1 General

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

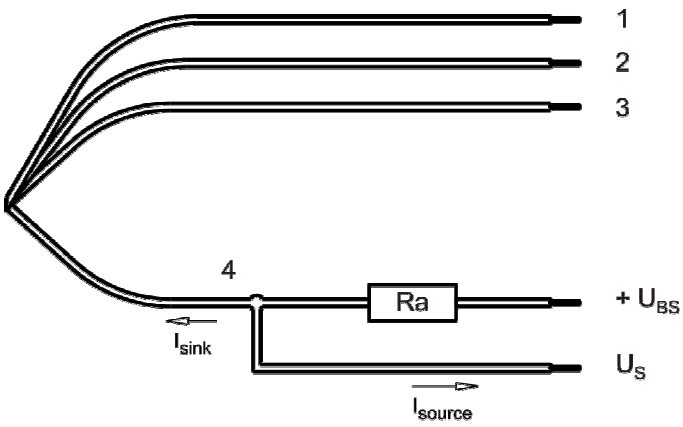
2 Mechanics

2.1 General

Width	80,0 mm	
Height	80,0 mm	
Depth	32 mm	
Mass	0,1 kg	
Housing material	Plastic	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges Screw size	Wire outlet corner: 100 Ncm Remaining corners: 100 Ncm ISO 4762 - M4 degreased, without an additional brace and without washer	

2.2 Connections

Electrical connection	Wires	
Lead wire length Tolerance	L = 310 mm +- 10,0 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 26	1,35 mm
2	blue	- GND	AWG 26	1,35 mm
3	violet	PWM	AWG 26	1,35 mm
4	white	Tacho	AWG 26	1,35 mm

3 Operating Data

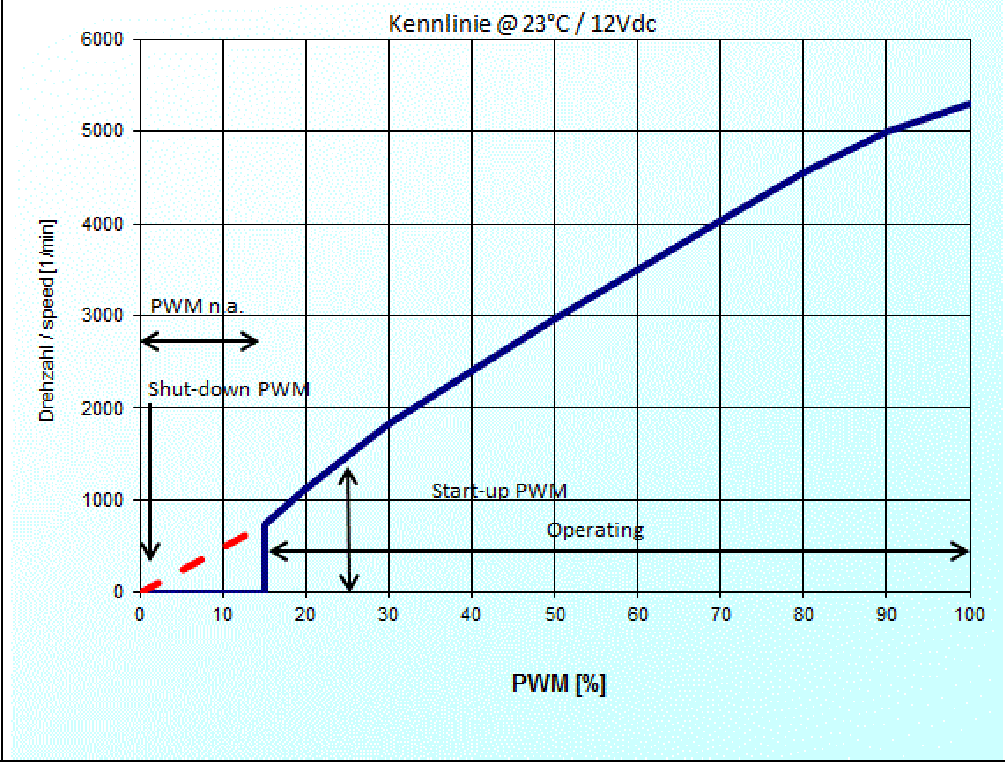
3.1 Electrical Interface - Input

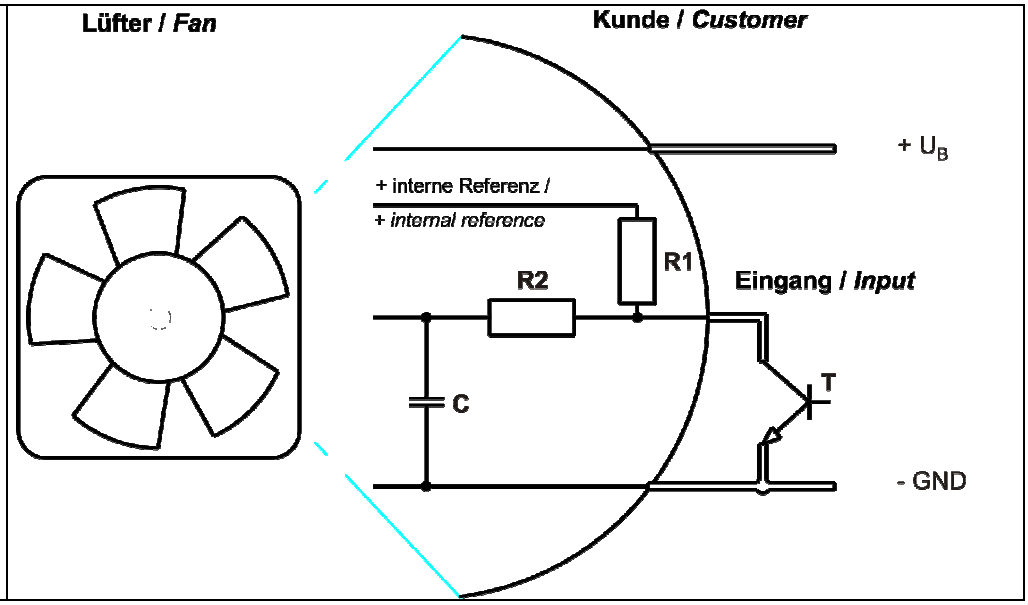
Control input	PWM

Features

Inpute type	Open collector / TTL	
PWM - Frequency		21 kHz - 28 kHz typical: 25 kHz
Max. voltage for logic "Low"		0,8 V
Max. voltage for logic "High"	Open circuit voltage	5,25 V
Maximum source current	short circuit current	5 mA
4 wire startup condition	PWM duty cycle	> 25 %
4 wire operation condition after startup	PWM duty cycle	15 % - 100 %
PWM not applicable	PWM n.a.	0 % - 14 %
Shutdown condition	PWM duty cycle	< 1 %
Typical time until warm restart	After shutdown by PWM	11,8 s

Characteristics



Schematics	

3.2 Electrical Operating Data

Measurement conditions: Normal air density = 1,2 kg/m3; Temperature 23℃ +/ - 3℃; 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.

Δp = 0: corresp. to free air flow (see chapter aerodynamics)
I: corresp. to arithm. mean current value

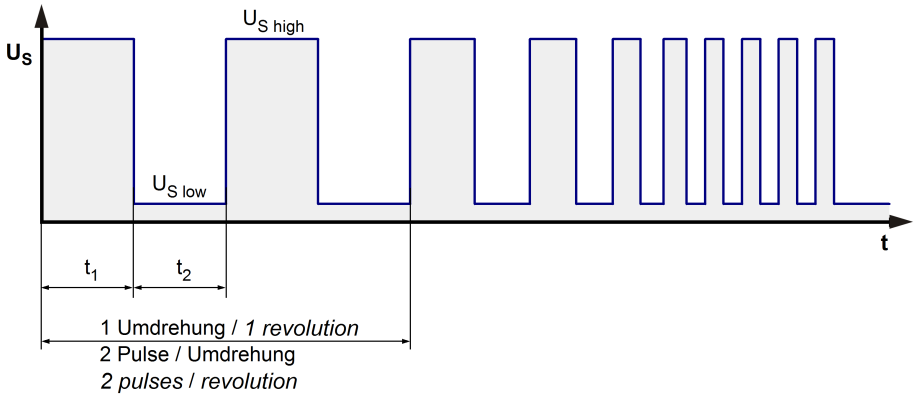
Name	**Condition**		
PWM 0001	PWM: 100 %;		

Features	**Condition**	**Symbol**	**Values**		
Voltage range		U	10,8 V		15 V
Nominal voltage		U_N		12 V	
Power consumption Tolerance	Δp = 0 PWM 0010	P	3,1 W +- 17,5 %	4 W +- 12,5 %	4,7 W +- 15 %
Current consumption Tolerance	Δp = 0 PWM 0010	I	287 mA +- 17,5 %	330 mA +- 12,5 %	356 mA +- 15 %
Speed Tolerance	Δp = 0 PWM 0010	n	4.680 1/min +- 12,5 %	5.300 1/min +- 7,5 %	6.300 1/min +- 10 %
Starting current consumption				1.700 mA	

3.3 Electrical Interface - Output

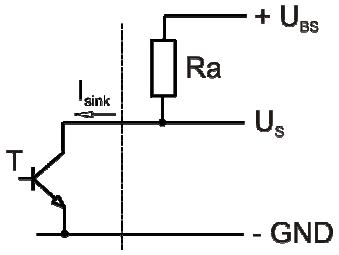
Tacho type	/2 (open collector)

Signal-Ausgangsspannung / *Signal output voltage*

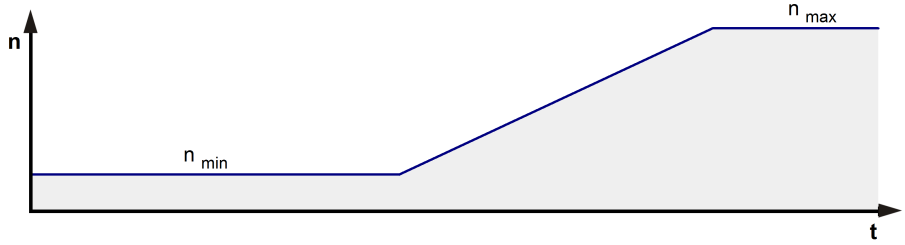


$$Ra = \frac{U_{BS} - U_{S\,low}}{I_{sink}}$$

Lüfter / *Fan* **Kunde / *Customer***



Lüfter-Drehzahl / *Fan speed*

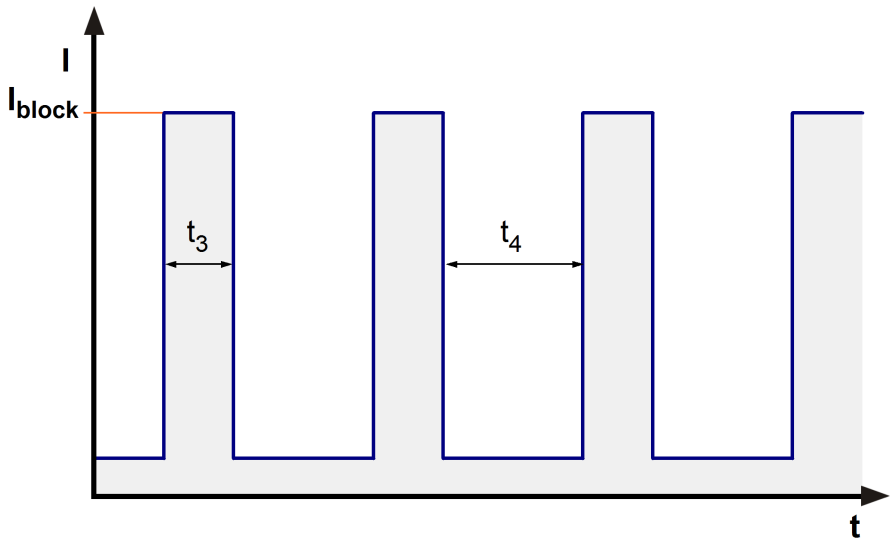


Features		Note	Values
Tacho operating voltage	U_{BS}		<= 30 V
Tacho signal Low	$U_{S\,low}$	I sink: 2 mA	<= 0,4 V
Tacho signal High	$U_{S\,high}$	I source: 0 mA	<=30 V
Maximum sink current	I_{sink}		<= 4 mA
Maximum source current			0 mA
External resistor		External resistor Ra from UBS to US required. All voltages measured to GND.	
Tacho frequency		(2 x n) / 60	
Tacho isolated from motor		No	
Slew rate			=> 0,5 V/us

n = revolutions per minute (1/min)

3.4 Electrical Features

Electronic function	None	
Reversed polarity protection Max. residual current at U_N	Rectifying diode I_F <= 500 uA	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	I_{block} approx. 1.700 mA	
Clock signal at locked rotor	t_3 / t_4 typical: 0,16 s / 11,8 s	


I
I_{block}
t_3
t_4
t

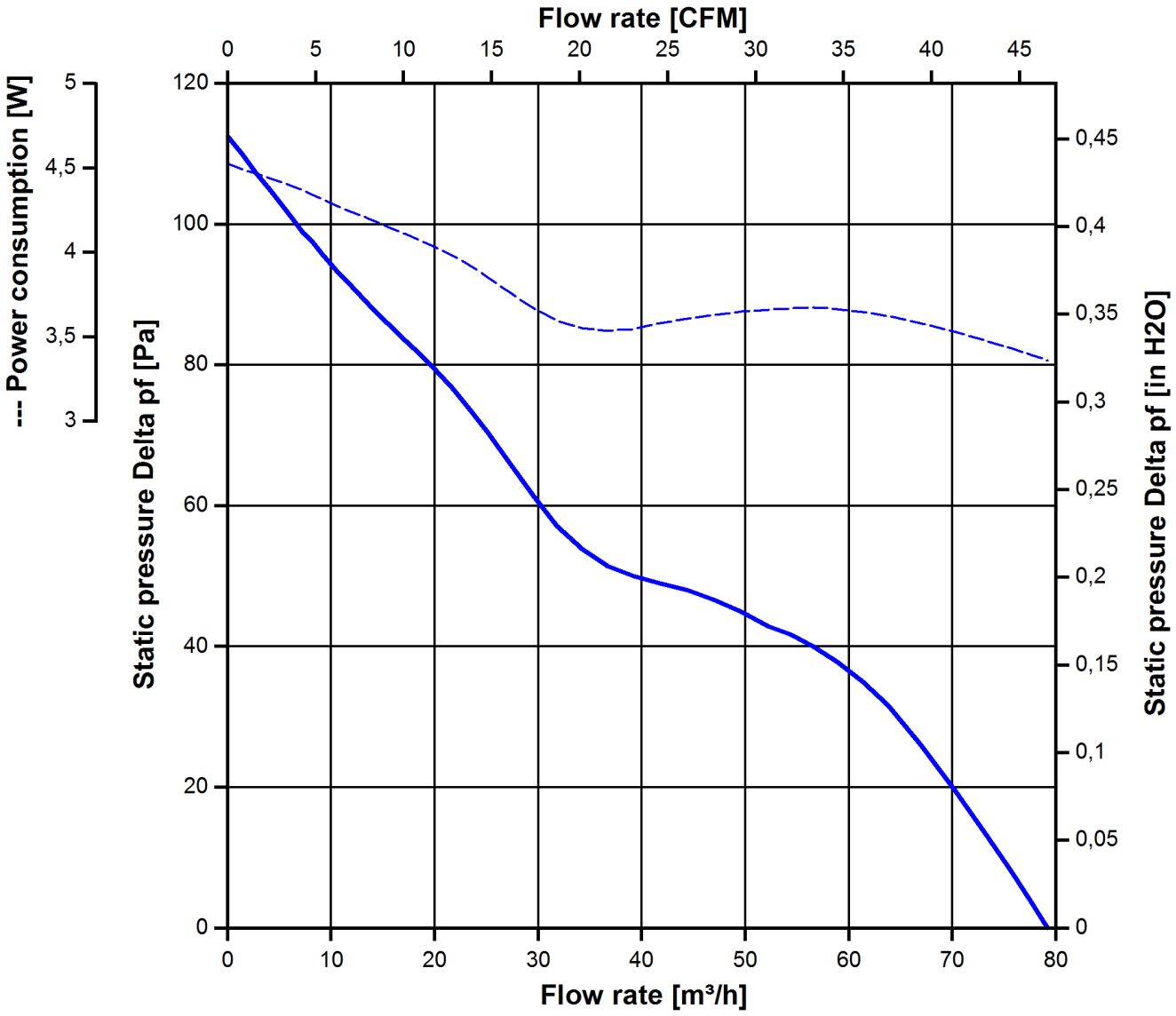
3.5 Aerodynamics

Measurement conditions:	Measured with a double chamber intake rig acc. to DIN EN ISO 5801. Normal air density = 1,2 kg/m3; Temperature 23℃ +/ - 3℃; 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:

5.300 1/min at free air flow	PWM 100 %;		

Max. free-air flow (Δp = 0 / $\dot{V}$ = max.)	78 m3/h	
Max. static pressure (Δp = max. / $\dot{V}$ =0)	113 Pa	


Flow rate [CFM]
0
5
10
15
20
25
30
35
40
45
--- Power consumption [W]
5
4,5
4
3,5
3
Static pressure Delta pf [Pa]
120
100
80
60
40
20
0
Static pressure Delta pf [in H2O]
0,45
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
0
10
20
30
40
50
60
70
80
Flow rate [m³/h]

3.6 Sound Data

Measurement conditions:	Sound pressure level: 1 meter distance between microphone and the air intake. Sound power level: According to DIN 45635 Part 38 (ISO 10302) Measured in a semianchoic chamber with a background noise level of Lp(A) < 5 dB(A) For further measurement conditions see chapter aerodynamics.

a.) Operation condition:

5.300 1/min at free air flow	PWM 100 %;		

Optimal operating point	52 m3/h @ 43 Pa	
Sound power level at the optimal operating point	5,3 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	43 dB(A)	

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-20 ℃	
Max. permitted ambient temperature TU max.	75 ℃	
Min. permitted storage temperature TL min.	-40 ℃	
Max. permitted storage temperature TL max.	80 ℃	

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℃. 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℃ measured with U=500 VDC for 1 min.	RI > 10 MOhm	
Clearance / creepage distance	1,0 mm / 1,2 mm	
Protection class	III	

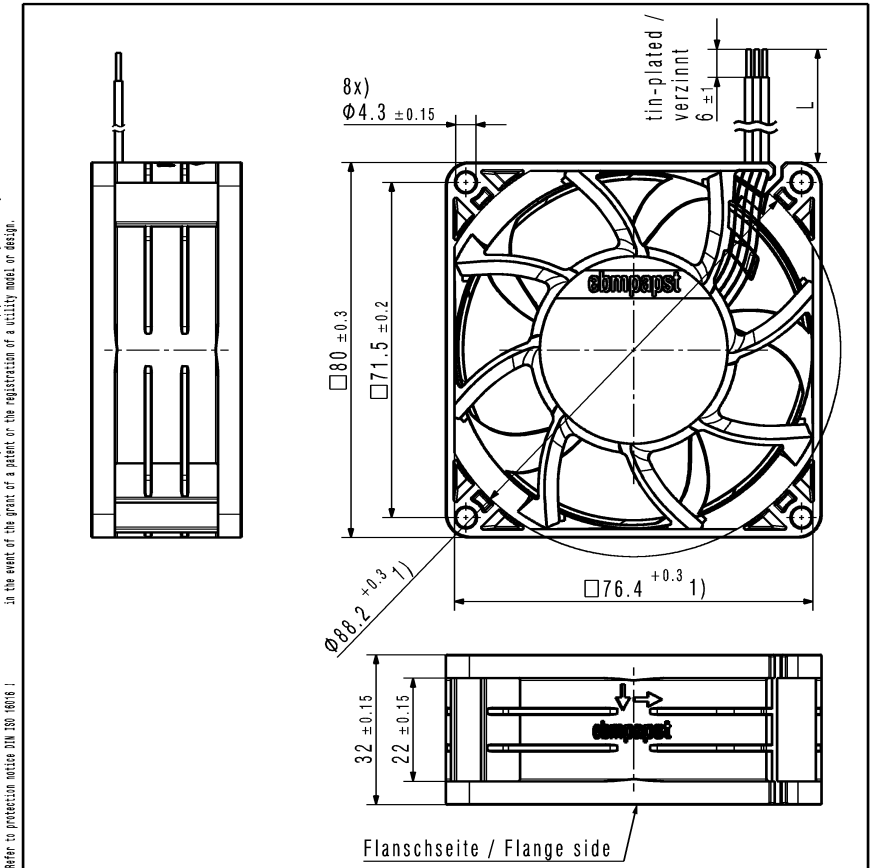
5.2 Approval Tests

CE	EC Declaration of Conformity	No
EAC	Eurasian Conformity	Yes
UL	Underwriters Laboratories	Yes / UL507, Electric Fans
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 ℃	82.500 h	
Life expectancy L10 at TU max.	32.500 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 ℃	140. 000 h	



1) Maße für Montagewand / Dimensions for assemlby wall
- Kein Axialspiel der Kugellager durch Federausgleich / no axial clearance of ball bearings due to a pre-load spring
- Anzahl und Länge der Litzen siehe Produktspezifikation Blatt 1 Number and length of the wires see design specification sheet 1

Dokument-Status / Document-State	CATIA-Version/ CATIA-Version	CAD-Umgebung/ CAD-Environment	Werkstoff / Material:	Volumen / Volume (mm^3):		
	9292910101 CPR000A			Gewicht / Mass (g):		
Aend.-Nr./ Change-No.	3D-Referenzmodell / 3D-Referencemodel		Artikel / Title:			
Tolerierung / Tolerances:	Datum	Name				
	Bearb./ Drawn					
Allgemeintoleranzen / Gen. Tolerances:	Gepr./ Checked		Zchg.-Nr./ Drawing No:		Ers.f.Zchg. / Replaces:	
	Freig./ Releas.					
ebmpapst			Dokumenttyp / Type of Document	Teildokument (Blatt/Page)	Index / Index	Format / Size: / Massstab/Scale
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