

Product Data Sheet

9595420221

VCS0190RULDS  
RG190-39/14/2TDMO-  
221

**ebmpapst**

engineering a better life



RG190-39/14/2TDMO-221

INDEX

- 1 General ..... 3**
- 2 Mechanics ..... 3**
  - 2.1 General ..... 3
  - 2.2 Connections ..... 3
- 3 Operating Data ..... 5**
  - 3.1 Electrical Interface - Input ..... 5
  - 3.2 Electrical Operating Data ..... 7
  - 3.3 Electrical Interface - Output ..... 8
  - 3.4 Electrical Features ..... 9
  - 3.5 Data According ErP Directive ..... 9
  - 3.6 Aerodynamics ..... 10
  - 3.7 Sound Data ..... 11
- 4 Environment ..... 11**
  - 4.1 General ..... 11
  - 4.2 Climatic Requirements ..... 11
- 5 Safety ..... 12**
  - 5.1 Electrical Safety ..... 12
  - 5.2 Approval Tests ..... 12
- 6 Reliability ..... 12**
  - 6.1 General ..... 12

**1 General**

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

**Please note:**

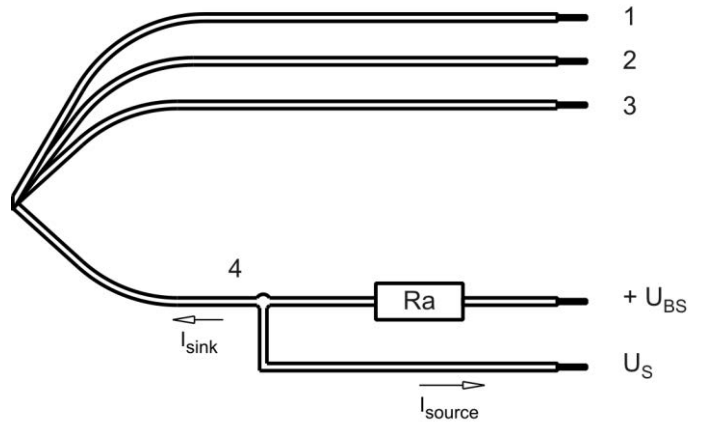
"Sensorless commutation electronic, starting at the first start may not be 100% guaranteed, automatic restart occurs."

**2 Mechanics****2.1 General**

Width	226 mm	
Height	226 mm	
Depth	85,5 mm	
Mass	1,21 kg	
Housing material	Plastic	
Impeller material	Plastic	

**2.2 Connections**

Electrical connection	Wires	
Lead wire length	L = 350 mm	
Tolerance	+ - 10,0 mm	
Tube length	S = 36 mm	
Tolerance	+ - 5 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 18	2,2 mm
2	blue	- GND	AWG 18	2,2 mm
3	violet	CONTR	AWG 22	1,3 mm
4	white	Tacho	AWG 22	1,3 mm

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

**Note:**

It must be ensured that the power supply is applied before the control signal (U Contr) is turned on.

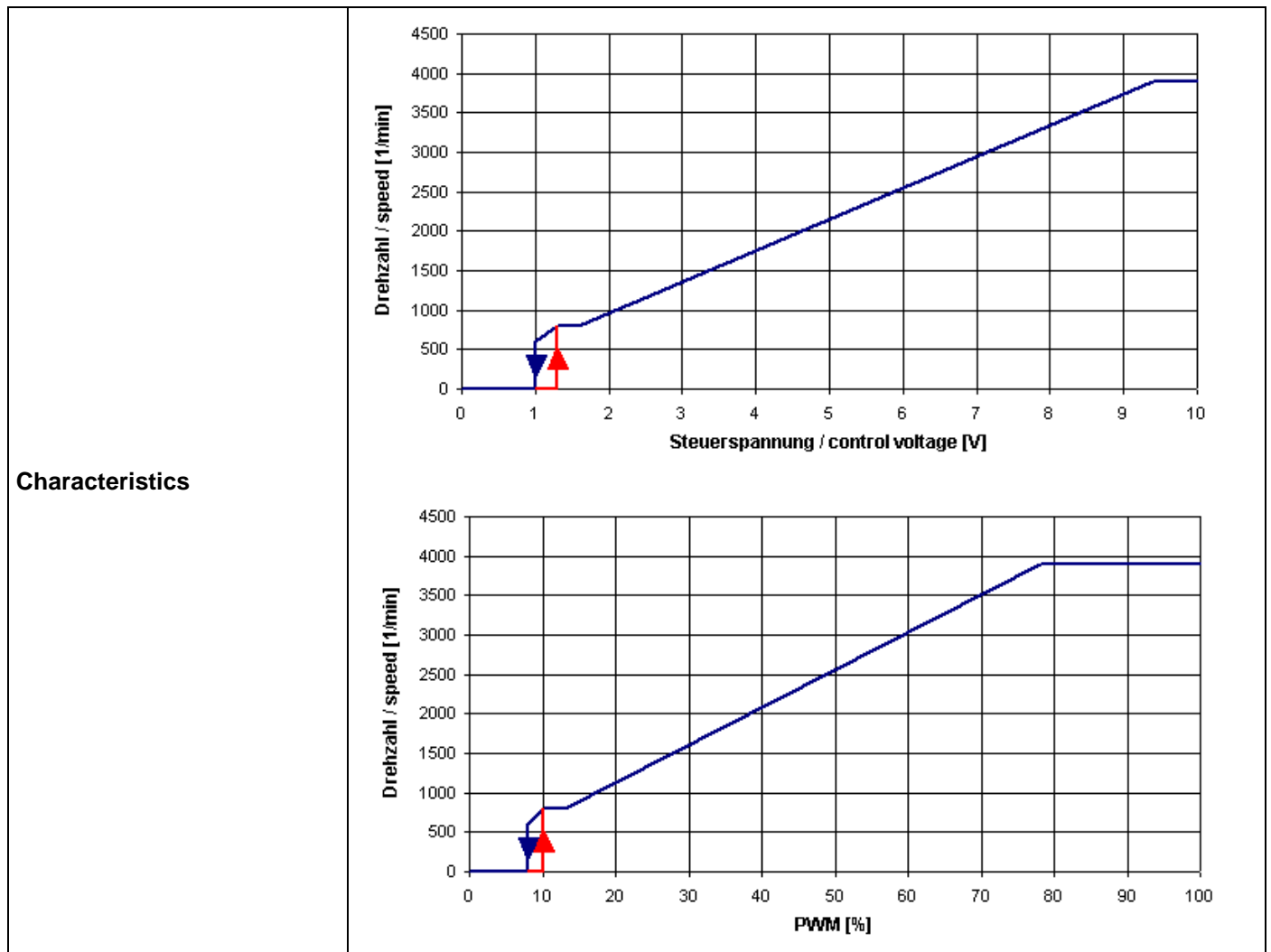
3 Operating Data

3.1 Electrical Interface - Input

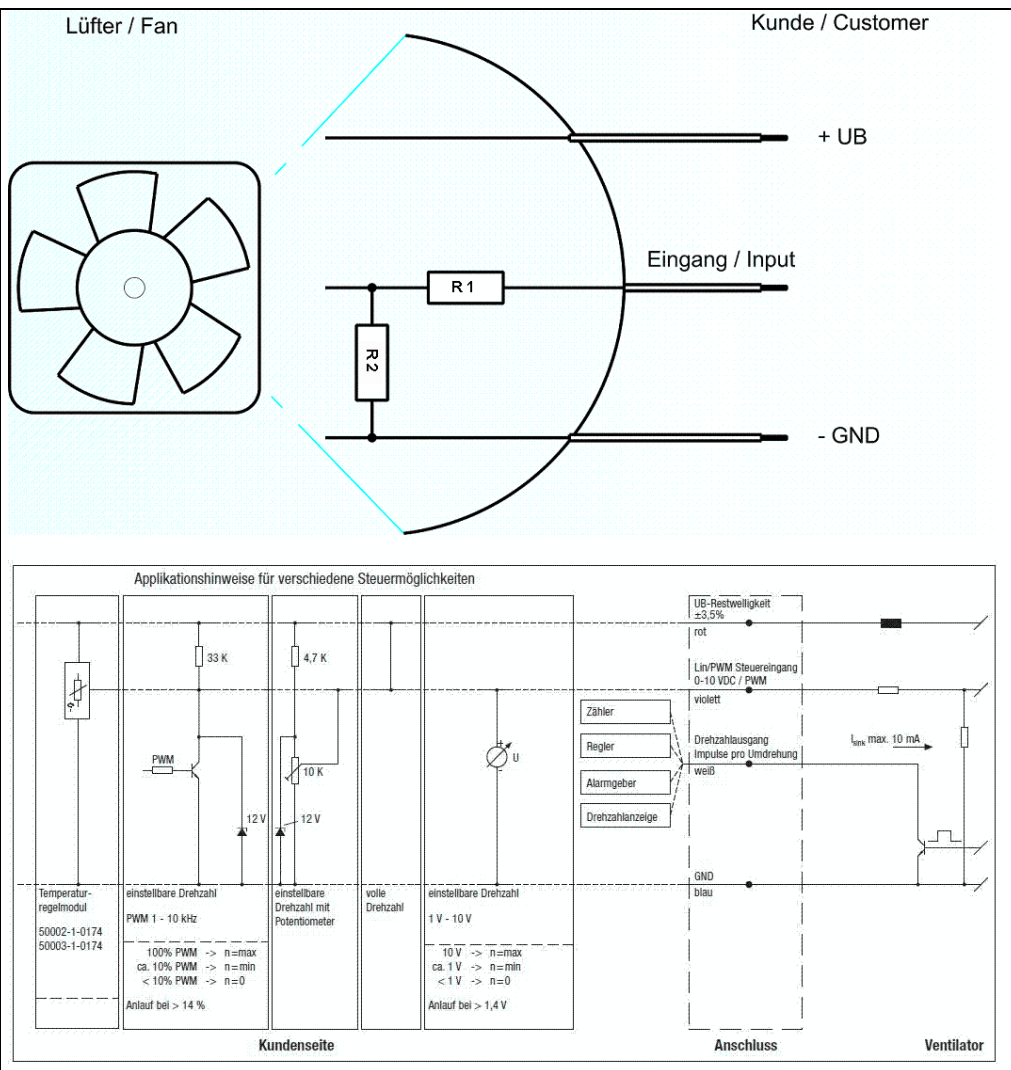
Control input	Analog
---------------	--------

Features

PWM - Frequency	1 kHz - 10 kHz typical: 2 kHz
Input voltage range	0 V - 10 V



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: 3.900 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)

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:	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:	3.900 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)

**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.

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

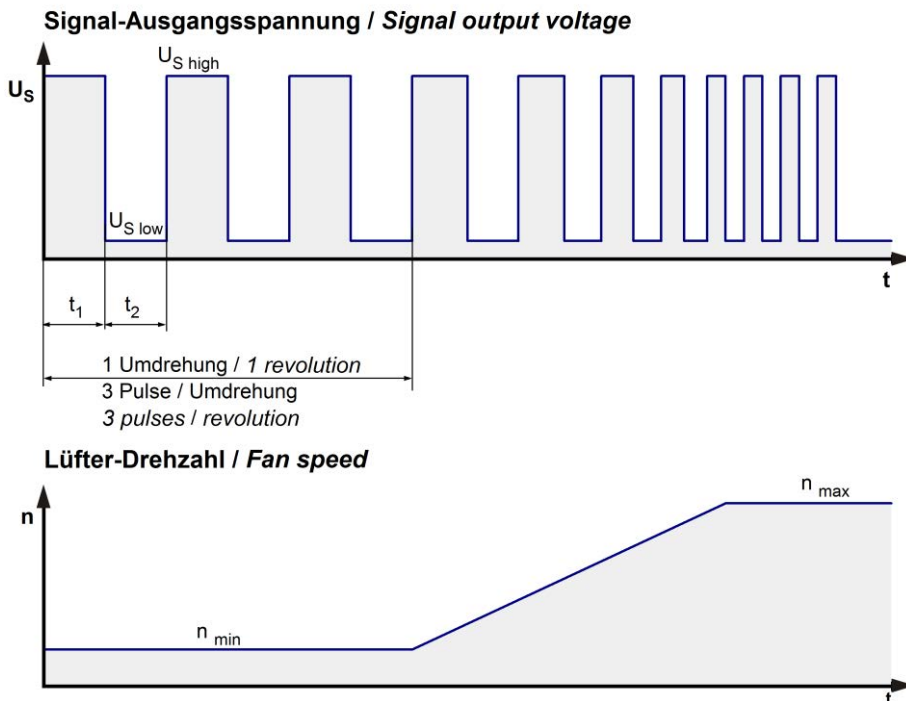
Name	Condition
U Contr. 0001	U Contr.: 10,0 V

**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	$\Delta p = 0$	P	65 W	113 W	106 W
Tolerance	U Contr. 0010		+/- 10 %	+/- 10,0 %	+/- 10,0 %
Current consumption	$\Delta p = 0$	I	4.080 mA	4.700 mA	2.930 mA
Tolerance	U Contr. 0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Speed	$\Delta p = 0$	n	3.350 1/min	3.900 1/min	3.900 1/min
Tolerance	U Contr. 0010		+/- 10,0 %	+/- 5,0 %	+/- 5,0 %

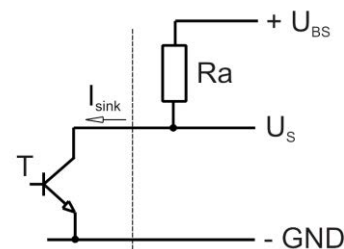
3.3 Electrical Interface - Output

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



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

Lüfter / Fan      Kunde / Customer



Features	Note	Values
Tacho operating voltage	$U_{BS}$	$\leq 60,0\ V$
Tacho signal Low	$U_{S\ low}$	$I_{sink}: 2\ mA$ $\leq 0,4\ V$
Tacho signal High	$U_{S\ high}$	$I_{source}: 0\ mA$ $\leq 60,0\ V$
Maximum sink current	$I_{sink}$	$\leq 20\ mA$
Maximum source current		$0\ mA$
External resistor	External resistor $R_a$ from $U_{BS}$ to $U_S$ required. All voltages measured to GND.	
Tacho frequency	$(3 \times n) / 60$	195 Hz
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\ V/\mu s$

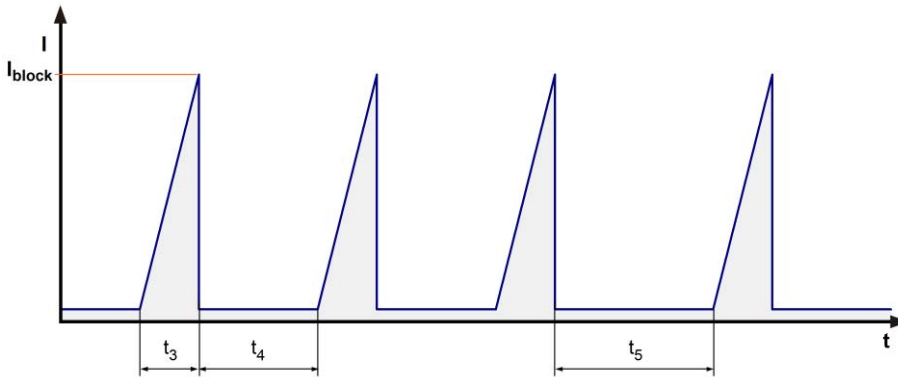
$n$  = revolutions per minute (1/min)

**Please note:**

At zero speed the tacho 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 tacho signal is only activated after the start-up is completed.

3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	P-CH FET	
Max. residual current at $U_N$	$I_F \leq 5 \text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at $U_N$	$I_{block}$ approx. 2.400 mA	
Clock signal at locked rotor	$t_3 / t_4$ typical: 2,6 s / 10,0 s	



Locked rotor signal  $t_5$ :

After 4 failed start-ups there is an extended timeout of 40,0s.

3.5 Data According ErP Directive

Installation / Efficiency category	A / static
Speed control	integrated
Specific ratio	1,00473
Target overall efficiency 2015	41,4 %
Overall efficiency	51,7 %
Efficiency grade	61
Power input	135,6 W
Speed	3.900 1/min

All values measured in optimum energy efficiency point.

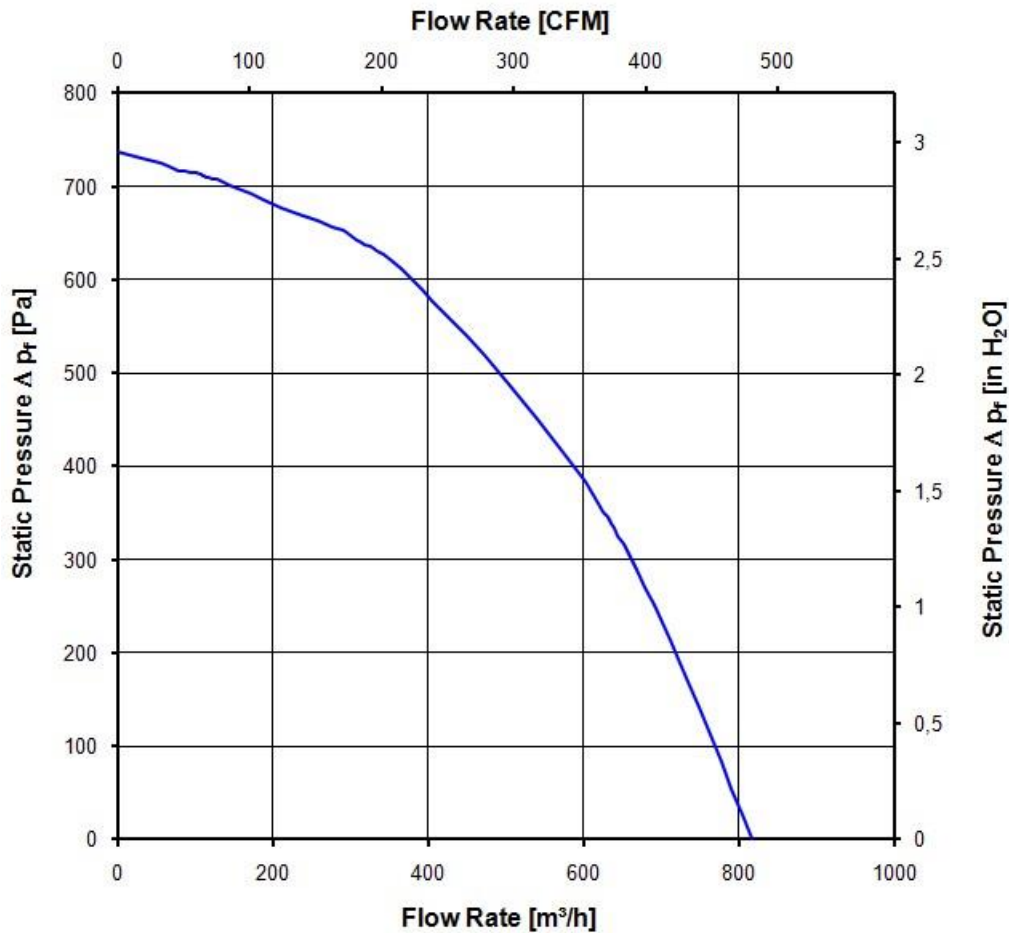
Productiondatecode is printed on the fan label.

3.6 Aerodynamics

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

a.) Operation condition:

3.900 1/min at free air flow	U Contr. 10,0 V		
Max. free-air flow ( $\Delta p = 0 / \dot{V} = \text{max.}$ )		815,0 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \text{max.} / \dot{V} = 0$ )		740 Pa	



### 3.7 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 semianechoic chamber with a background noise level of  $L_p(A) < 5 \text{ dB}(A)$   
For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

3.900 1/min at free air flow	U Contr. 10,0 V		
------------------------------	-----------------	--	--

Optimal operating point	500,0 m <sup>3</sup> /h @ 444 Pa		
Sound power level at the optimal operating point	7,9 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.

**5 Safety****5.1 Electrical Safety**

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

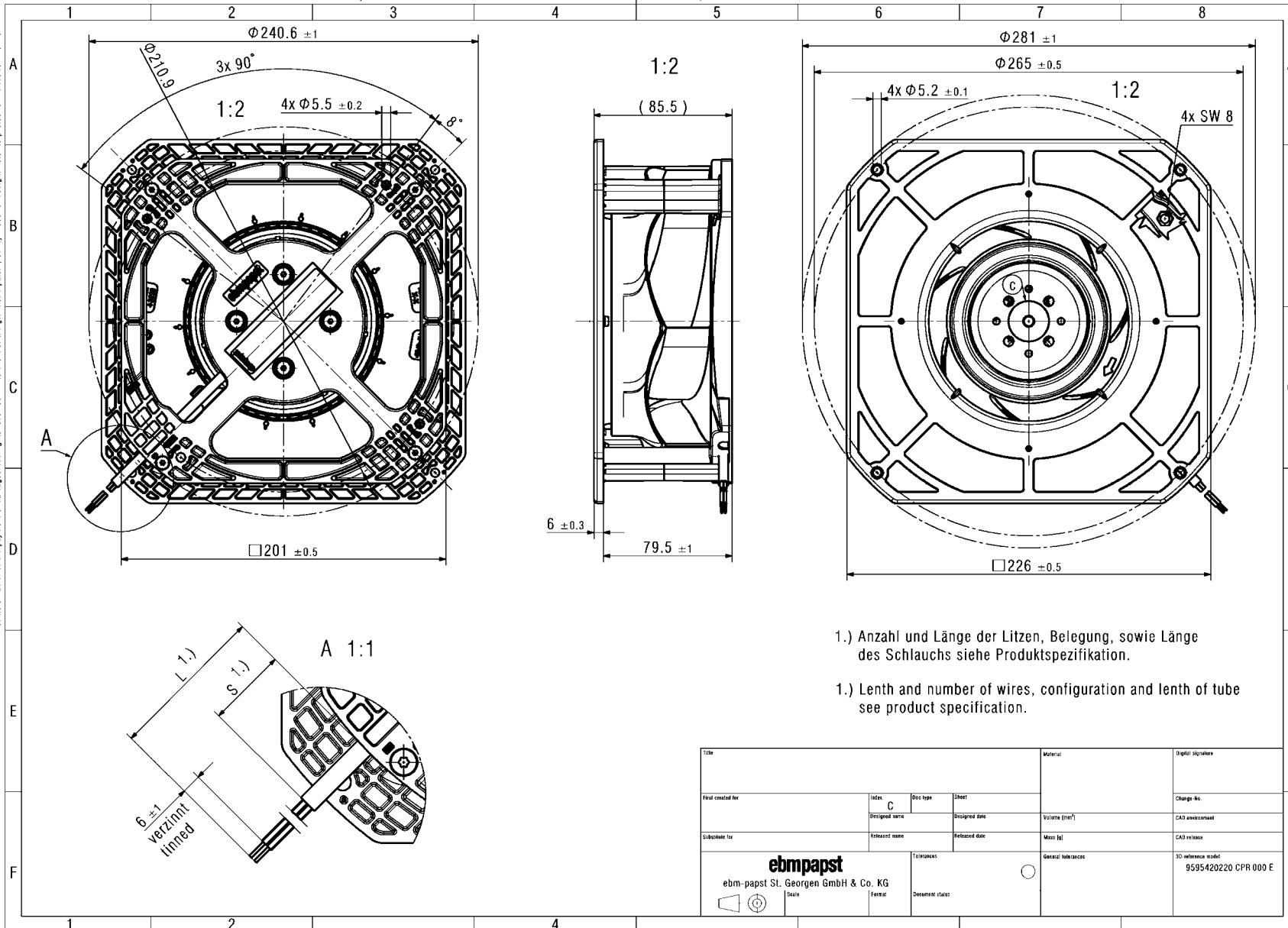
**5.2 Approval Tests**

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 / 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	52.500 h	
Life expectancy L10 at TU max.	30.500 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	87.500 h	

The reproduction, distribution and utilization of this document as well as the communication of its contents to others without express authorization is prohibited. Offenders will be held liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design. Refer to protection notice ISO 10206.



1.) Anzahl und Länge der Litzen, Belegung, sowie Länge des Schlauchs siehe Produktspezifikation.

1.) Lenth and number of wires, configuration and lenth of tube see product specification.