

**Product Data Sheet**

**9594314204**

VBS0133RUJCS

RER133-33/18/2TDMO

**ebmpapst**

The engineer's choice



## RER133-33/18/2TDMO

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## 1 General

|                                     |                                           |  |
|-------------------------------------|-------------------------------------------|--|
| Fan type                            | Blower without chassis with intake nozzle |  |
| Rotating direction looking at rotor | Clockwise                                 |  |
| Airflow direction                   | Air in axially, Air out radially          |  |
| Bearing system                      | Ball bearing                              |  |
| Mounting position - shaft           | Any                                       |  |

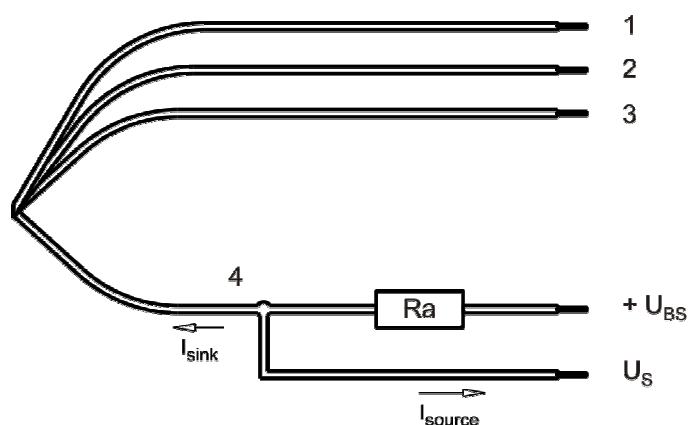
## 2 Mechanics

### 2.1 General

|                   |         |  |
|-------------------|---------|--|
| Depth             | 55,5 mm |  |
| Diameter          | 133 mm  |  |
| Mass              | 0,46 kg |  |
| Housing material  |         |  |
| Impeller material | Plastic |  |

### 2.2 Connections

|                       |            |  |
|-----------------------|------------|--|
| Electrical connection | Wires      |  |
| Lead wire length      | L = 310 mm |  |
| Tolerance             | + - 10 mm  |  |
| Tube length           | S = 65 mm  |  |
| Tolerance             | + - 5 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 | CONTR     | AWG 22    | 1,7 mm              |
| 4    | white  | Tacho     | AWG 22    | 1,7 mm              |

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

Wire 1 - 4: AWG20 (Insulationdiameter 1,7mm)

### 3 Operating Data

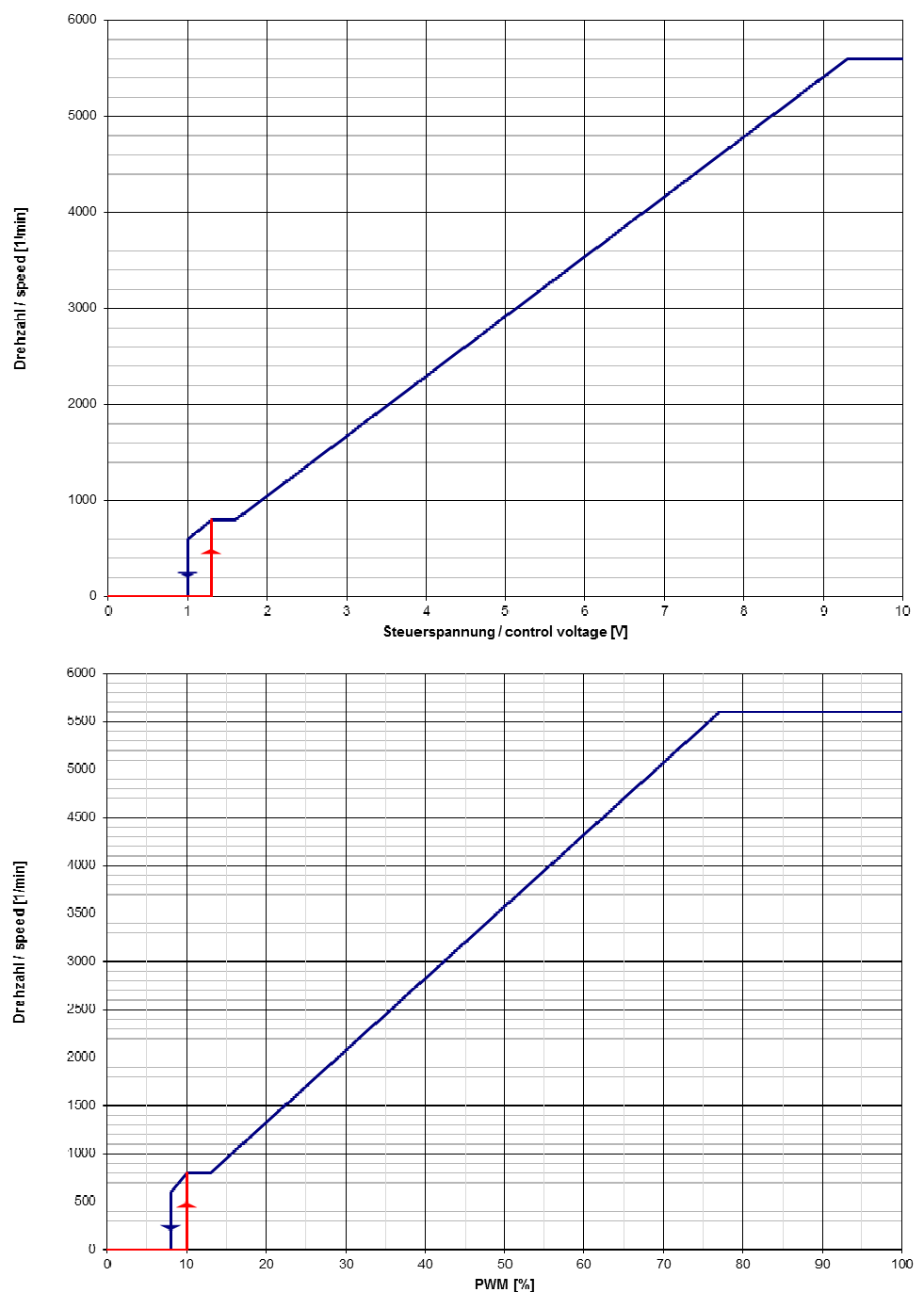
#### 3.1 Electrical Interface - Input

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

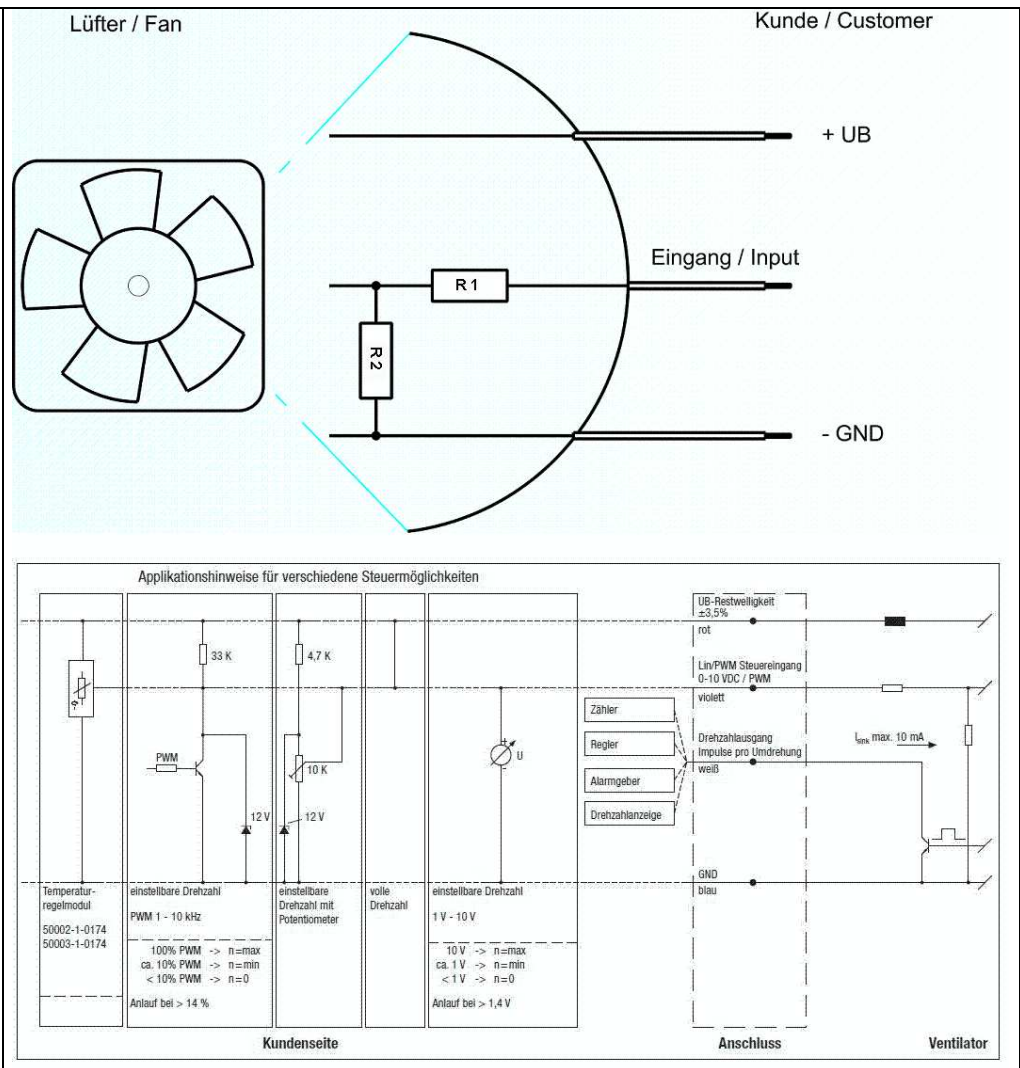
#### Features

|                     |                                  |
|---------------------|----------------------------------|
| 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 (PWM) 0 ... 100%  
with switching transistor in emitter circuit and collector resistance to 12 V  
Frequency = 2 kHz (1 - 10 kHz)

**Information to the curve PWM:**

0% - <10% PWM: 0 1/min  
10% PWM: 800 1/min (Fan on, coming from 0% PWM)  
10% - 13% PWM: 800 1/min (corresponding to min. speed)  
13% - 78% PWM: linear increasing curve  
78% - 100% PWM: 5.600 1/min (corresponding to max. speed)  
10% - >8% PWM: linear decreasing curve (coming from 100% PWM)  
8% PWM: 600 1/min or 0 1/min (Fan off, coming from 100% PWM)

or:

**Speed control:**

By analog voltage 0 - 10 V

**Information to the curve analog:**

|                  |                                                  |
|------------------|--------------------------------------------------|
| 0 V - < 1,3 V:   | 0 1/min                                          |
| 1,3 V:           | 800 1/min (Fan on, coming from von 0 V)          |
| 1,3 V - 1,6 V:   | 800 1/min (corresponding to min. speed)          |
| 1,6 V - 9,4 V:   | linear increasing curve                          |
| 9,4 V - 10 V:    | 5.600 1/min (corresponding to max. speed)        |
| 1,3 V - > 1,0 V: | linear decreasing curve (coming from 10 V)       |
| 1,0 V:           | 600 1/min or 0 1/min (Fan off, coming from 10 V) |

**The fan have no sensor break detection!**

### 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 (unless otherwise specified).  
In the intake and outlet area should not be any solid obstruction within 0,5 m.

|                                        |                                   |
|----------------------------------------|-----------------------------------|
| Measurement setup:                     | Measured between two steel plates |
| Steel plate:                           | 140 mm x 140 mm                   |
| Intake nozzle:                         | D: 87 mm; R: 8 mm                 |
| Distance between bottom and top plate: | 66,5 mm                           |
| Overlapping impeller / nozzle:         | 2 mm                              |

$\Delta p = 0$ : corresp. to free air flow (see chapter aerodynamics)

I: corresp. to arithm. mean current value

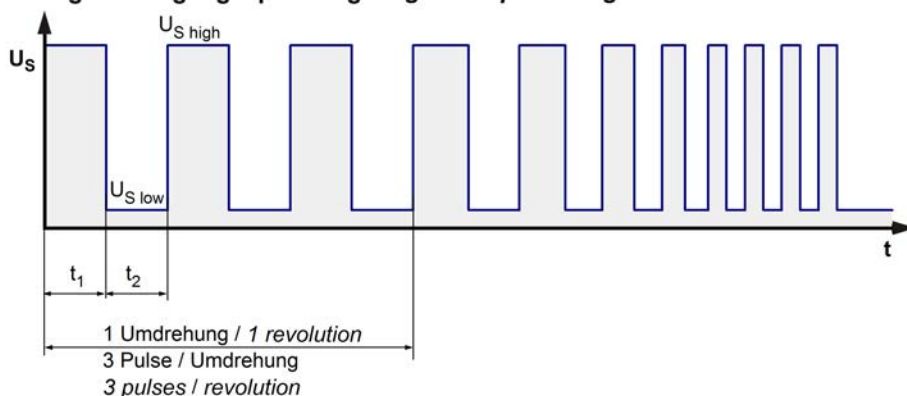
| Name          | Condition      |  |  |
|---------------|----------------|--|--|
| U Contr. 0001 | U Contr.: 10 V |  |  |

| Features            | Condition      | Symbol | Values      |             |             |
|---------------------|----------------|--------|-------------|-------------|-------------|
| Voltage range       |                | U      | 36 V        |             | 60 V        |
| Nominal voltage     |                | $U_N$  |             | 48 V        |             |
| Power consumption   | $\Delta p = 0$ | P      | 50 W        | 62 W        | 66 W        |
| Tolerance           | U Contr. 0010  |        | +/- 10,0 %  | +/- 10,0 %  | +/- 10,0 %  |
| Current consumption | $\Delta p = 0$ | I      | 1.400 mA    | 1.300 mA    | 1.100 mA    |
| Tolerance           | U Contr. 0010  |        | +/- 10,0 %  | +/- 10,0 %  | +/- 10,0 %  |
| Speed               | $\Delta p = 0$ | n      | 5.100 1/min | 5.600 1/min | 5.600 1/min |
| Tolerance           | U Contr. 0010  |        | +/- 10,0 %  | +/- 5 %     | +/- 5 %     |

## 3.3 Electrical Interface - Output

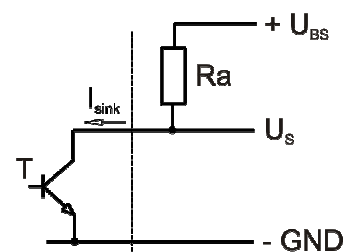
|            |                     |
|------------|---------------------|
| Tacho type | /2 (open collector) |
|------------|---------------------|

Signal-Ausgangsspannung / Signal output voltage

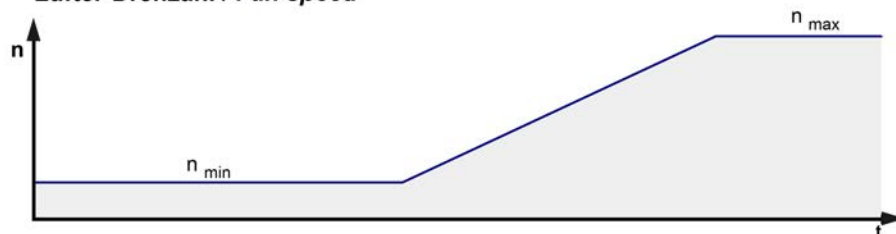


$$R_a = \frac{U_{BS} - U_{S\ low}}{I_{sink}}$$

Lüfter / Fan      Kunde / Customer



Lüfter-Drehzahl / Fan speed



| Features                  | Note                                                                                   | Values                                |
|---------------------------|----------------------------------------------------------------------------------------|---------------------------------------|
| Tacho operating voltage   | $U_{BS}$                                                                               | $\leq 60,0\text{ V}$                  |
| Tacho signal Low          | $U_{S\ low}$                                                                           | $\leq 0,4\text{ V}$                   |
| Tacho signal High         | $U_{S\ high}$                                                                          | $\leq 60,0\text{ V}$                  |
| Maximum sink current      | $I_{sink}$                                                                             | $\leq 20\text{ mA}$                   |
| 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           | $(3 \times n) / 60$                                                                    | $280\text{ Hz @ } 5.600\text{ 1/min}$ |
| Tacho isolated from motor | No                                                                                     |                                       |
| Slew rate                 |                                                                                        | $\Rightarrow 0,5\text{ V/us}$         |

n = revolutions per minute (1/min)

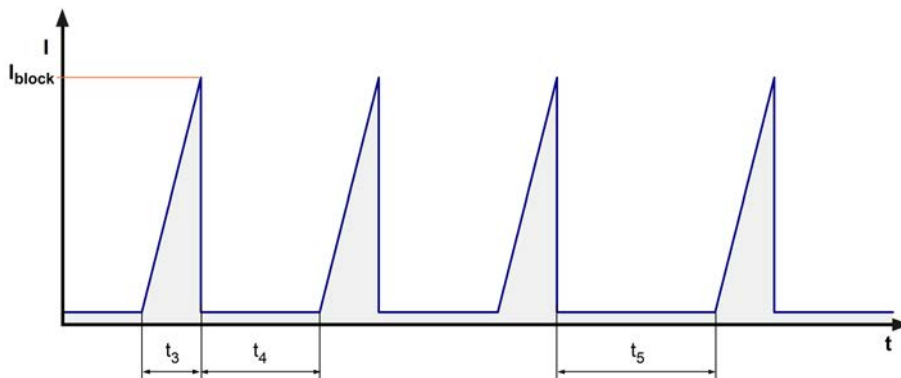
**Please note:**

At zero speed the tachometer signal is at a static HIGH. It will be also HIGH when the fan is still spinning, but the speed control signal is set to zero speed already.

The tachometer signal is only activated after the start-up is completed.

### 3.4 Electrical Features

|                                                   |                                                                                          |  |
|---------------------------------------------------|------------------------------------------------------------------------------------------|--|
| Electronic function                               | Speed-Controlled                                                                         |  |
| Reversed polarity protection                      | N-CH FET                                                                                 |  |
| Max. residual current at $U_N$                    | $I_F \leq 5 \text{ mA}$                                                                  |  |
| Locked rotor protection                           | Auto restart                                                                             |  |
| Locked rotor current at $U_N$                     | $I_{\text{block}}$ approx. 2.700 mA                                                      |  |
| Clock signal at locked rotor<br>Extended Downtime | $t_3 / t_4$ typical: 6 s / 10,0 s<br>$t_5$ : 40 s after 4 start-up tests                 |  |
| Internal fuse                                     | Littelfuse NANO2 > Very Fast-Acting > 451/453 Series<br>4A / 125V (Art.No.: 0451004.MRL) |  |



**Locked rotor signal  $t_5$ :**

**After 4 failed start-ups there is an extended timeout of 40 s.**

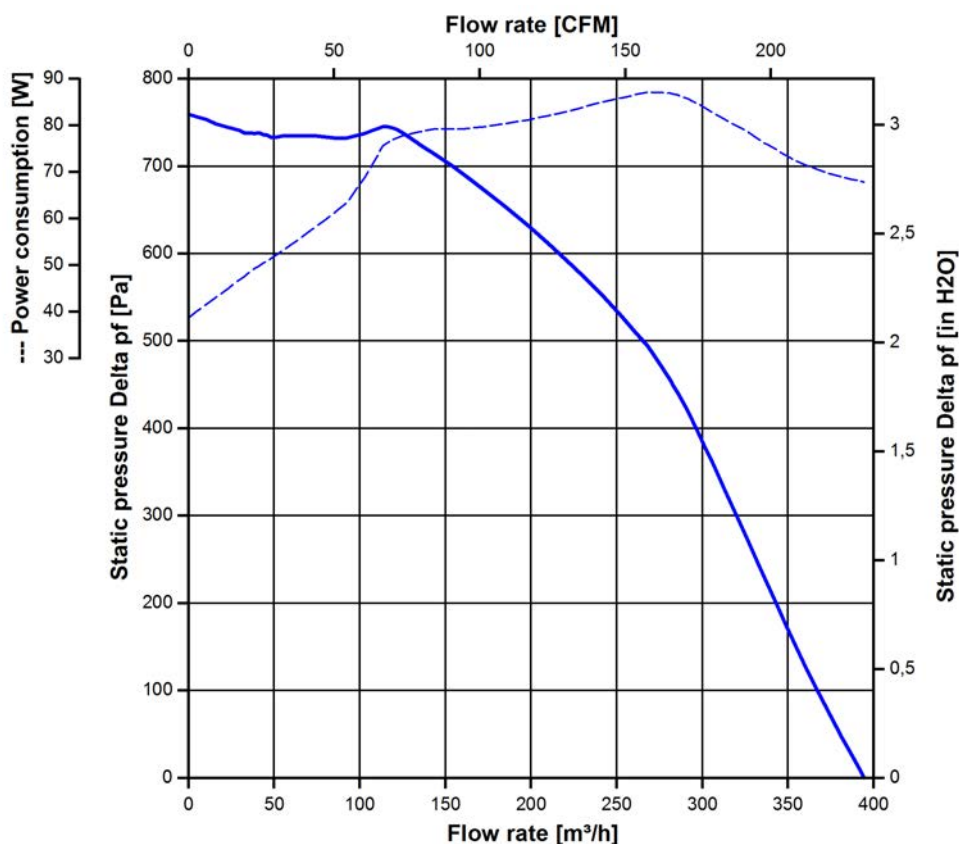
### 3.5 Aerodynamics

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.

|                                        |                                   |
|----------------------------------------|-----------------------------------|
| Measurement setup:                     | Measured between two steel plates |
| Steel plate:                           | 140 mm x 140 mm                   |
| Intake nozzle:                         | D: 87 mm; R: 8 mm                 |
| Distance between bottom and top plate: | 66,5 mm                           |
| Overlapping impeller / nozzle:         | 2 mm                              |

a.) Operation condition:

|                                                                   |                       |  |  |
|-------------------------------------------------------------------|-----------------------|--|--|
| 5.600 1/min at free air flow                                      | U Contr. 10 V         |  |  |
| Max. free-air flow ( $\Delta p = 0$ / $\dot{V} = \text{max.}$ )   | 395 m <sup>3</sup> /h |  |  |
| Max. static pressure ( $\Delta p = \text{max.}$ / $\dot{V} = 0$ ) | 760 Pa                |  |  |



### 3.6 Sound Data

Measurement conditions: Sound pressure level: 1 meter distance between microphone and the air intake.  
Sound power level: According 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:

|                                                                 |                                |  |  |
|-----------------------------------------------------------------|--------------------------------|--|--|
| 5.600 1/min at free air flow                                    | U Contr. 10 V                  |  |  |
| Optimal operating point                                         | 260 m <sup>3</sup> /h @ 516 Pa |  |  |
| Sound power level at the optimal operating point                | 7,7 bel(A)                     |  |  |
| Sound pressure level at free air flow, measured in rubber bands |                                |  |  |

## 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. | 80 °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                  | Radiated Emission; 30 MHz - 1000 MHz |
| According             | DIN EN 55032:2016-02                 |
| Ceek accuracy / Limit | Class B                              |
| Result                | Below limit Class B                  |

| 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; 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                                                                                                                                                                                                                                                                                                                                                    | 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 | No                                                                      |
| CSA | Canadian Standards Association                                      | Yes / CSA audited by UL according to C22.2 No. 113 Fans and Ventilators |
| CCC | China Compulsory Certification                                      | Yes                                                                     |

UL Filenummer: E38324

**6 Reliability****6.1 General**

|                                                    |           |  |
|----------------------------------------------------|-----------|--|
| Life expectancy L10 at TU = 40 °C                  | 55.000 h  |  |
| Life expectancy L10 at TU max.                     | 30.000 h  |  |
| Life expectancy L10 acc. to IPC 9591 at TU = 40 °C | 92.5 00 h |  |

