

251657216

## Product Data Sheet

**8315100115**

VCS0045XUGAS

RVE45-3/54/2A

**ebm****papst**

The engineer's choice



RVE45-3/54/2A

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## 1 General

|                                     |                                  |  |
|-------------------------------------|----------------------------------|--|
| Fan type                            | Blower                           |  |
| Rotating direction looking at rotor | Counterclockwise                 |  |
| Airflow direction                   | Air in axially, Air out radially |  |
| Bearing system                      | Ball bearing                     |  |
| Mounting position - shaft           | Any                              |  |

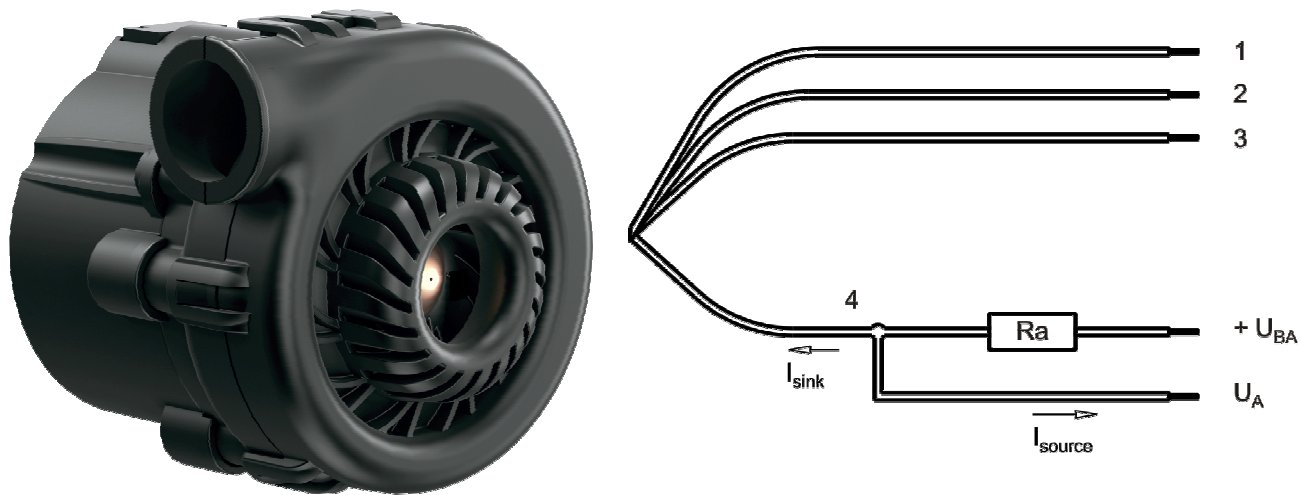
## 2 Mechanics

### 2.1 General

|                   |                                                                                                                        |  |
|-------------------|------------------------------------------------------------------------------------------------------------------------|--|
| Width             | 64,6 mm                                                                                                                |  |
| Height            | 64,5 mm                                                                                                                |  |
| Depth             | 65,5 mm                                                                                                                |  |
| Diameter          | 57 mm                                                                                                                  |  |
| Mass              | 0,16 kg                                                                                                                |  |
| Housing material  | FDA approved plastics for the air-conducting parts (top and bottom housing) and V0 for the motor and electronics cover |  |
| Impeller material | FDA approved plastics                                                                                                  |  |

### 2.2 Connections

|                       |            |  |
|-----------------------|------------|--|
| Electrical connection | Wires      |  |
| Lead wire length      | L = 354 mm |  |
| Tolerance             | + - 11 mm  |  |
| Wire size (AWG)       | 22         |  |
| Insulation diameter   | 1,7 mm     |  |



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

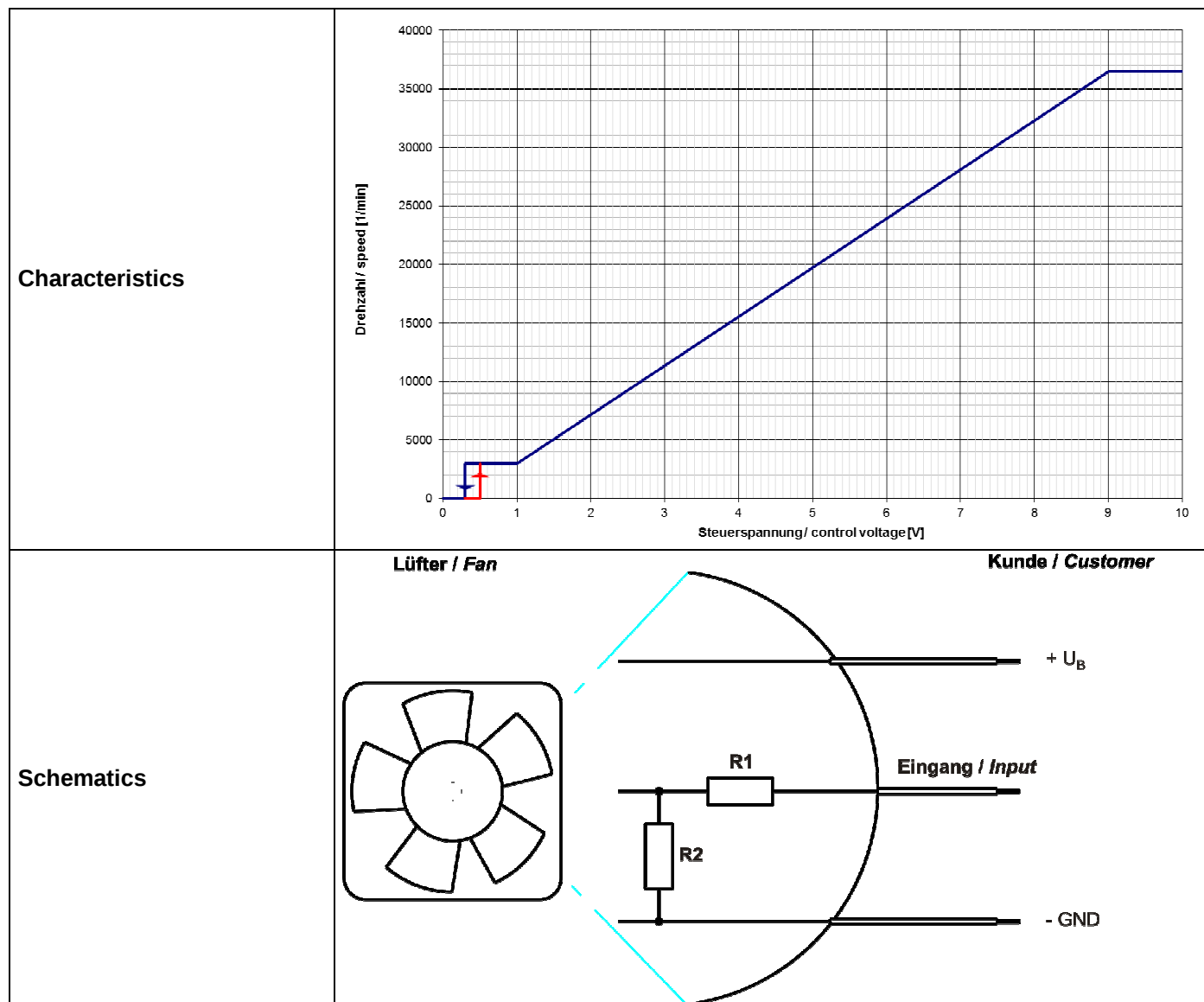
### 3 Operating Data

#### 3.1 Electrical Interface - Input

|               |        |
|---------------|--------|
| Control input | Analog |
|---------------|--------|

#### Features

|                     |            |
|---------------------|------------|
| Input voltage range | 0 V - 10 V |
|---------------------|------------|



#### Information to the curve:

|            |                                                              |
|------------|--------------------------------------------------------------|
| 0V - 0,5V: | 0 1/min (corresponding to minimum speed or power)            |
| 0,5V - 1V: | 3000 1/min (corresponding to minimum speed)                  |
| 1V - 9V:   | linearly increasing curve (coming from 0V)                   |
| 9V - 10V:  | 37.000 1/min (corresponding to maximum speed)                |
| 1V - 0,3V  | 3000 1/min (corresponding to minimum speed, coming from 10V) |
| 0,3V - 0V  | 0 1/min (corresponding to minimum speed or power)            |

If the setpoint is set to 0V, the fan brakes from < 20,000 rpm.

The fan is controlled and not regulated. The speed depends on the operating voltage and the operating point.

### 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 5 minutes. In the intake and outlet area should not be any solid obstruction within 0,5 m.

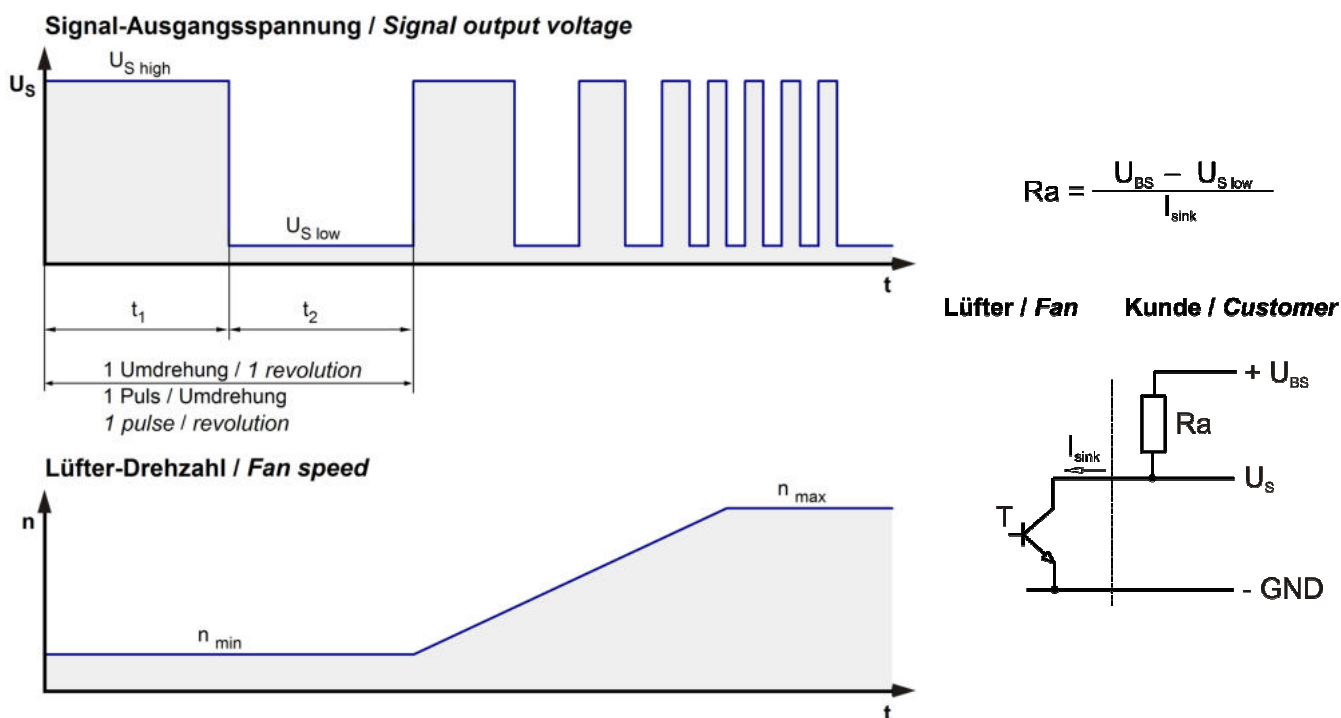
$\Delta p = 0$ : corresp. to free air flow (see chapter aerodynamics)  
 I: corresp. to arithm. mean current value

| Name          | Condition      |
|---------------|----------------|
| U Contr. 0001 | U Contr.: 10 V |

| Features                     | Condition      | Symbol | Values       |              |              |
|------------------------------|----------------|--------|--------------|--------------|--------------|
| Voltage range                |                | U      | 16 V         |              | 30 V         |
| Nominal voltage              |                | $U_N$  |              | 24 V         |              |
| Power consumption            | $\Delta p = 0$ | P      | 16 W         | 36 W         | 37 W         |
| Tolerance                    | U Contr. 0010  |        | +/- 10 %     | +/- 10 %     | +/- 10 %     |
| Current consumption          | $\Delta p = 0$ | I      | 1.000 mA     | 1.500 mA     | 1.250 mA     |
| Tolerance                    | U Contr. 0010  |        | +/- 10 %     | +/- 10 %     | +/- 10 %     |
| Speed                        | $\Delta p = 0$ | n      | 27.500 1/min | 36.500 1/min | 37.000 1/min |
| Tolerance                    | U Contr. 0010  |        | +/- 10 %     | +/- 10 %     | +/- 10 %     |
| Starting current consumption |                |        |              | <= 3.000 mA  |              |

## 3.3 Electrical Interface - Output

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



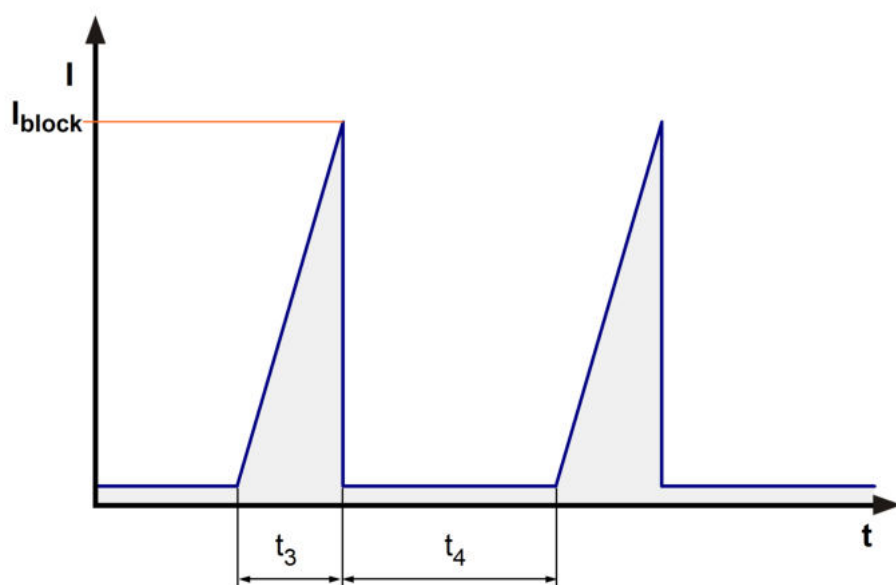
| Features                  | Note                                                                                   | Values                                 |
|---------------------------|----------------------------------------------------------------------------------------|----------------------------------------|
| 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      | $I_{sink}$                                                                             | $\leq 4\text{ mA}$                     |
| Maximum source current    |                                                                                        | $0\text{ mA}$                          |
| External resistor         | External resistor $R_a$ from $U_{BS}$ to $U_S$ required. All voltages measured to GND. |                                        |
| Tacho frequency           | $n / 60$                                                                               | $616\text{ Hz @ } 37.000\text{ 1/min}$ |
| Tacho isolated from motor | No                                                                                     |                                        |
| Slew rate                 |                                                                                        | $\Rightarrow 0,5\text{ V/us}$          |

$n$  = revolutions per minute (1/min)

### 3.4 Electrical Features

|                                |                                                                                                                       |  |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------|--|
| Electronic function            | Open loop speed                                                                                                       |  |
| 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. 70 mA                                                                                      |  |
| Clock signal at locked rotor   | $t_3 / t_4$ typical: 0,22 s / 0,22 s                                                                                  |  |
| Voltage control *)             | Fan turns on at $U_B > 15 \text{ V}$ or $< 31 \text{ V}$<br>Fan turns off at $U_B < 14 \text{ V}$ or $> 32 \text{ V}$ |  |

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



### 3.5 Aerodynamics

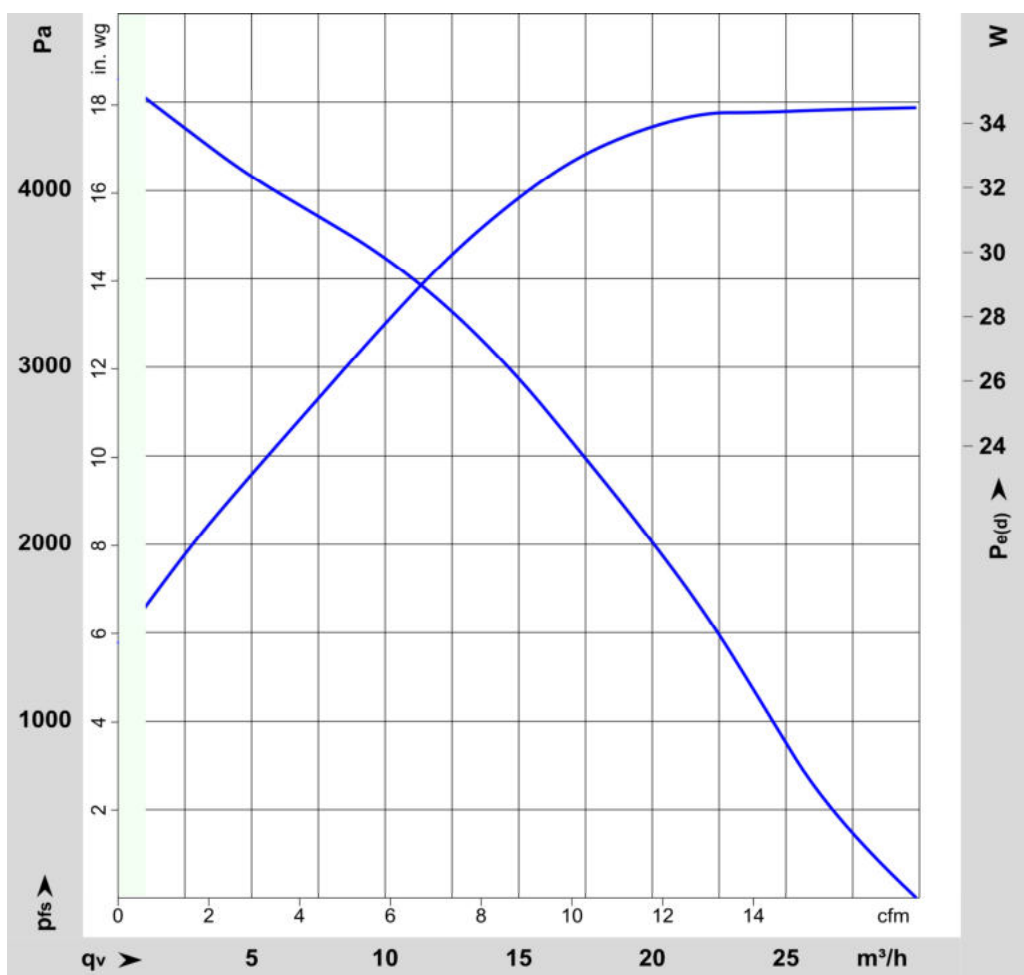
Measurement conditions: Measured with a double chamber intake rig acc. to DIN EN ISO 5801.  
Normal air density = 1,2 kg/m<sup>3</sup>; Temperature 23°C +/- 3°C;  
In the intake and outlet area should not be any solid obstruction within 0,5 m. Motor shaft horizontal.  
The information is only valid under 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:

|                               |               |  |  |
|-------------------------------|---------------|--|--|
| 36.500 1/min at free air flow | U Contr. 10 V |  |  |
|-------------------------------|---------------|--|--|

|                                                                 |                      |  |
|-----------------------------------------------------------------|----------------------|--|
| Max. free-air flow ( $\Delta p = 0 / \dot{V} = \text{max.}$ )   | 30 m <sup>3</sup> /h |  |
| Max. static pressure ( $\Delta p = \text{max.} / \dot{V} = 0$ ) | 4.500 Pa             |  |

The fan must not be operated at < 1m<sup>3</sup> / h.



### 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  $L_p(A) < 5 \text{ dB(A)}$   
For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

|                               |               |  |  |
|-------------------------------|---------------|--|--|
| 36.500 1/min at free air flow | U Contr. 10 V |  |  |
|-------------------------------|---------------|--|--|

|                                                                 |          |  |
|-----------------------------------------------------------------|----------|--|
| Optimal operating point                                         |          |  |
| Sound power level at the optimal operating point                |          |  |
| Sound pressure level at free air flow, measured in rubber bands | 58 dB(A) |  |

## 4 Environment

### 4.1 General

|                                            |        |  |
|--------------------------------------------|--------|--|
| Min. permitted ambient temperature TU min. | -20 °C |  |
| Max. permitted ambient temperature TU max. | 65 °C  |  |
| Min. permitted storage temperature TL min. | -40 °C |  |
| Max. permitted storage temperature TL max. | 85 °C  |  |

### 4.2 Climatic Requirements

|                       |                                                               |  |
|-----------------------|---------------------------------------------------------------|--|
| Humidity requirements | humid heat, constant; according to DIN EN 60068-2-78, 14 days |  |
| Water exposure        | None                                                          |  |
| Dust requirements     | None                                                          |  |
| Salt fog requirements | None                                                          |  |

Permitted 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.

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

### 4.3 EMC

|                       |                                                                                            |
|-----------------------|--------------------------------------------------------------------------------------------|
| Kind                  | Electrostatic Discharge Immunity Test                                                      |
| According             | DIN EN 61000-4-2:2001-12                                                                   |
| Ceek 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                                                                   |
| Check 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                                                                   |
| Check 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                                                                   |
| Check 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                                        | 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                                      | Not applicable                                                                                    |

## 6 Reliability

### 6.1 General

|                                                    |             |  |
|----------------------------------------------------|-------------|--|
| Life expectancy L10 at TU = 20 °C                  | 22.500 h    |  |
| Life expectancy L10 at TU = 40 °C                  | 17.500 h    |  |
| Life expectancy L10 at TU max.                     | 8.500 h     |  |
| Life expectancy L10 acc. to IPC 9591 at TU = 40 °C | 27.5 00 h   |  |
| Life expectancy L10 acc. to IPC 9591 at TU = 25 °C | 45.0 00 hrs |  |

[illegible]