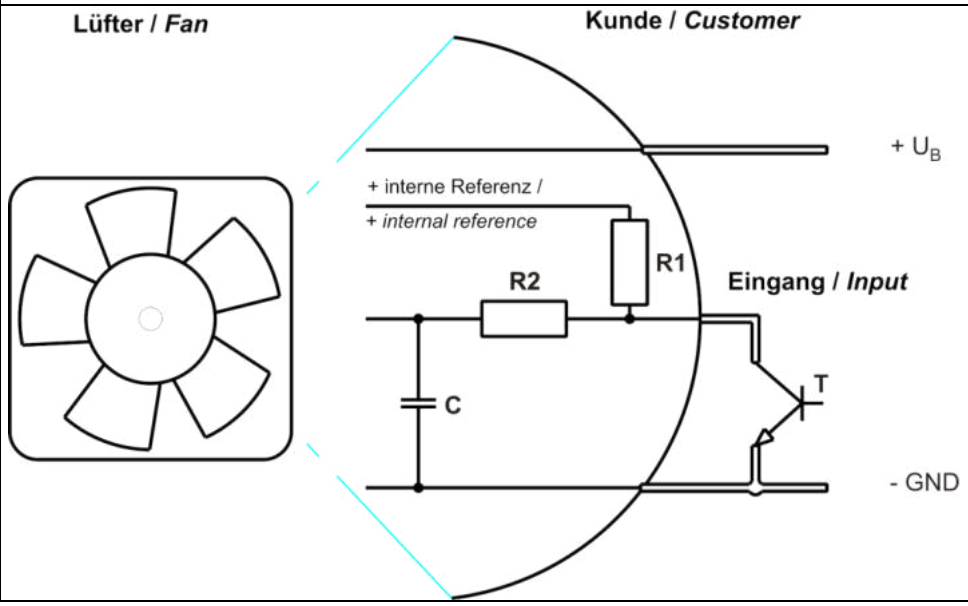
**Features**

| | | |
|---|---|---|
| Inpute type | Open collector | |
| PWM - Frequency | | typical: 2 kHz |

**Characteristics**




**Schematics**




PWM input transistor requirements:
$U_{CE}$max. => 12 V; I Sink max. > 5 mA; $U_{CE}$sat. < 0,15 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% - <=7% PWM: | 0 1/min (Fan off) |
| 7% PWM: | 1.000 1/min (Start-up, comming from 0% PWM) |
| 7% - 10 % PWM: | 1.000 1/min (corresp. to min fan speed) |
| 10% - 90% PWM: | Linear increasing curve |
| 90% - 100% PWM: | 8.300 1/min (corresp. to max fan speed) |
| 5% PWM: | 800 1/min or 0 1/min (Fan turns 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 (unless otherwise specified). In the intake and outlet area should not be any solid obstruction within 0,5 m.

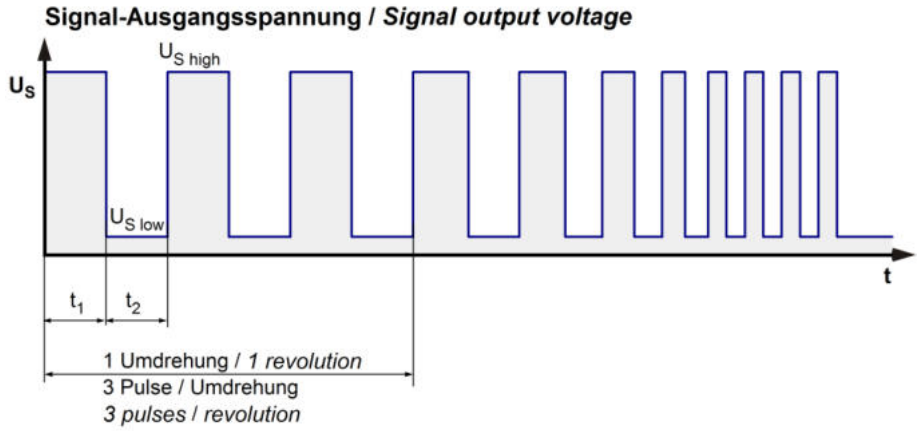
Δp = 0: corresp. to free air flow (see chapter aerodynamics)
I: corresp. to arithm. mean current value

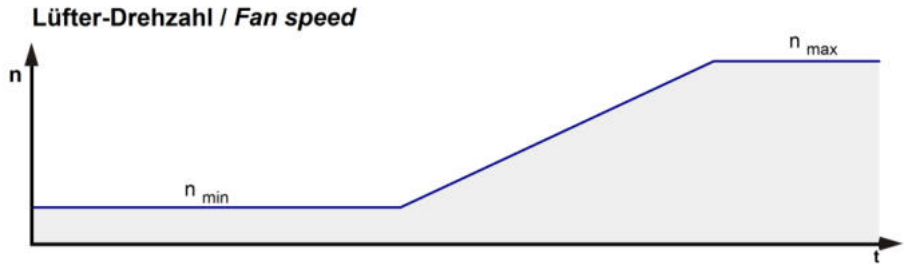
| Name | Condition | | |
|---|---|---|---|
| PWM 0001 | PWM: 100 %; | | |

| Features | Condition | Symbol | Values | | |
|---|---|---|---|---|---|
| Voltage range | | U | 36 V | | 72 V |
| Nominal voltage | | $U_N$ | | 48 V | |
| Power consumption<br>Tolerance | Δp = 0<br>PWM 0010 | P | 65 W<br>+- 15 % | 98 W<br>+- 15 % | 100 W<br>+- 15 % |
| Current consumption<br>Tolerance | Δp = 0<br>PWM 0010 | I | 1.800 mA<br>+- 15 % | 2.050 mA<br>+- 15 % | 1.400 mA<br>+- 15 % |
| Speed<br>Tolerance | Δp = 0<br>PWM 0010 | n | 7.300 1/min<br>+- 10 % | 8.300 1/min<br>+- 10 % | 8.300 1/min<br>+- 10 % |

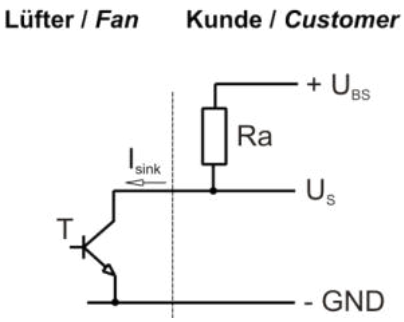
### 3.3 Electrical Interface - Output

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




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



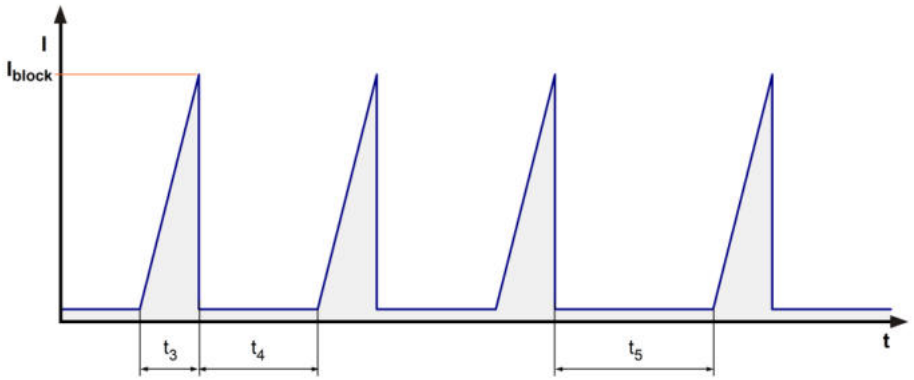

| Features | | Note | Values |
|---|---|---|---|
| Tacho operating voltage | $U_{BS}$ | | <= 60 V |
| Tacho signal Low | $U_{S\,low}$ | I sink: 2 mA | <= 0,4 V |
| Tacho signal High | $U_{S\,high}$ | I source: 0 mA | |
| Maximum sink current | $I_{sink}$ | | <= 20 mA |
| External resistor | | External resistor Ra from UBS to US required. All voltages measured to GND. | |
| Tacho frequency | | (3 x n) / 60 | |
| 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 $U_N$ | Rectifying diode<br>$I_F$ <= 5 | |
| Locked rotor protection | Auto restart | |
| Locked rotor current at $U_N$ | $I_{block}$ | |
| Clock signal at locked rotor<br>Extended Downtime | $t_3$ / $t_4$ typical: 3 s / 10 s<br>$t_5$: 30 s after 5 start-up tests | |
| Internal fuse | Littelfuse NANO2 > Very Fast-Acting > 451/453 Series<br>6,3A / 125V (Art.No.: 045106.3MRL) | |
| Voltage control *) | Fan turns on at $U_B$ > 14 V or < 33 V<br>Fan turns off at $U_B$ < 12 V or > 35 V | |

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




### 3.5 Data According ErP Directive

| | |
|---|---|
| Installation / Efficency category | A / static |
| Speed control | integrated |
| Specific ratio | 1,00612 |
| Target overall efficiency 2015 | 28,7 % |
| Overall efficiency | 48,2 % |
| Efficiency grade | 40 |
| Power input | 165 W |
| Speed | 8.300 1/min |

All values measured in optimum energy efficiency point.

Productiondatecode is printed on the fan label.

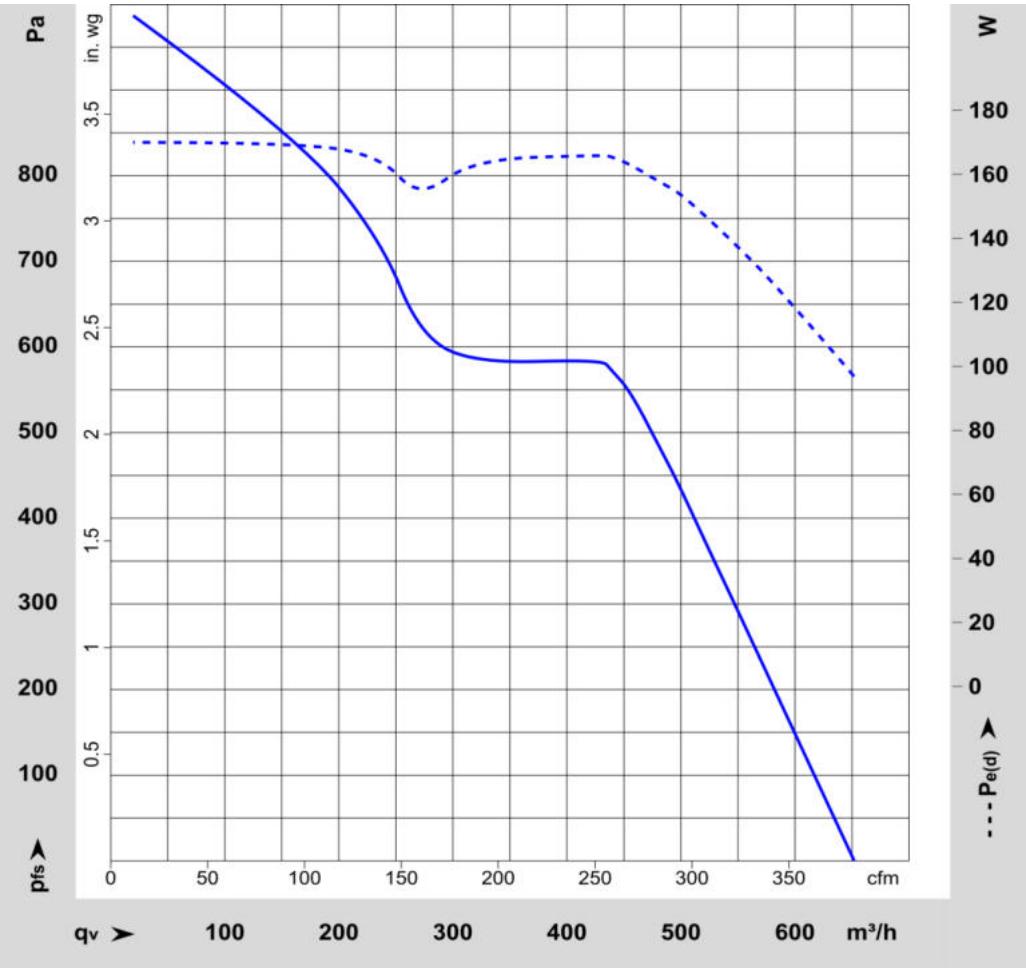
### 3.6 Aerodynamics

| | |
|---|---|
| Measurement conditions: | Measured with a double chamber intake rig acc. to DIN EN ISO 5801.<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:

| | | | |
|---|---|---|---|
| 8.300 1/min at free air flow | PWM 100 %; | | |

| | | |
|---|---|---|
| Max. free-air flow (Δp = 0 / V̇ = max.) | 650 m3/h | |
| Max. static pressure (Δp = max. / V̇ =0) | 980 Pa | |



### 3.7 Sound Data

| | |
|---|---|
| Measurement conditions: | Sound pressure level: 1 meter distance between microphone and the air intake.<br>Sound power level: According to ISO 13347-3.<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:

| | | | |
|---|---|---|---|
| 8.300 1/min at free air flow | PWM 100 %; | | |

| | | |
|---|---|---|
| Optimal operating point | 545 m3/h @ 295 Pa | |
| Sound power level at the optimal operating point | 8,1 bel(A) | |
| Sound pressure level at free air flow, measured in rubber bands | 70 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 temperature, cyclic; according to DIN EN 60068-2-38, 10 cycle and condensation water check; according to DIN EN ISO 6270-2, 14 days | |
| Water exposure | Splash water check IPX4; according to DIN EN 60529 VDE 0470, not certified | |
| Dust requirements | Dust check IP5X; according to DIN EN 60529 VDE 0470, not certified | |
| Salt fog requirements | Salt fog, cylic, in operation; according to DIN EN 60068-2-52; 10 cycles | |

Permitted application area:
The product is for the use in open and unsheltered areas. Direct exposure to water as well as saline ambient conditions are allowed provided that this does not prevent the normal operation.

Pollution degree 4 (according DIN EN 60664-1)
It occurs permanent conductivity caused by conductive dust, rain or moisture.

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

### 4.3 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** | **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 / 1,5 mm | |
| Protection class | I | |

### 5.2 Approval Tests

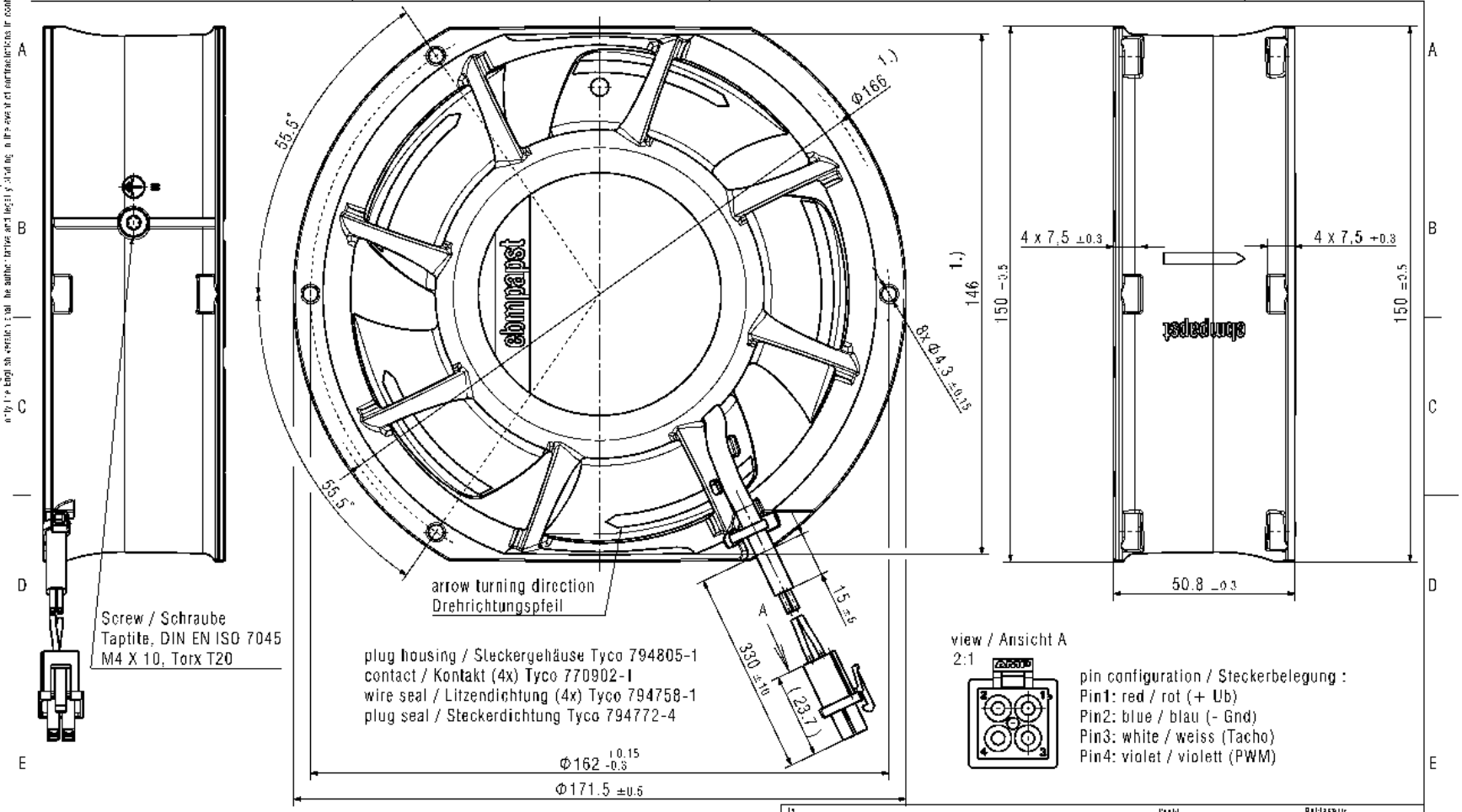
| | | |
|---|---|---|
| CE | EC Declaration of Conformity | Yes |
| EAC | Eurasian Conformity | Yes |
| UL | Underwriters Laboratories | Yes / UL507, Electric Fans E38324 |
| VDE | Association for Electrical, Electronic and Information Technologies | Yes / Approval acc. to EN 62368 - Audio/video, information and communication technology equipment |
| CSA | Canadian Standards Association | Yes / CSA audited by UL according to C22.2 No. 113 Fans and Ventilators |
| CCC | China Compulsory Certification | Yes / GB 12350 Safety Requirements for small Power Motors |

## 6 Reliability

### 6.1 General

| | | |
|---|---|---|
| Life expectancy L10 at TU = 40 °C | 70.000 h | |
| Life expectancy L10 at TU max. | 35.000 h | |
| Life expectancy L10 acc. to IPC 9591 at TU = 40 °C | 117.500 h | |

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1.) measures of mounting cut out
- ball bearing without clearance by a pre-load spring

1.) Maße aus Montageausschnitt
- Axialspiel der Kugellager mit Feder spielfrei verspannt

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