

Product Data Sheet **9595420303**
VBS0220RULDS
RER220-43/18/2TDMO

ebmpapst

engineering a better life



RER220-43/18/2TDMO

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
 - 4.3 EMC 11
- 5 Safety 13**
 - 5.1 Electrical Safety 13
 - 5.2 Approval Tests 13
- 6 Reliability 13**
 - 6.1 General 13

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	

Please note:

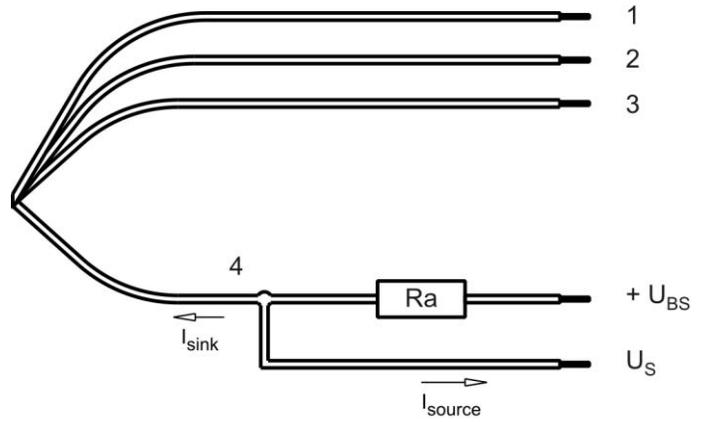
"Sensorless commutation electronic, starting at the first start may not be 100% guaranteed, automatic restart occurs."

2 Mechanics**2.1 General**

Depth	71 mm	
Diameter	220 mm	
Mass	0,89 kg	
Housing material		
Impeller material	Plastic	

2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 425 mm	
Tolerance	+/- 10,0 mm	
Tube length	S = 135 mm	
Tolerance	+/- 5 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 22	1,35 mm
2	blue	- GND	AWG 22	1,35 mm
3	violet	CONTR	AWG 22	1,35 mm
4	white	Tacho	AWG 22	1,35 mm

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

Lead wire 1 - 2: AWG22

Lead wire 3 - 4: AWG22 (Insulation diameter 1,35mm)

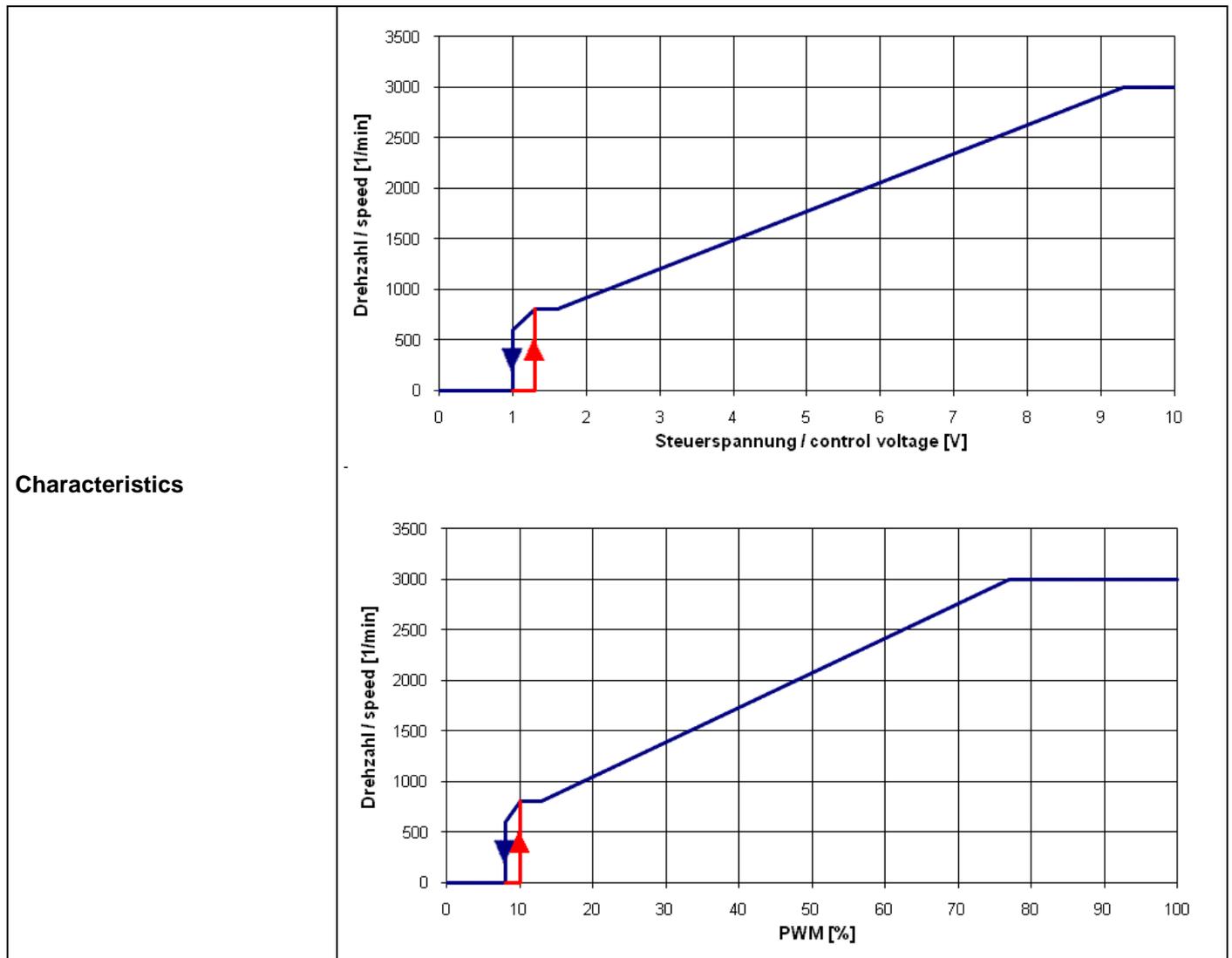
3 Operating Data

3.1 Electrical Interface - Input

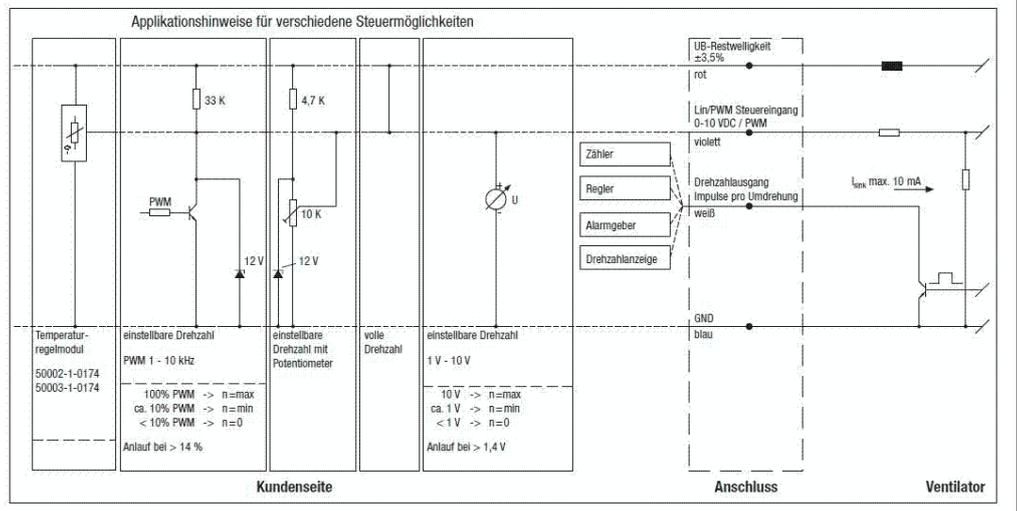
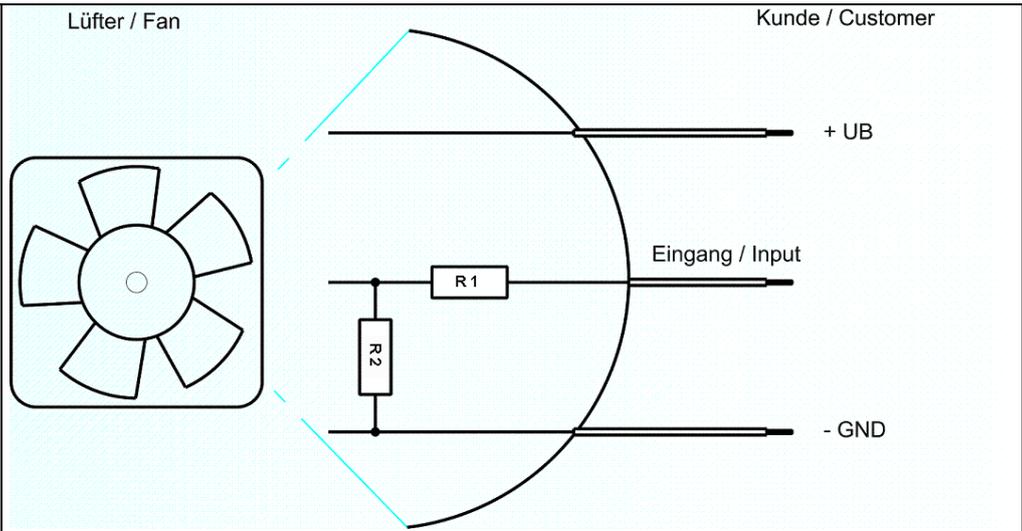
Control input	Analog
---------------	--------

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: 3000 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: 3000 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)

All values are measured in the housing!

Fan doesn't have a sensor break detection!

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.

Measurement setup:	Measured between two steel plates
Steel plate:	260 mm x 260 mm
Intake nozzle:	D: 155 mm; R: 22 mm
Distance between bottom and top plate:	89,2 mm
Overlapping impeller / nozzle:	2 mm

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

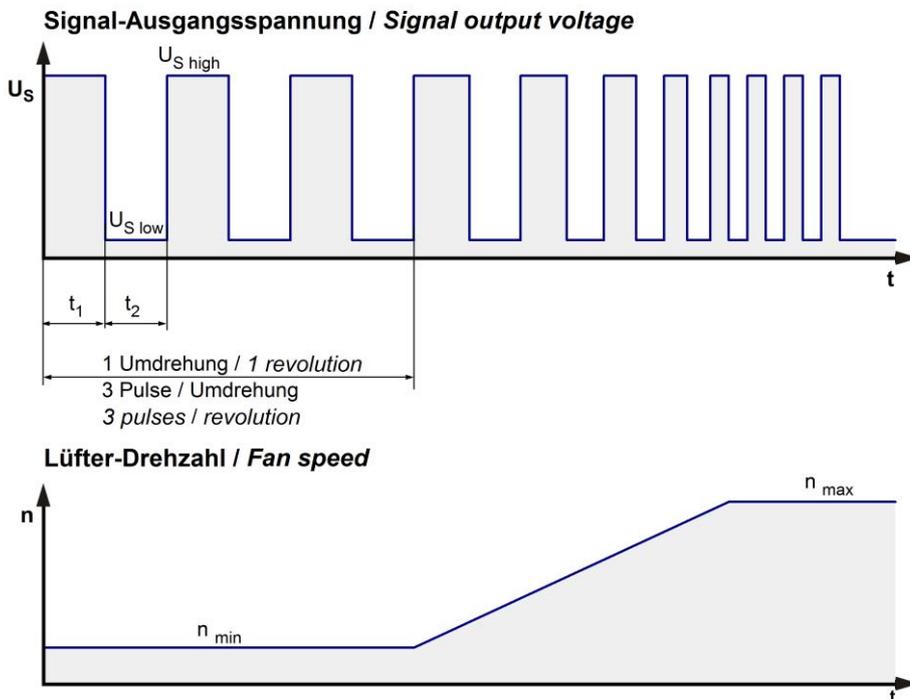
Name	Condition
U Contr. 0001	U Contr.: 10 V

The data at 5V are no FK features and need not be tested.

Features	Condition	Symbol	Values		
Voltage range		U	36 V		72,0 V
Nominal voltage		U _N		48,0 V	
Power consumption	$\Delta p = 0$	P	103 W	110 W	107 W
Tolerance	U Contr. 0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Current consumption	$\Delta p = 0$	I	2.860 mA	2.300 mA	1.490 mA
Tolerance	U Contr.0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Speed	$\Delta p = 0$	n	2.970 1/min	3.000 1/min	3.000 1/min
Tolerance	U Contr. 0010		+/- 7,5 %	+/- 5,0 %	+/- 5,0 %

3.3 Electrical Interface - Output

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



Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 60\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$\leq 60\text{ V}$
Maximum sink current	I_{sink}	$\leq 20\text{ mA}$
External resistor	External resistor R_a from U_{BS} to U_S required. All voltages measured to GND.	
Tacho frequency	$(3 \times n) / 60$	150 Hz
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\text{ V/us}$

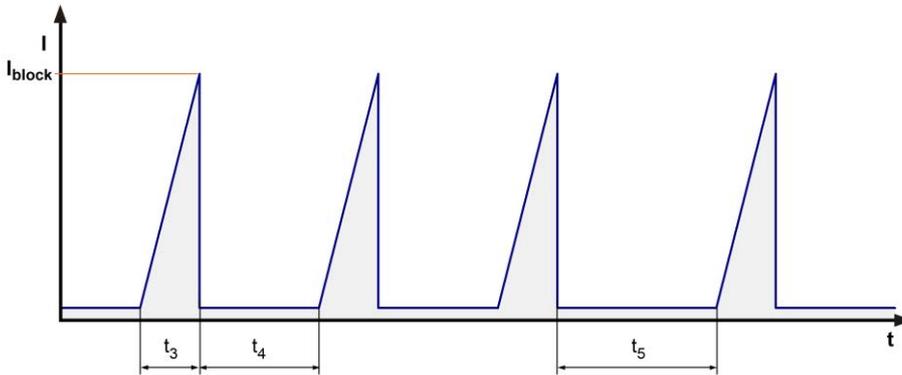
n = revolutions per minute (1/min)

Please note:

At zero speed the 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. 3.000 mA	
Clock signal at locked rotor	t_3 / t_4 typical: 7,8 s / 10 s	



Locked rotor signal t_5 50s:

After 2 failed start-ups there is an extended timeout of 50 s.

3.5 Data According ErP Directive

Installation / Efficiency category	A / static
Speed control	integrated
Specific ratio	1,00394
Target overall efficiency 2015	42,3 %
Overall efficiency	54,0 %
Efficiency grade	62
Power input	132,6 W
Speed	2.970 1/min

All values measured in optimum energy efficiency point.

Productiondatecode is printed on the fan label.

3.6 Aerodynamics

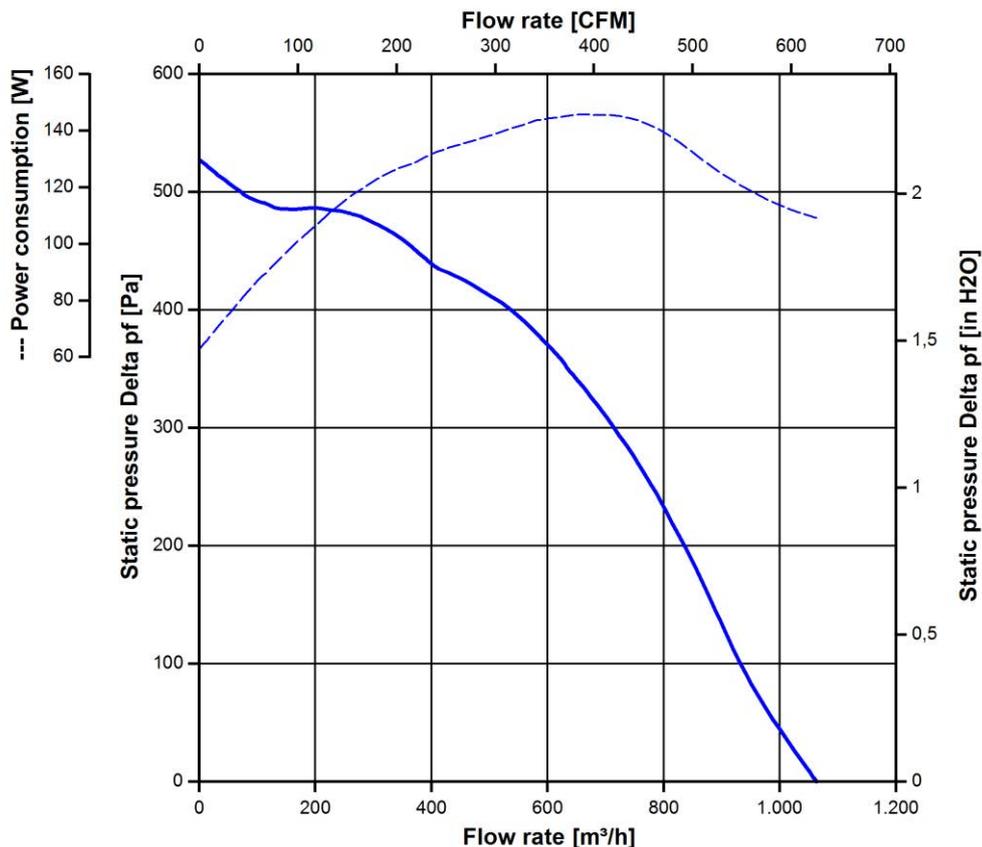
Measurement conditions: Measured with a double chamber intake rig acc. to DIN EN ISO 5801. Normal air density = 1,2 kg/m³; Temperature 23°C +/- 3°C; In the intake and outlet area should not be any solid obstruction within 0,5 m. Motor shaft horizontal. The information is only valid under the specified 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.

Measurement setup:	Measured between two steel plates
Steel plate:	260 mm x 260 mm
Intake nozzle:	D: 155 mm; R: 22 mm
Distance between bottom and top plate:	89,2 mm
Overlapping impeller / nozzle:	2 mm

a.) Operation condition:

3.000 1/min at free air flow	U Contr. 10 V		
------------------------------	---------------	--	--

Max. free-air flow ($\Delta p = 0 / \dot{V} = \text{max.}$)	1.063,0 m ³ /h	
Max. static pressure ($\Delta p = \text{max.} / \dot{V} = 0$)	525 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:

3.000 1/min at free air flow	U Contr. 10 V		
------------------------------	---------------	--	--

Optimal operating point	647 m ³ /h @ 343 Pa	
Sound power level at the optimal operating point	7,5 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.	55 °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
Check accuracy / Limit	Class B
Result	Below limit Class B

Kind	Electrostatic Discharge Immunity Test
Accordinging	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
Accordinging	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
Accordinging	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
Accordinging	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 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.	1000 VAC / 1 Min. 1700 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 / 1,5 mm	
Protection class	I	

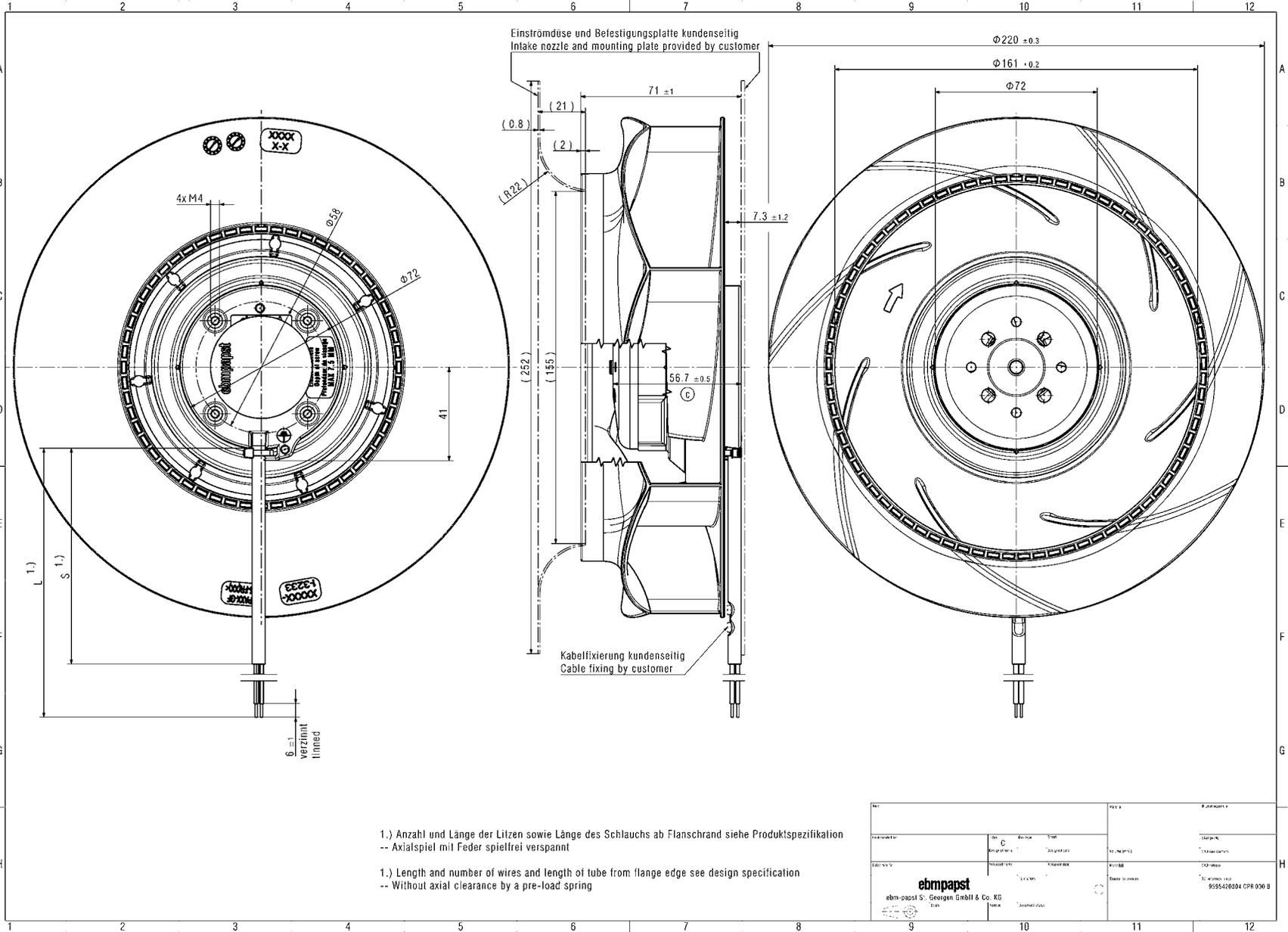
5.2 Approval Tests

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 / 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	65.000 h	
Life expectancy L10 at TU max.	45.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	110.000 h	

The reproduction, distribution and utilization of this document as well as the communication of its content to others without express written authorization is strictly prohibited. All rights reserved in the event of the part of a patent. City of origin: Germany. Patent no. protection: 1000 181818



- 1.) Anzahl und Länge der Litzen sowie Länge des Schlauchs ab Flanschrand siehe Produktspezifikation
-- Axialspiel mit Feder spielfrei verspannt
- 1.) Length and number of wires and length of tube from flange edge see design specification
-- Without axial clearance by a pre-load spring

ebmpapst ebm-papst S. Georgen GmbH & Co. KG S. Georgen Germany		9595420303 9595420303e CDR 090 B	
--	--	-------------------------------------	--