

Product Data Sheet **8300101208**
VKCH040DHDGS
DiaForce40

ebm**papst**

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DiaForce40

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
5	Safety.....	10
5.1	Electrical Safety	10
5.2	Approval Tests	10
6	Reliability.....	10
6.1	General	10

1 General

Fan type	Mixed-flow fan	
Rotating direction looking at rotor	Counterclockwise	
Airflow direction	Air inlet and air outlet axially	
Bearing system	Ball bearing	
Mounting position - shaft	Horizontal/rotor down: vertical/rotor up: any	

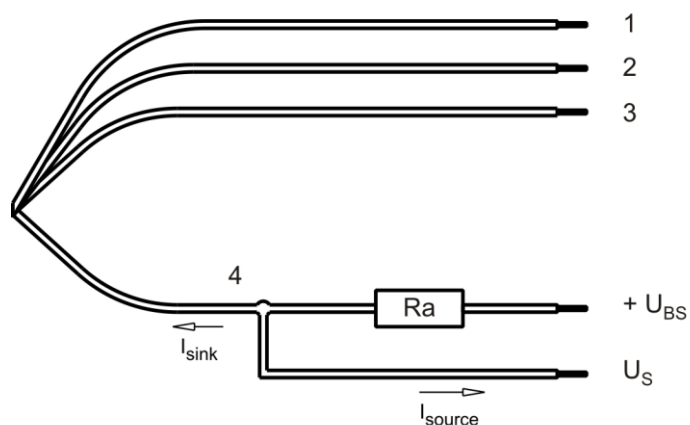
2 Mechanics

2.1 General

Width	40 mm	
Height	40 mm	
Depth	56 mm	
Mass	74 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	
Rotor protrusion max.	0 mm	

2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 310 mm	
Tolerance	+/- 10 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.

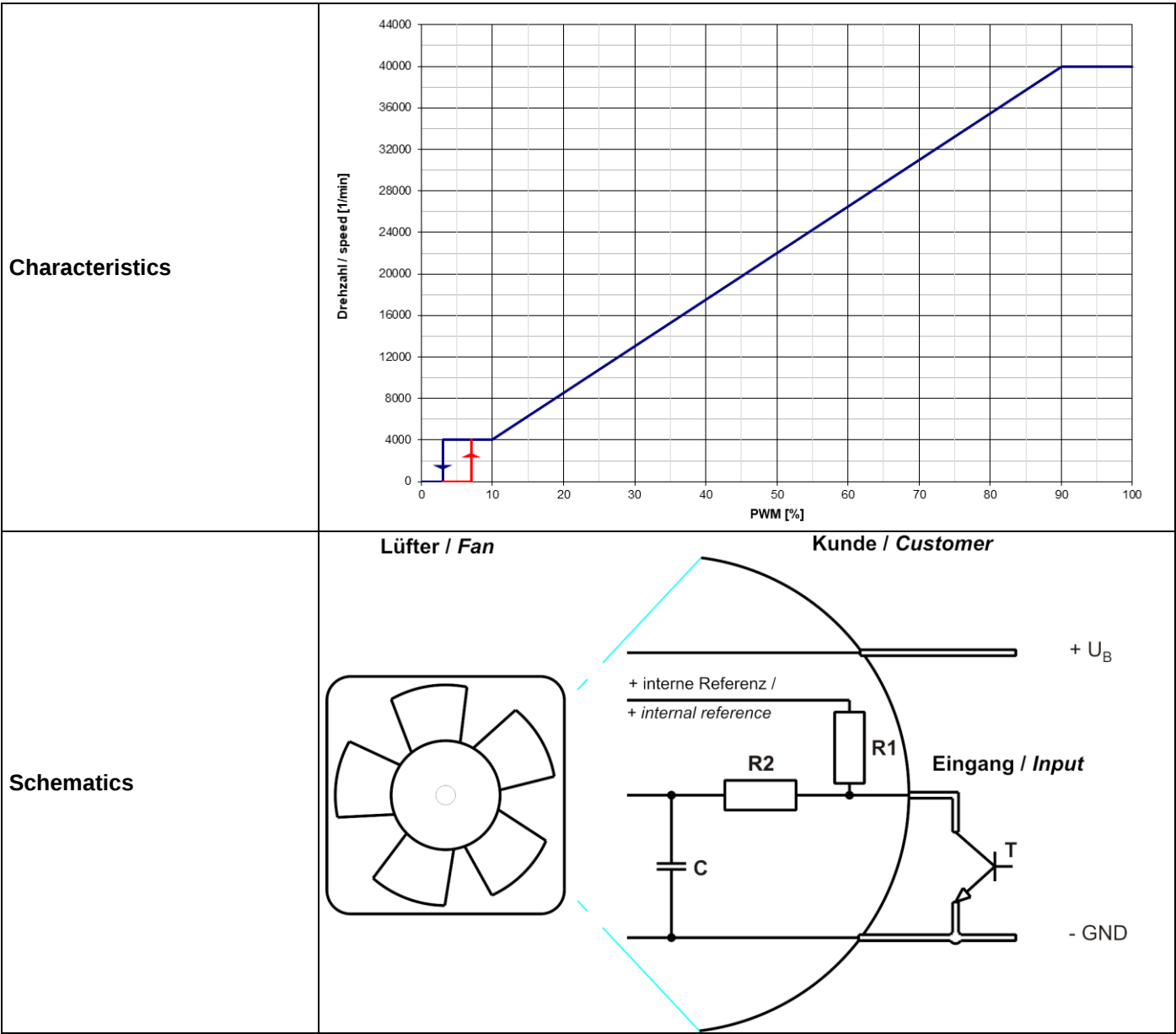
3 Operating Data

3.1 Electrical Interface - Input

Control input	PWM
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Features

Input type	Open collector	
PWM - Frequency		1 kHz - 30 kHz typical: 2 kHz



Speed controll: 0... 100 %, PWM-Low < 0,2 V
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

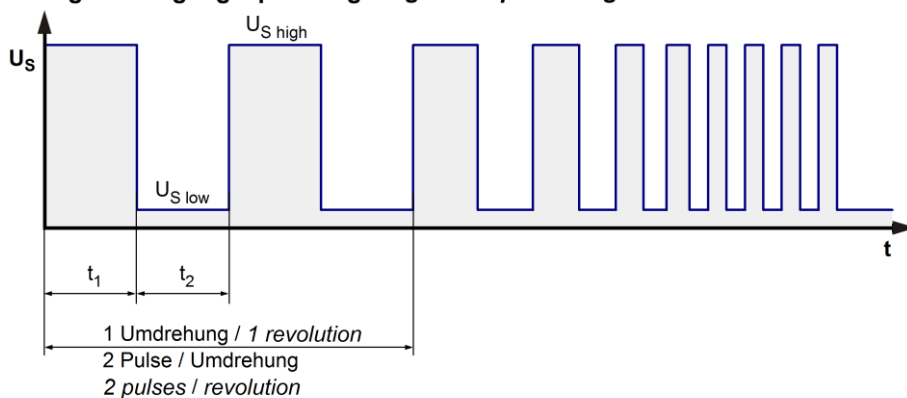
Unless otherwise specified in the table a general fan speed tolerance applies, relating to the maximum value of the required characteristic curve. Tolerance: +-5%

Features	Condition	Symbol	Values		
Voltage range		U	8 V		13,8 V
Nominal voltage		U _N		12 V	
Power consumption	$\Delta p = 0$	P	20 W	25,6 W	25,6 W
Tolerance	PWM 0010		+/- 17,5 %	+/- 20 %	+/- 20 %
Current consumption	$\Delta p = 0$	I	2.500 mA	2.130 mA	1.860 mA
Tolerance	PWM 0010		+/- 17,5 %	+/- 20 %	+/- 20 %
Speed	$\Delta p = 0$	n	36.900 1/min	40.000 1/min	40.000 1/min
Tolerance	PWM 0010		+/- 12,5 %	+/- 5 %	+/- 5 %
Starting current consumption				<= 7.000 mA	

3.3 Electrical Interface - Output

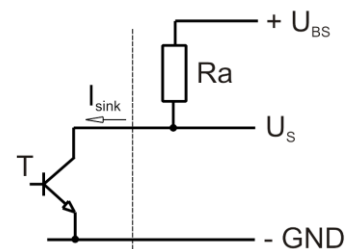
Tacho type	/2 (open collector)
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Signal-Ausgangsspannung / Signal output voltage

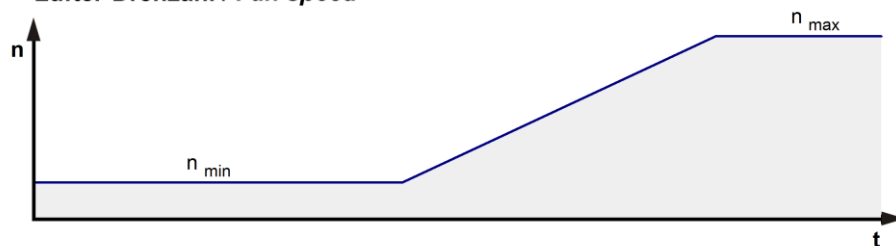


$$R_a = \frac{U_{BS} - U_{S\ low}}{I_{sink}}$$

Lüfter / Fan Kunde / Customer



Lüfter-Drehzahl / Fan speed

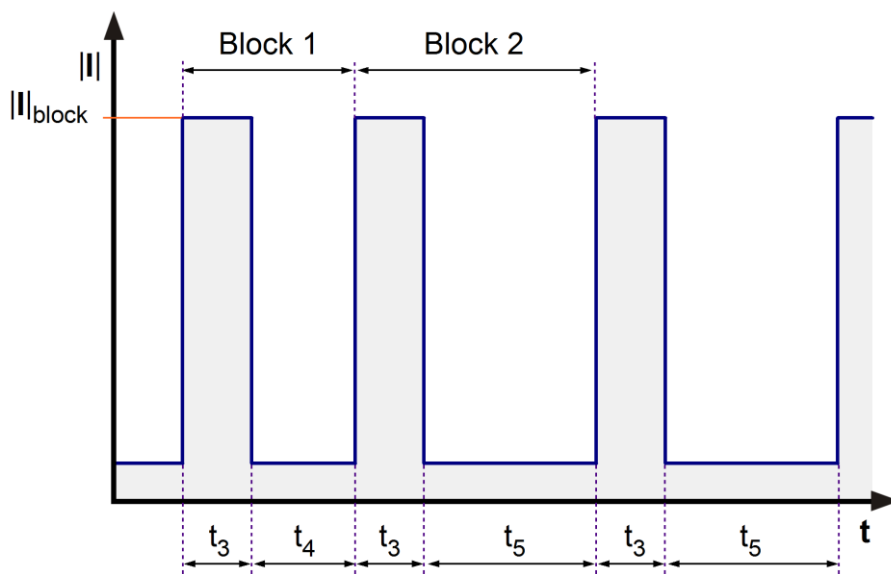


Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 30\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$\leq 30\text{ V}$
Maximum sink current	I_{sink}	4 mA
External resistor	External resistor R_a from U_{BS} to U_S required. All voltages measured to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

n = 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} approx. 5.000 mA	
Clock signal at locked rotor	t_3 / t_4 typical: 0,25 s / 0,8 s	
Extended Downtime	t_5 : 5 s after 5 start-up tests	
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.

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.

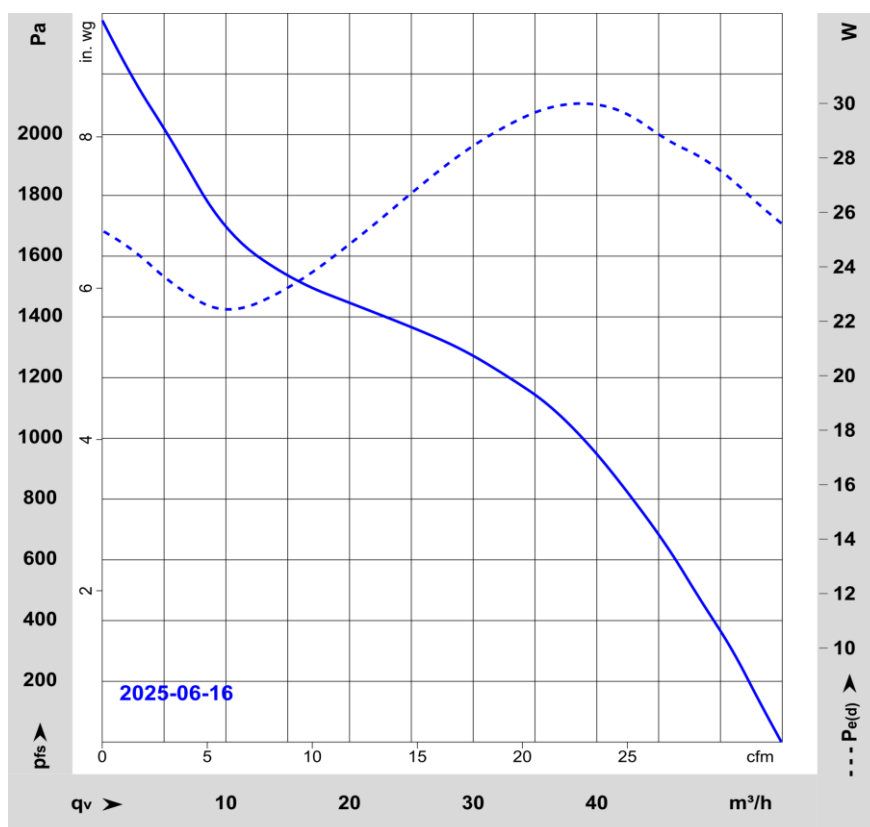
The information is only valid under the specified test conditions and may be changed by the installation conditions. If there are deviations from the standard test conditions, the characteristic values must be checked under the installed conditions. Power consumption of the fan motor when operating at normal voltage is shown. Depending on the operating conditions of the application, the power input may be higher.

a.) Operation condition:

40.000 1/min at free air flow	PWM 100 %; f: 2 kHz		
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Max. free-air flow ($\Delta p = 0$ / $\dot{V} = \text{max.}$)	55 m ³ /h	
Max. static pressure ($\Delta p = \text{max.}$ / $\dot{V} = 0$)	2.375 Pa	

Preliminary data.



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 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:

40.000 1/min at free air flow	PWM 100 %; f: 2 kHz		
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Optimal operating point	48 m ³ /h @ 500 Pa	
Sound power level at the optimal operating point	7,6 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	64 dB(A)	

Preliminary data.

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 **)	
Environmental class	H0	

**) 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.

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.		
Isolation resistance Measuring conditions: After 48h of storage at 95% R.H. and 25°C measured with U=500 VDC for 1 min.		
Clearance / creepage distance		
Protection class	III	

5.2 Approval Tests

CE	EC Declaration of Conformity	Yes
UKCA	UK Conformity Assessed	Yes
EAC	Eurasian Conformity	Yes
America	UL - Underwriters Laboratories	Yes / UL507, Electric Fans E38324
Europe	VDE - Association for Electrical or UL - Underwriters Laboratories or comparable	Yes / Approval acc. to EN 62368 - Audio/video, information and communication technology equipment
Canada	UL - Underwriters Laboratories or CSA - Canadian Standards Association	Yes / CSA audited by UL according to C22.2 No. 113 Fans and Ventilators
China	CCC - China Compulsory Certification or CQC - China Quality 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	120.000 h	

Technical drawing of the ebm-papst S1-Georgien fan, showing front, side, and rear views with dimensions and a specification table.

Dimensions:

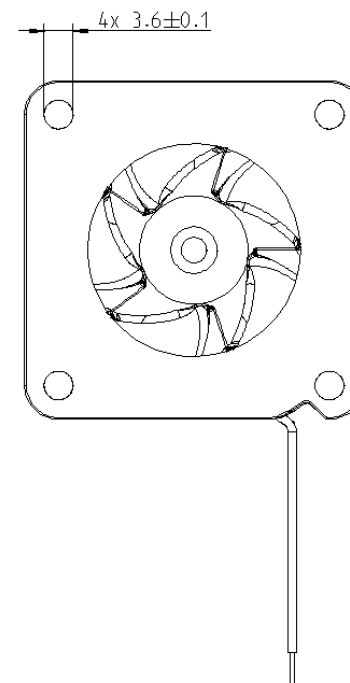
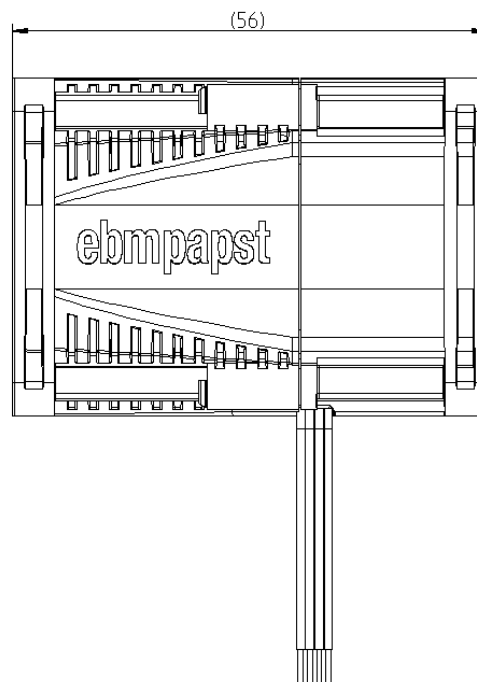
- Front view: Outer square frame 40 ± 0.15 , Inner square frame 32 ± 0.15 .
- Side view: Total width (56).
- Rear view: Mounting holes $4 \times 3.6 \pm 0.1$.
- Wires: Length 6 ± 0.1 , material verzinkt/finned .

Specifications:

- 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 and length of the wires see product specification

Table 1: Product Information

Title				Digital sign			
First created for	Index	Doc type	Sheet				
	Designed name	Designed date					
Substitute for	Revised name	Revised date	See digital sign				
ebm-papst ebm-papst St.Georgen GmbH & Co. KG				Tolerances Ind. MM-IP. Date Name			
Scale: 2:1 Format: A3				Document status: See digital sign			
				2D-CAD: 3D-CAD:			
				File Deviations			



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No axial clearance of the ball bearings due to a pre-load spring
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First created for			Index	Buc type	Sheet										
			Designed name:		Designed date										
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			See digital sign		See digital sign										
ebmpapst					Tolerances										
ebm-papst St.Georgen GmbH & Co. KG															
		Scale	Format	Document status	Int.					KW-Wr.	Date	Name	Fit		Deviation
		2:1	A3	See digital sign	2D-CAD					3D-CAD					