

**Product Data Sheet**    **8300101142**  
VWCE040KHDES  
AxiForce40

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## AxiForce40

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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                    |  |

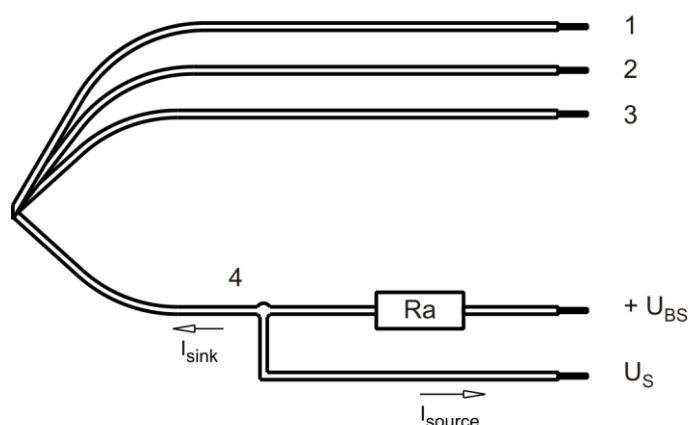
## 2 Mechanics

### 2.1 General

|                                                       |                                                                         |  |
|-------------------------------------------------------|-------------------------------------------------------------------------|--|
| Width                                                 | 40 mm                                                                   |  |
| Height                                                | 40 mm                                                                   |  |
| Depth                                                 | 28 mm                                                                   |  |
| Mass                                                  | 52 g                                                                    |  |
| Housing material                                      | Plastic                                                                 |  |
| Impeller material                                     | Plastic                                                                 |  |
| Max. torque when mounted across both mounting flanges | Wire outlet corner: 30 Ncm<br>Remaining corners: 30 Ncm                 |  |
| Screw size                                            | ISO 4762 - M3 degreased, without an additional brace and without washer |  |
| Rotor protrusion max.                                 | 0 mm                                                                    |  |

### 2.2 Connections

|                       |            |  |
|-----------------------|------------|--|
| Electrical connection | Wires      |  |
| Lead wire length      | L = 310 mm |  |
| Tolerance             | +/- 10 mm  |  |
| Wire size (AWG)       | 26         |  |
| Insulation diameter   | 1 mm       |  |



| Wire | Color  | Operation | Wire size | Insulation diameter |
|------|--------|-----------|-----------|---------------------|
| 1    | red    | + UB      | AWG 26    | 1 mm                |
| 2    | blue   | - GND     | AWG 26    | 1 mm                |
| 3    | violet | PWM       | AWG 26    | 1 mm                |
| 4    | white  | Tacho     | AWG 26    | 1 mm                |

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

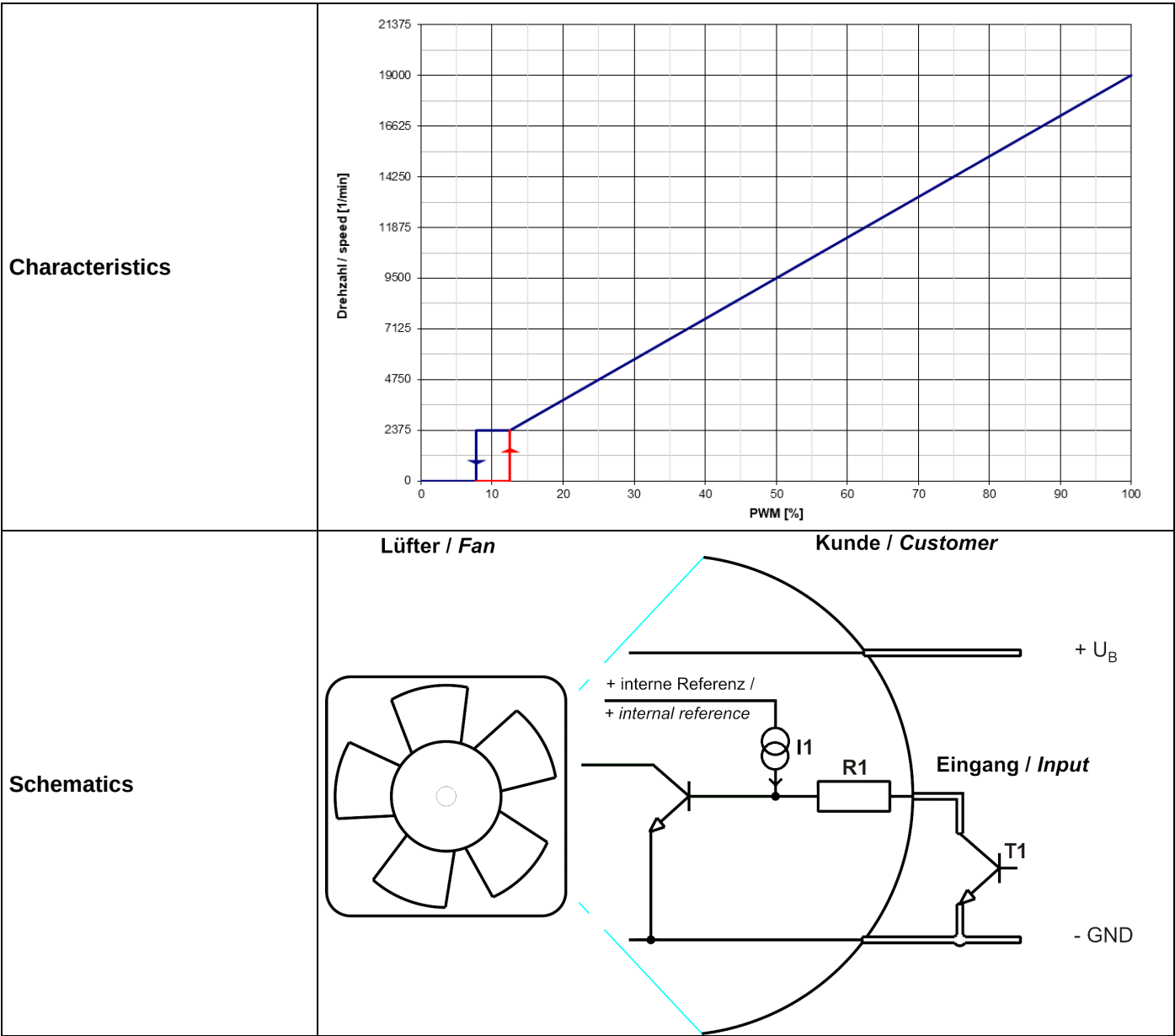
3 Operating Data

3.1 Electrical Interface - Input

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

Features

|                 |                |                                  |
|-----------------|----------------|----------------------------------|
| Input type      | Open collector |                                  |
| PWM - Frequency |                | 1 kHz - 30 kHz<br>typical: 2 kHz |



Speed control: 0... 100 %, PWM-Low < 0,2 V  
The current source I1 connected to the internal reference has a current of 50µA during standby and up to 300µA when the fan is running. R1 = 1,8 kOhm

### 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 15 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

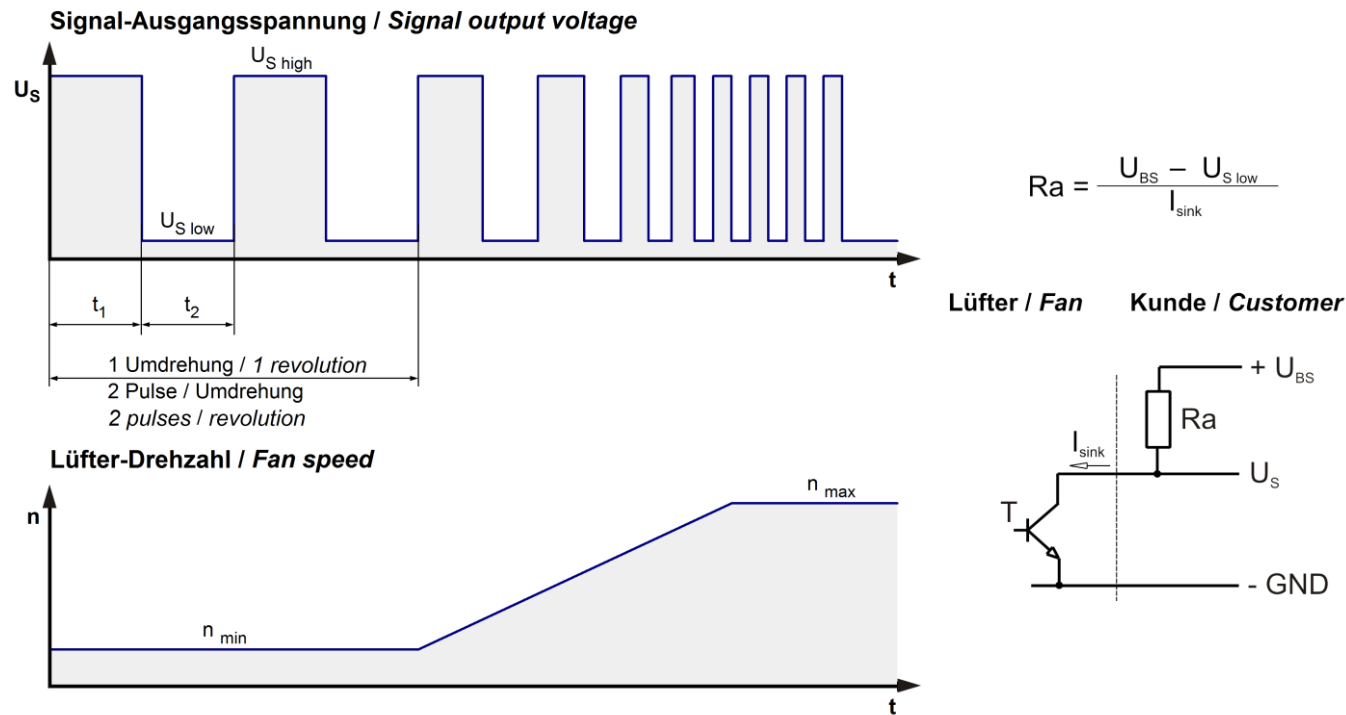
| Name     | Condition            |
|----------|----------------------|
| PWM 0001 | PWM: 100 %; f: 2 kHz |

Unless otherwise specified in the table a general fan speed tolerance applies, relating to the maximum value of the required characteristic curve. Tolerance: +-5

| Features                     | Condition      | Symbol         | Values       |              |              |
|------------------------------|----------------|----------------|--------------|--------------|--------------|
| Voltage range                |                | U              | 6 V          |              | 13,8 V       |
| Nominal voltage              |                | U <sub>N</sub> |              | 12 V         |              |
| Power consumption            | $\Delta p = 0$ | P              | 4 W          | 7 W          | 7 W          |
| Tolerance                    | PWM 0010       |                | +/- 17,5 %   | +/- 20 %     | +/- 20 %     |
| Current consumption          | $\Delta p = 0$ | I              | 650 mA       | 600 mA       | 500 mA       |
| Tolerance                    | PWM 0010       |                | +/- 17,5 %   | +/- 20 %     | +/- 20 %     |
| Speed                        | $\Delta p = 0$ | n              | 15.200 1/min | 19.000 1/min | 19.000 1/min |
| Tolerance                    | PWM 0010       |                | +/- 12,5 %   | +/- 5 %      | +/- 5 %      |
| Starting current consumption |                |                |              | <= 2.300 mA  |              |

3.3 Electrical Interface - Output

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

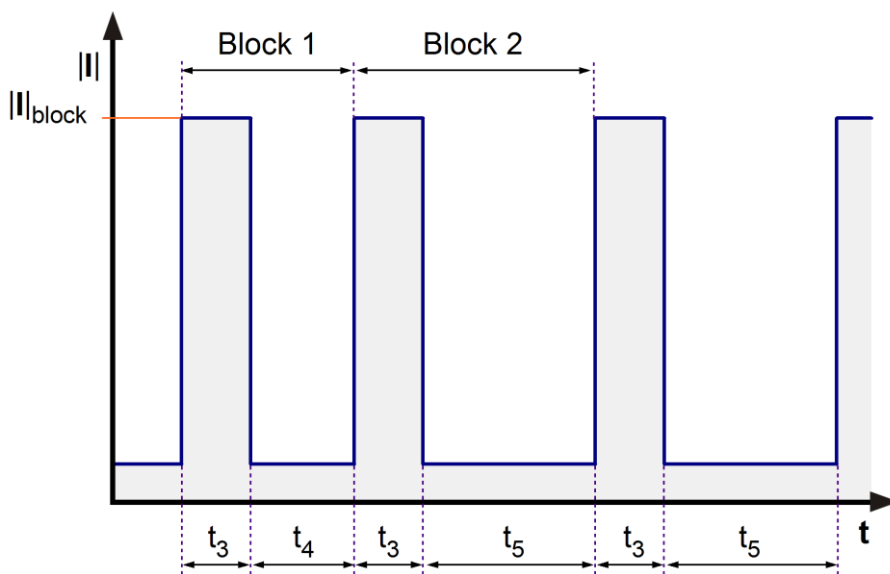


| Features                  | Note                                                                                   | Values                 |
|---------------------------|----------------------------------------------------------------------------------------|------------------------|
| Tacho operating voltage   | $U_{BS}$                                                                               | $\leq 30\text{ V}$     |
| Tacho signal Low          | $U_{S\ low}$                                                                           | $\leq 0,4\text{ V}$    |
| Tacho signal High         | $U_{S\ high}$                                                                          | $\leq 30\text{ V}$     |
| Maximum sink current      | $I_{sink}$                                                                             | $\leq 4\text{ mA}$     |
| 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                 |                                                                                        | $\geq 0,5\text{ V/us}$ |

n in revolutions per minute (1/min)

## 3.4 Electrical Features

|                                |                                         |  |
|--------------------------------|-----------------------------------------|--|
| Electronic function            | Speed-Controlled                        |  |
| Reversed polarity protection   | N-CH FET                                |  |
| Max. residual current at $U_N$ | $I_F \leq 1 \text{ mA}$                 |  |
| Locked rotor protection        | Auto restart                            |  |
| Locked rotor current at $U_N$  | $I_{\text{block}}$ approx. 2.300 mA     |  |
| Clock signal at locked rotor   | $t_3 / t_4$ typical: 0,33 s / 0,33 s    |  |
| Extended Downtime              | $t_5$ : 9,4 s after 3 start-up attempts |  |
| Internal fuse                  | None                                    |  |



Block1: (The first 2 cycles)  $t_3/t_4 = 0,33 \text{ s} / 0,33 \text{ s}$ ;  
 Block2: locked rotor protection  $t_3/t_5 = 0,33 \text{ s} / 9,4 \text{ s}$

### 3.5 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;

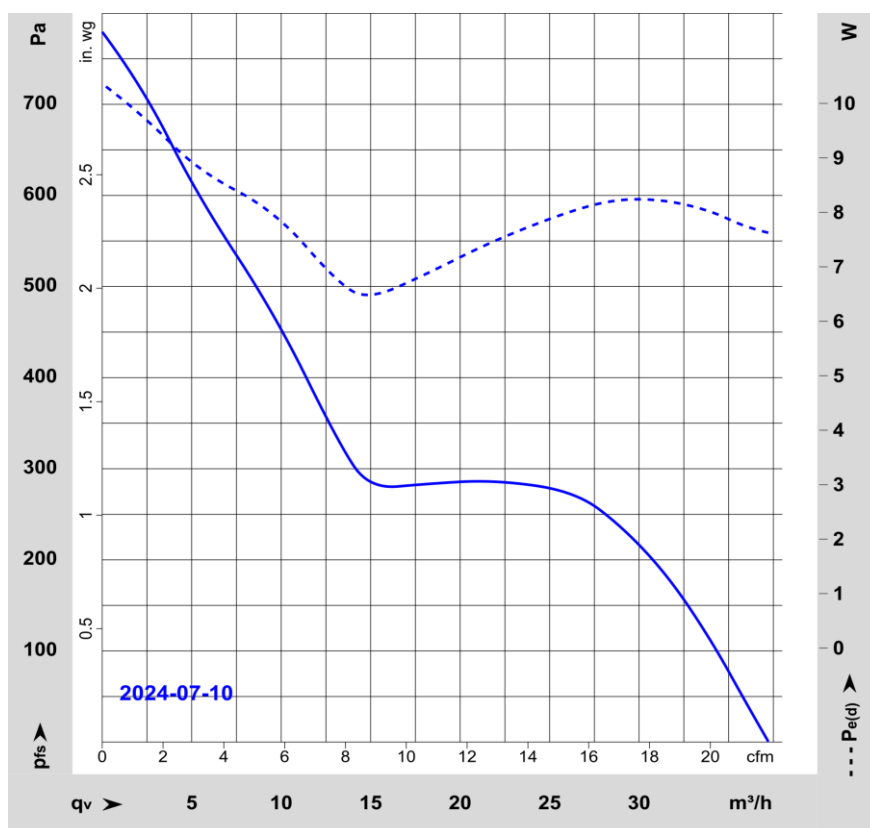
In the intake and outlet area should not be any solid obstruction within 0,5 m. Motor shaft horizontal.

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. 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:

|                               |                     |  |
|-------------------------------|---------------------|--|
| 19.000 1/min at free air flow | PWM 100 %; f: 2 kHz |  |
|-------------------------------|---------------------|--|

|                                                             |                      |  |
|-------------------------------------------------------------|----------------------|--|
| Max. free-air flow ( $\Delta p = 0$ / $\dot{V} = \max.$ )   | 37 m <sup>3</sup> /h |  |
| Max. static pressure ( $\Delta p = \max.$ / $\dot{V} = 0$ ) | 775 Pa               |  |





### 3.6 Sound Data

Measurement conditions: Sound pressure level: 1 meter distance between microphone and the air intake.  
Sound power level: According to ISO 10302-1  
Measured in a semi anechoic chamber with a background noise level of  $L_p(A) < 5 \text{ dB}(A)$   
For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

|                                                                 |                               |  |
|-----------------------------------------------------------------|-------------------------------|--|
| 19.000 1/min at free air flow                                   | PWM 100 %; f: 2 kHz           |  |
| Optimal operating point                                         | 26 m <sup>3</sup> /h @ 275 Pa |  |
| Sound power level at the optimal operating point                | 6,7 bel(A)                    |  |
| Sound pressure level at free air flow, measured in rubber bands | 55 dB(A)                      |  |

## 4 Environment

### 4.1 General

|                                            |        |  |
|--------------------------------------------|--------|--|
| Min. permitted ambient temperature TU min. | -40 °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) **) |  |
|--------------------------------|-----------------------------------------------------------|--|

\*\*) 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

|                      |                                                          |
|----------------------|----------------------------------------------------------|
| <b>Kind</b>          | <b>Radiated Emission; 30 MHz - 1000 MHz (without PE)</b> |
| According            | DIN EN 55032:2016-02                                     |
| Test severity/ Limit | Class B                                                  |
| Result               | Below limit Class B                                      |

|                      |                                                                                            |
|----------------------|--------------------------------------------------------------------------------------------|
| <b>Kind</b>          | <b>Electrostatic Discharge Immunity Test</b>                                               |
| According            | DIN EN 61000-4-2:2001-12                                                                   |
| Test severity/ Limit | Contact Discharge +/- 4 kV; Air Discharge +/- 8 kV                                         |
| Result               | A: The monitored function operates as designed during and after exposure to a disturbance. |

|                      |                                                                                            |
|----------------------|--------------------------------------------------------------------------------------------|
| <b>Kind</b>          | <b>Electromagnetic Field Immunity Test</b>                                                 |
| According            | DIN EN 61000-4-3:2006-12                                                                   |
| Test severity/ 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. |

|                      |                                                                                            |
|----------------------|--------------------------------------------------------------------------------------------|
| <b>Kind</b>          | <b>Electrical Fast Transient / Burst Immunity Test</b>                                     |
| According            | DIN EN 61000-4-4:2005-07                                                                   |
| Test severity/ 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. |

|                      |                                                                                            |
|----------------------|--------------------------------------------------------------------------------------------|
| <b>Kind</b>          | <b>Immunity to Conducted Disturbances, Induced by RF-Fields</b>                            |
| According            | DIN EN 61000-4-6:2001-12                                                                   |
| Test severity/ 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                                      |  |

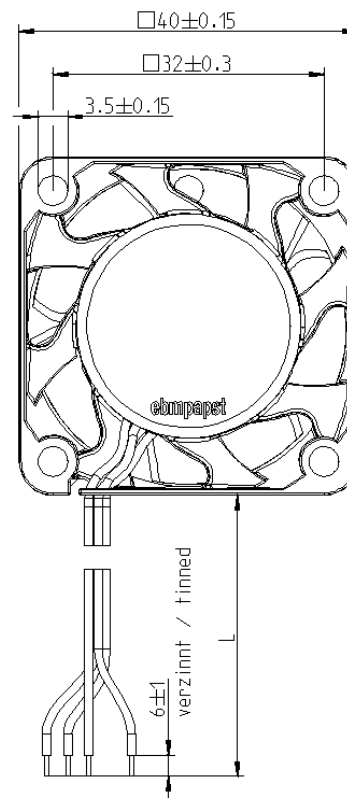
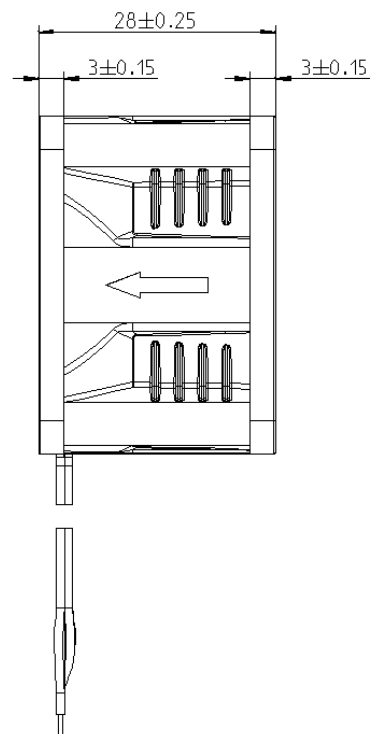
**5.2 Approval Tests**

|     |                                |                                                                                                            |
|-----|--------------------------------|------------------------------------------------------------------------------------------------------------|
| CE  | EC Declaration of Conformity   | Yes                                                                                                        |
| EAC | Eurasian Conformity            | No                                                                                                         |
| UL  | Underwriters Laboratories      | Yes / UL507, Electric Fans E38324                                                                          |
| EU  | safety mark for Europe         | Yes/ Approval according to EN 62368 - Equipment for audio/video, information, and communication technology |
| CSA | Canadian Standards Association | Yes / CSA audited by UL according to 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                  | 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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- kein Axialspiel der Kugellager durch Federausgleich /  
No axial clearance of the ball bearings due to a pre-load spring
- Anzahl und Länge der Litzen siehe Produktspezifikation  
Number an length of the wires see product specification

|                                                                                       |  |              |                                   |                                     |                                   |              |       |      |      |  |     |             |  |  |  |
|---------------------------------------------------------------------------------------|--|--------------|-----------------------------------|-------------------------------------|-----------------------------------|--------------|-------|------|------|--|-----|-------------|--|--|--|
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