

8300100443 ebmpapst Datasheet - FansCo
VWCE040KHDGS
AxiForce40

ebmpapst

engineering a better life



AxiForce40

INDEX

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

1 General

Fan type	Axial	
Rotating direction looking at rotor	Counterclockwise	
Airflow direction	Air outlet over struts	
Bearing system	Ball bearing	
Mounting position - shaft	Any	

Note: To comply with the specified voltage range, an additional external circuit may be necessary from a cable length of 1m.

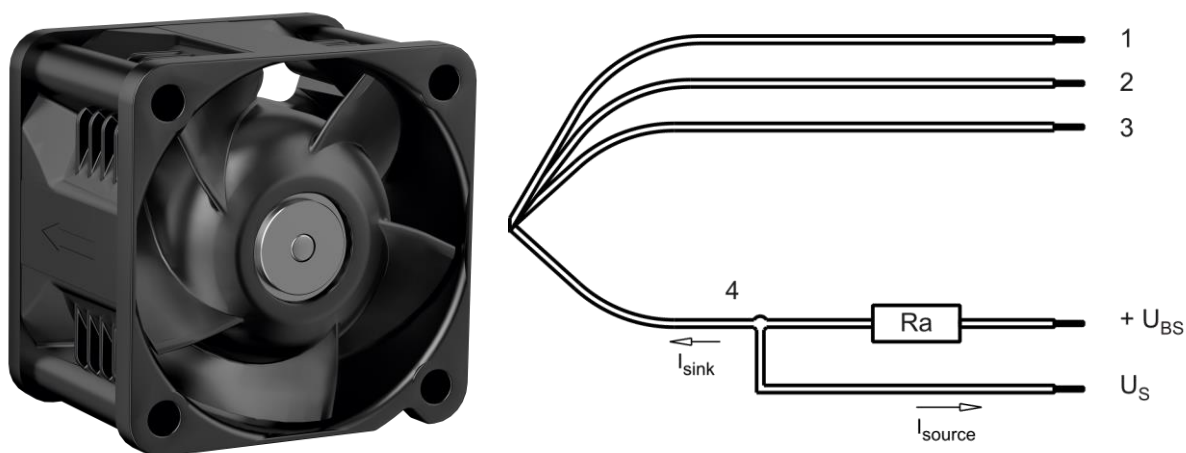
2 Mechanics

2.1 General

Width	40,0 mm	
Height	40,0 mm	
Depth	28,0 mm	
Mass	50 g	
Housing material	Plastic	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	Wire outlet corner: 30 Ncm Remaining corners: 30 Ncm	
Screw size	ISO 4762 - M3 degreased, without an additional brace and without washer	

2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 310 mm	
Tolerance	+/- 20 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 26	1,0 mm
2	blue	- GND	AWG 26	1,0 mm
3	violet	PWM	AWG 26	1,0 mm
4	white	Tacho	AWG 26	1,0 mm

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

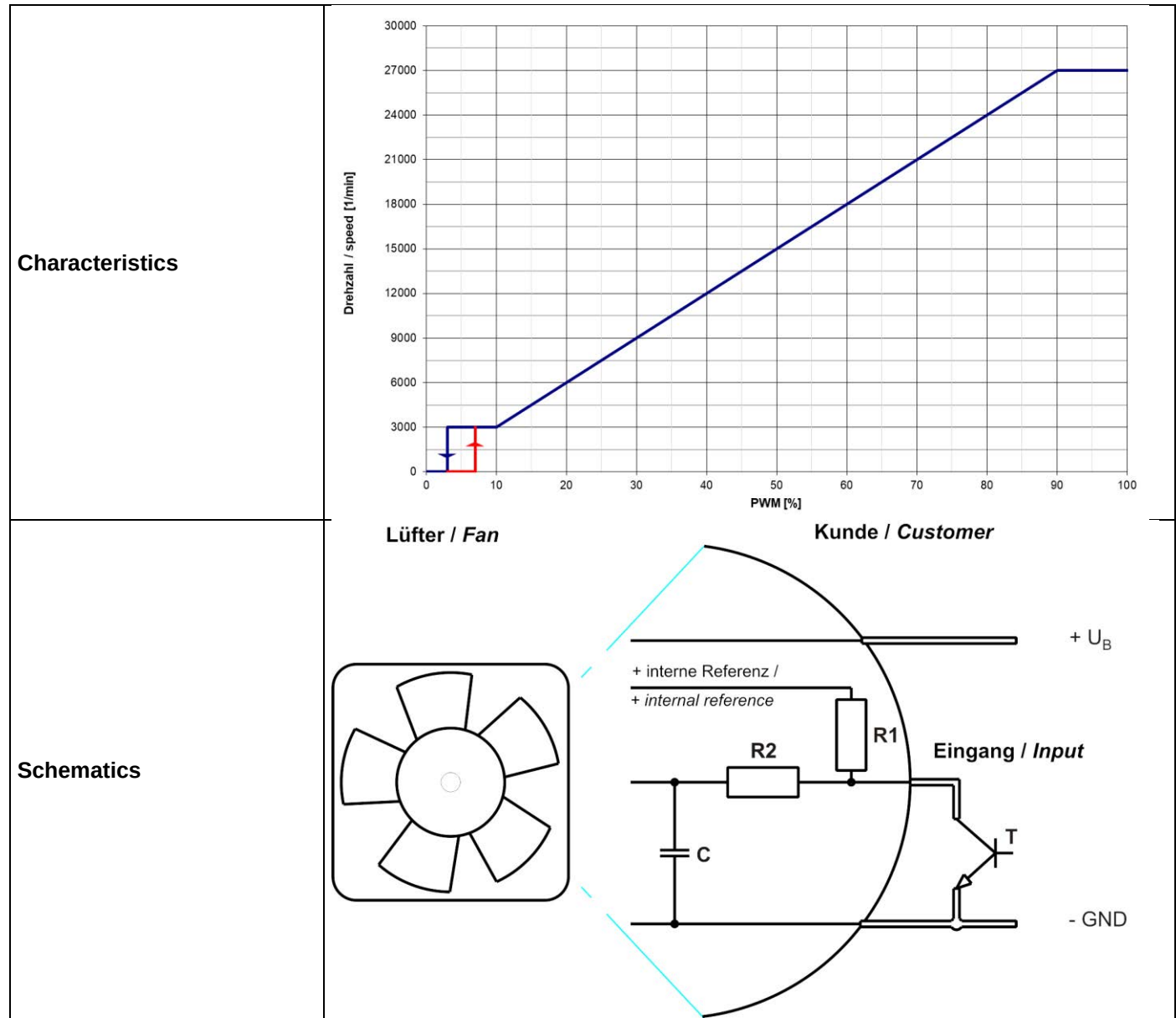
3 Operating Data

3.1 Electrical Interface - Input

Control input	PWM
---------------	-----

Features

Input type	Open collector	
PWM - Frequency		1 kHz - 25 kHz typical: 2 kHz



Speed control: 0... 100 %, PWM-Low < 0,2V
R1=5,1kOhm; R2=220kOhm; internal reference: 5V

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 15 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
PWM 0001	PWM: 100 %; f: 2 kHz

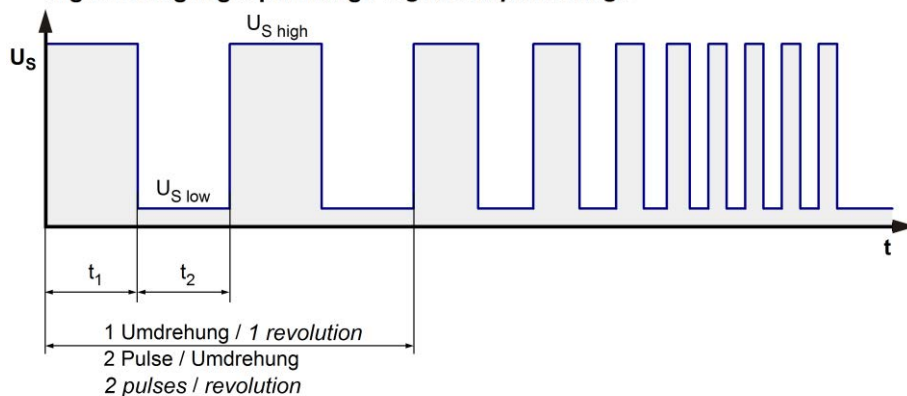
Unless otherwise specified in the table a general fan speed tolerance applies, relating to the maximum value of the required characteristic curve. Tolerance: +/-5%

Features	Condition	Symbol	Values		
Voltage range		U	8 V		13,8 V
Nominal voltage		U _N		12 V	
Power consumption	$\Delta p = 0$	P	13 W	19 W	19 W
Tolerance	PWM 0010		+/- 17,5 %	+/- 20 %	+/- 20 %
Current consumption	$\Delta p = 0$	I	1.600 mA	1.600 mA	1.400 mA
Tolerance	PWM 0010		+/- 17,5 %	+/- 20 %	+/- 20 %
Speed	$\Delta p = 0$	n	24.500 1/min	27.000 1/min	27.000 1/min
Tolerance	PWM 0010		+/- 12,5 %	+/- 5 %	+/- 5 %
Starting current consumption				<= 5.000 mA	

3.3 Electrical Interface - Output

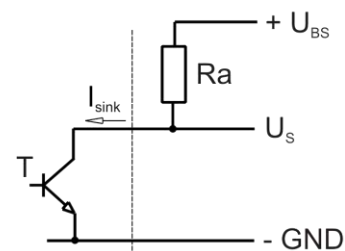
Tacho type	/2 (open collector)
------------	---------------------

Signal-Ausgangsspannung / Signal output voltage

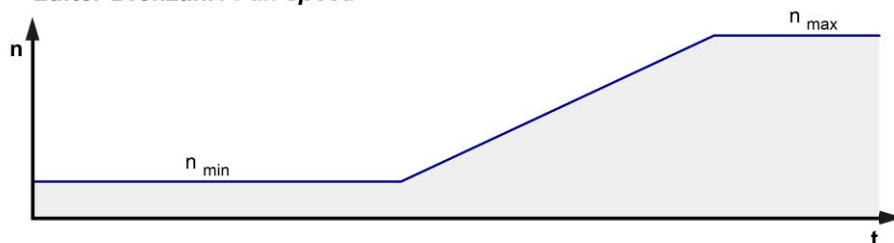


$$R_a = \frac{U_{BS} - U_{S \text{ low}}}{I_{\text{sink}}}$$

Lüfter / Fan Kunde / Customer



Lüfter-Drehzahl / Fan speed

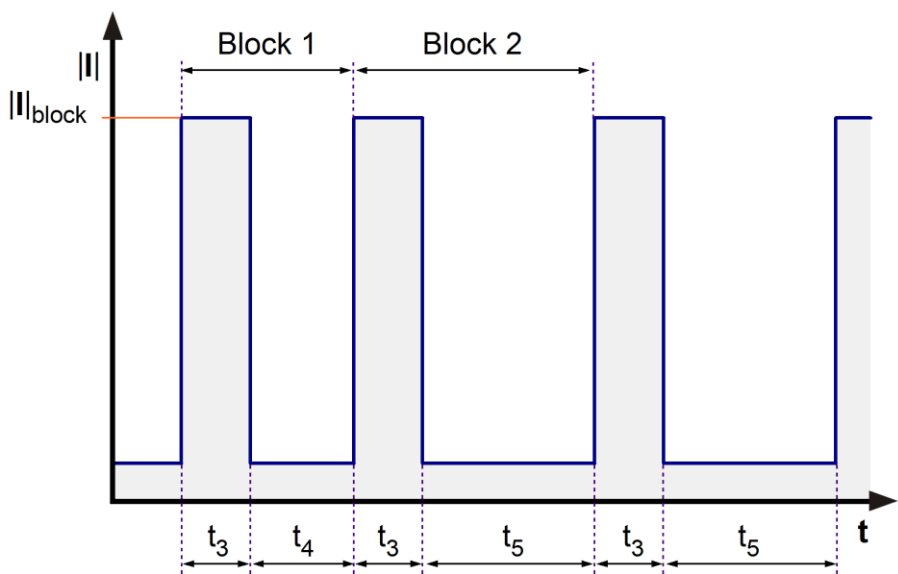


Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 30 \text{ V}$
Tacho signal Low	$U_{S \text{ low}}$	$\leq 0,4 \text{ V}$
Tacho signal High	$U_{S \text{ high}}$	$\leq 30 \text{ V}$
Maximum sink current	I_{sink}	$\leq 4 \text{ mA}$
External resistor	External resistor R_a from U_{BS} to U_S required. All voltages measured to GND.	
Tacho frequency	$(2 \times n) / 60$	
Tacho isolated from motor	No	
Slew rate		$\geq 0,5 \text{ V/us}$

n in revolutions per minute (1/min)

3.4 Electrical Features

Electronic function	Speed-Controlled	
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	$I_{block} \text{ approx. } 3.500 \text{ mA}$	
Clock signal at locked rotor	$t_3 / t_4 \text{ typical: } 0,25 \text{ s} / 0,8 \text{ s}$	
Extended Downtime	$t_5: 5 \text{ s after } 5 \text{ start attempts}$	
Internal fuse	None	



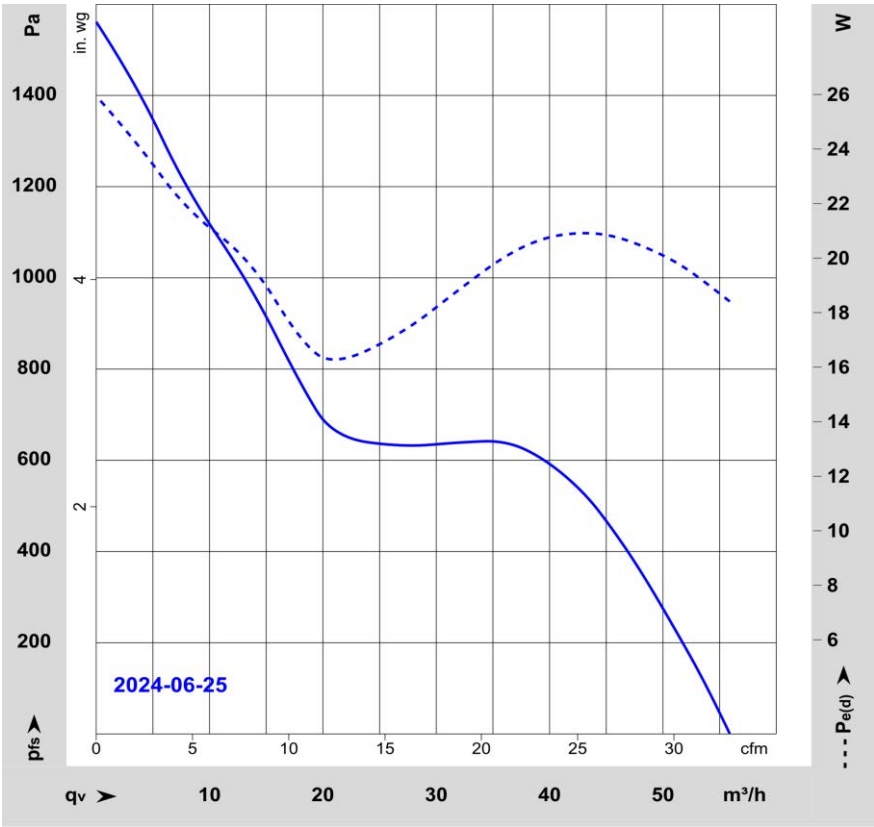
First five blocks: Block 1 t_3/t_4 typically 0.25s/0.8s. Afterwards cyclical: Block 2 t_3/t_5 typically 0.25s/5s.

3.5 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. 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:

27.000 1/min at free air flow	PWM 100 %; f: 2 kHz		
Max. free-air flow ($\Delta p = 0 / \dot{V} = \text{max.}$)	56 m ³ /h		
Max. static pressure ($\Delta p = \text{max.} / \dot{V} = 0$)	1.550 Pa		



3.6 Sound Data

Measurement conditions: Sound pressure level: 1 meter distance between microphone and the air intake.
Sound power level: According to ISO 10302-1
Measured in a semi anechoic chamber with a background noise level of $L_p(A) < 5 \text{ dB(A)}$
For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

27.000 1/min at free air flow	PWM 100 %; f: 2 kHz		
Optimal operating point	38 m ³ /h @ 620 Pa		
Sound power level at the optimal operating point	7,4 bel(A)		
Sound pressure level at free air flow, measured in rubber bands	64 dB(A)		

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-20 °C	
Max. permitted ambient temperature TU max.	70 °C	
Min. permitted storage temperature TL min.	-40 °C	
Max. permitted storage temperature TL max.	80 °C	

4.2 Climatic Requirements

IP-protection type (certified)	IP 20 **)	
Humidity requirements	humid heat, constant; according to DIN EN 60068-2-78, 14 days	
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 to DIN EN 60664-1)

There is either no pollution or it occurs only dry, non-conductive pollution. The pollution has no negative impact.

**) The specification of the IP protection refers to the conditions mentioned in certification of the fan. The above mentioned short description of the protection scope is not final. For detailed information of the respective protection scope and definitions, see certification as well as DIN EN 60529 (protection by housings) and ISO 20653 (for vehicles) with the letter K.

Short description of the IP-protection type:

Solid particle Protection: Protected against solid particles with a diameter of 12.5 mm and larger.
Protection against deliberate contact: Protected against contact to hazardous parts with a finger.
Protection against water: No protection.

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

4.3 EMC

Kind	Radiated Emission; 30 MHz - 1000 MHz (without PE)
According	DIN EN 55032:2016-02
Test severity/ Limit	Class B
Result	Below limit Class B

Kind	Electrostatic Discharge Immunity Test
According	DIN EN 61000-4-2:2001-12
Test severity/ 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
Test severity/ 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
Test severity/ 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
Test severity/ 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.	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	No
UL	Underwriters Laboratories	Yes / UL507, Electric Fans E38324
EU	safety mark for Europe	Yes/ Approval according to EN 62368 - Equipment for audio/video, information, and communication technology
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 = 40 °C	70.000 h	
Life expectancy L10 at TU max.	35.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	117.500 h	

Technical drawing of the ebm-papst S1-Georgien GmbH & Co. KG fan unit, showing side and front views with dimensions and a table of specifications.

Side View Dimensions:

- Total width: 28 ± 0.25
- Flange thickness (left): 3 ± 0.15
- Flange thickness (right): 3 ± 0.15

Front View Dimensions:

- Outer square frame: 40 ± 0.15
- Inner square frame: 32 ± 0.3
- Flange thickness: 3.5 ± 0.15
- Wire length: 6 ± 1 (verzinkt / tinned)

Table of Specifications:

Title				Digital sign			
First created for	Index	Doc type	Sheet				
	Designed name		Designed date				
Substitute for	Revised name		Revised date				
	See digital sign		See digital sign				
ebm-papst ebm-papst S1-Georgien GmbH & Co. KG				Tolerances			
Scale: 2:1 Format: A3				Document status: See digital sign			
				Int.	KM-IP.	Date	Name
				2D-CAD		3D-CAD	
				Fit		Deviations	
				Size			

Notes:

- kein Axialspiel der Kugellager durch Federausgleich / No axial clearance of the ball bearings due to a pre-load spring
- Anzahl und Länge der Litzen siehe Produktspezifikation Number an length of the wires see product specification

- | | | | | | | | |
|---|--|------------------|---------------|------------------|------------------|---|--|
| Title | | | | Digital sign | | | |
| First created for | | Index | Doc type | Sheet | | | |
| | | Designed name | Designed date | | | | |
| Substitute for | | Issued name | Released date | | | | |
| | | See digital sign | | See digital sign | | | |
| <div style="text-align: center;"> 
 ebm-papst </div> | | | | Tolerances | | | |
| ebm-papst St-Georgen GmbH & Co. KG | | | | | | | |
|  | | Scale | Format | | Document status | | |
| 2:1 | | A3 | | | See digital sign | | |
| 5 | | 6 | | 7 | | 8 | |