

Product Data Sheet **9595420305**
VCS0220RULDS
RG220-43/14/2TDMO

ebmpapst

The engineer's choice



RG220-43/14/2TDMO

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
5	Safety.....	12
5.1	Electrical Safety	12
5.2	Approval Tests.....	12
6	Reliability.....	12
6.1	General.....	12

1 General

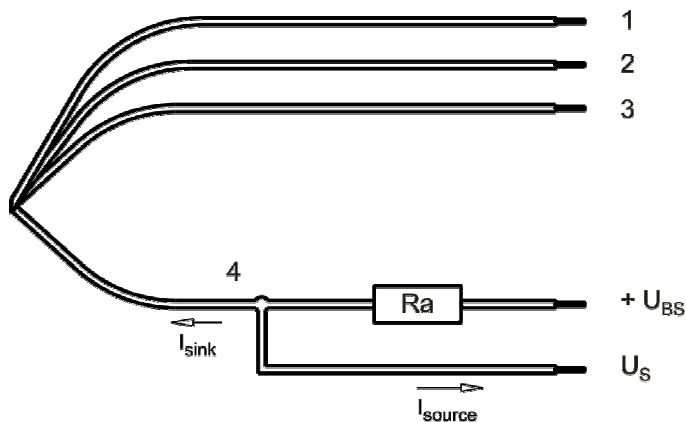
Fan type	Blower	
Rotating direction looking at rotor	Clockwise	
Airflow direction	Air in axially, Air out radially	
Bearing system	Ball bearing	
Mounting position - shaft	Any	

2 Mechanics**2.1 General**

Width	270 mm	
Height	270 mm	
Depth	99 mm	
Mass	1,560 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 = 35 mm	
Tolerance	+ - 5,0 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 20	2,05 mm
2	blue	- GND	AWG 20	2,05 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.

Litzen 1 - 2: AWG20
Litzen 3 - 4: AWG22 (Isolationsdurchmesser 1,35mm)

Lead wire 1 - 2: AWG20
Lead wire 3 - 4: AWG22 (Insulation diameter 1,35mm)

3 Operating Data

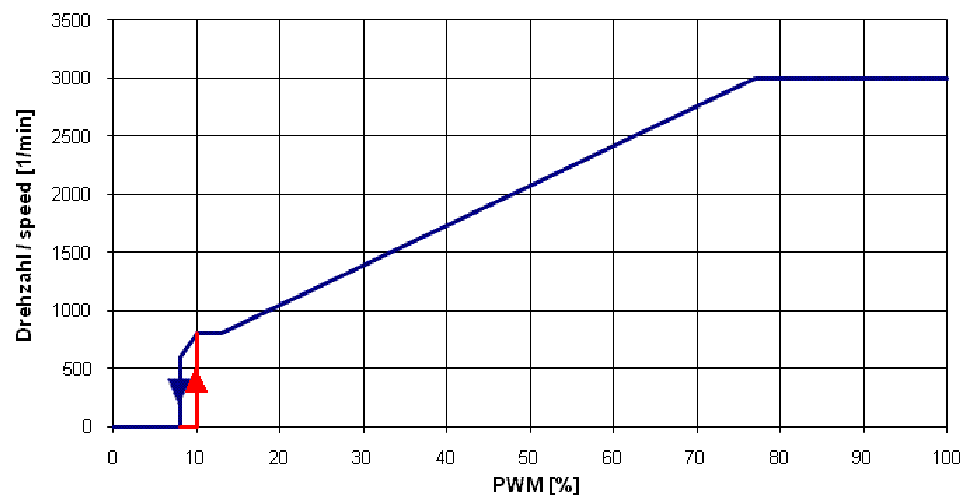
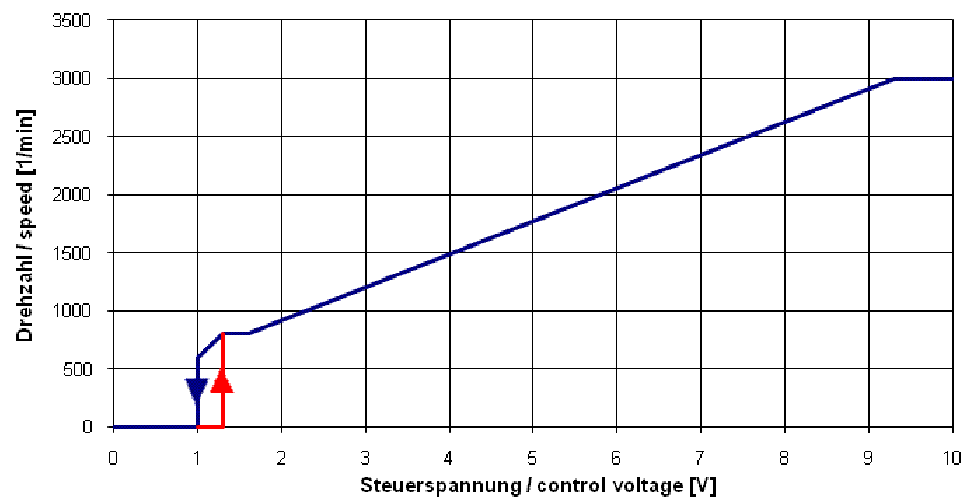
3.1 Electrical Interface - Input

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

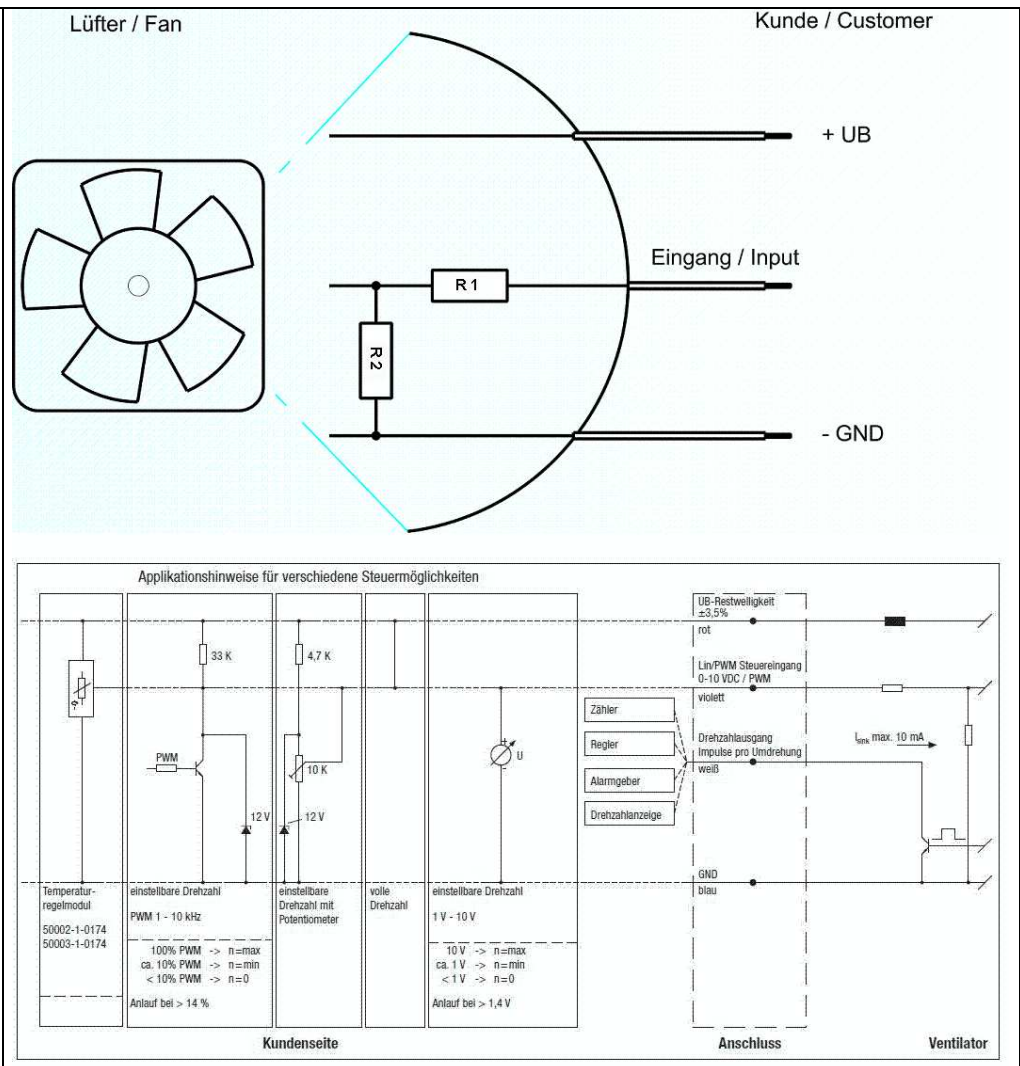
Features

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

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: 2500 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:	2500 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!**
=> open Control Input = 0rpm!

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.

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

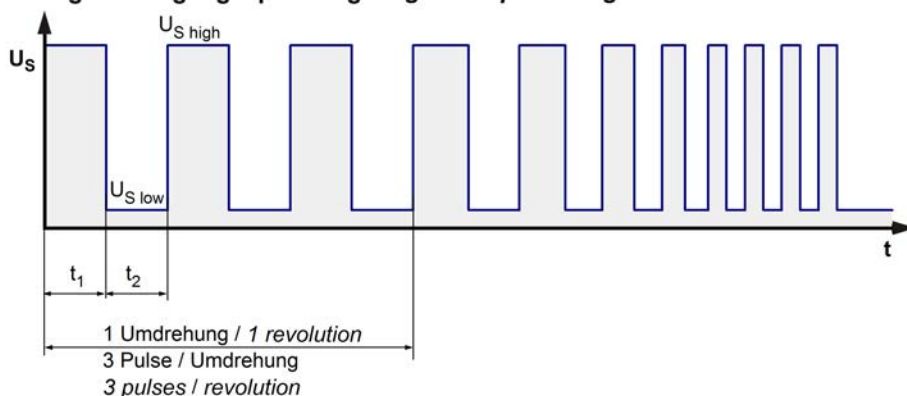
Name	Condition
U Contr. 0001	U Contr.: 10 V

Features	Condition	Symbol	Values		
Voltage range		U	16 V		36 V
Nominal voltage		U_N		24 V	
Power consumption	$\Delta p = 0$	P	64 W	101 W	97 W
Tolerance	U Contr. 0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Current consumption	$\Delta p = 0$	I	4.000 mA	4.200 mA	2.700 mA
Tolerance	U Contr. 0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Speed	$\Delta p = 0$	n	2.600 1/min	3.000 1/min	3.000 1/min
Tolerance	U Contr. 0010		+/- 10,0 %	+/- 5,0 %	+/- 5,0 %
Starting current consumption				4.800 mA	

3.3 Electrical Interface - Output

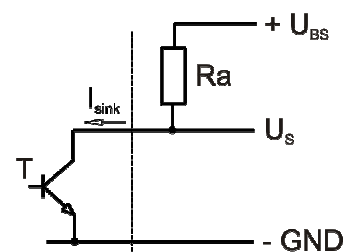
Tacho type	/2 (open collector)
------------	---------------------

Signal-Ausgangsspannung / Signal output voltage

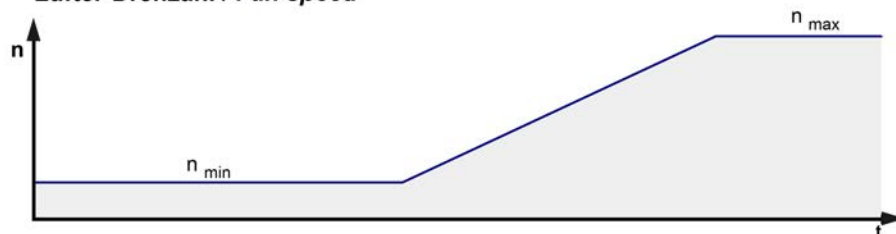


$$R_a = \frac{U_{BS} - U_{S\ low}}{I_{sink}}$$

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 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. 3.600 mA	
Clock signal at locked rotor	t_3 / t_4 typical: 7 s / 10,0 s	



Locked rotor signal t_5 :

After 2 failed start-ups there is an extended timeout of 50,0s.

3.5 Data According ErP Directive

Installation / Efficiency category	A / static
Speed control	integrated
Specific ratio	1,00313
Target overall efficiency 2015	41,0 %
Overall efficiency	51,8 %
Efficiency grade	61
Power input	125 W
Speed	2.950 1/min

All values measured in optimum energy efficiency point.

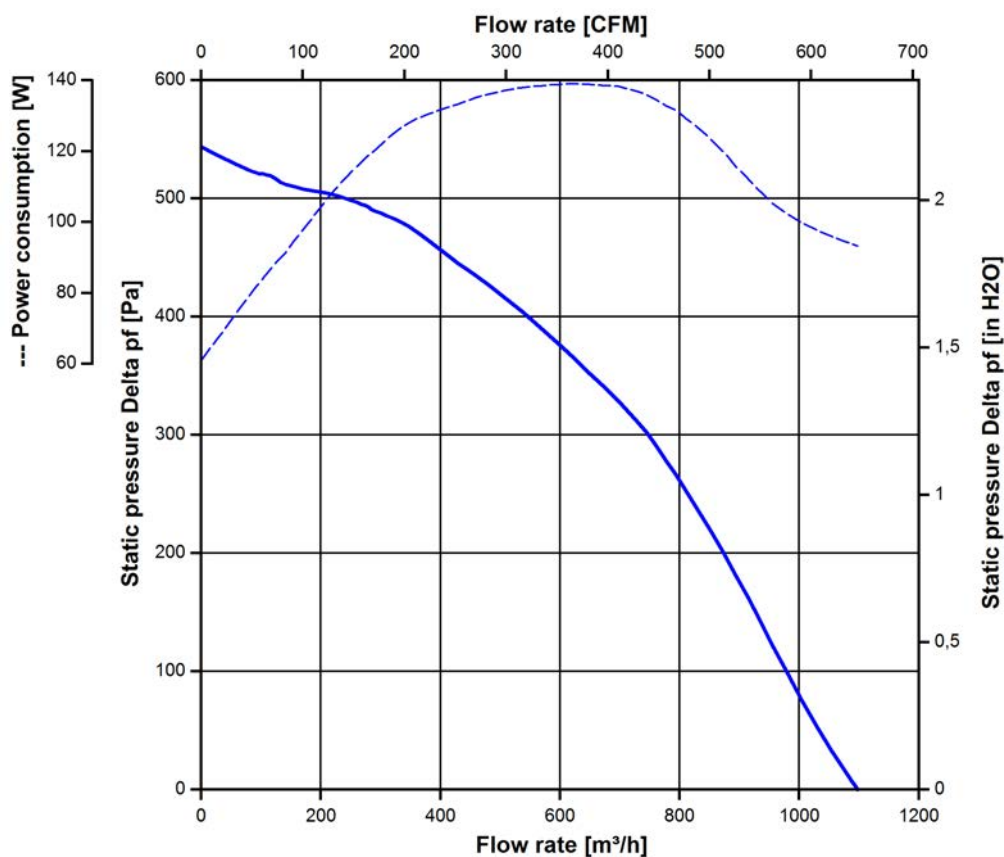
Productiondatecode is printed on the fan label.

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.

a.) Operation condition:

3.000 1/min at free air flow	U Contr. 10 V		
Max. free-air flow ($\Delta p = 0$ / $\dot{V} = \text{max.}$)	1.098,0 m ³ /h		
Max. static pressure ($\Delta p = \text{max.}$ / $\dot{V} = 0$)	545 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 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:

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

Optimal operating point	760,0 m3/h @ 225 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.

5 Safety**5.1 Electrical Safety**

Dielectric strength DIN EN 60950 (VDE 0805) and DIN EN 60335 (VDE 0700) 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 60950 (VDE 0805) - Information 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	55.000 h	
Life expectancy L10 at TU max.	40.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	92.5 00 h	

