

Product Data Sheet 422 J/2HP

**ebmpapst**

The engineer's choice



422 J/2HP

INDEX

<b>1</b>	<b>General</b> .....	<b>3</b>
<b>2</b>	<b>Mechanics</b> .....	<b>3</b>
2.1	General .....	3
2.2	Connections .....	3
<b>3</b>	<b>Operating Data</b> .....	<b>4</b>
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 .....	10
<b>4</b>	<b>Environment</b> .....	<b>10</b>
4.1	General .....	10
4.2	Climatic Requirements .....	10
4.3	Mechanical Requirements .....	10
<b>5</b>	<b>Safety</b> .....	<b>12</b>
5.1	Electrical Safety .....	12
5.2	Approval Tests .....	12
<b>6</b>	<b>Reliability</b> .....	<b>12</b>
6.1	General .....	12

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	

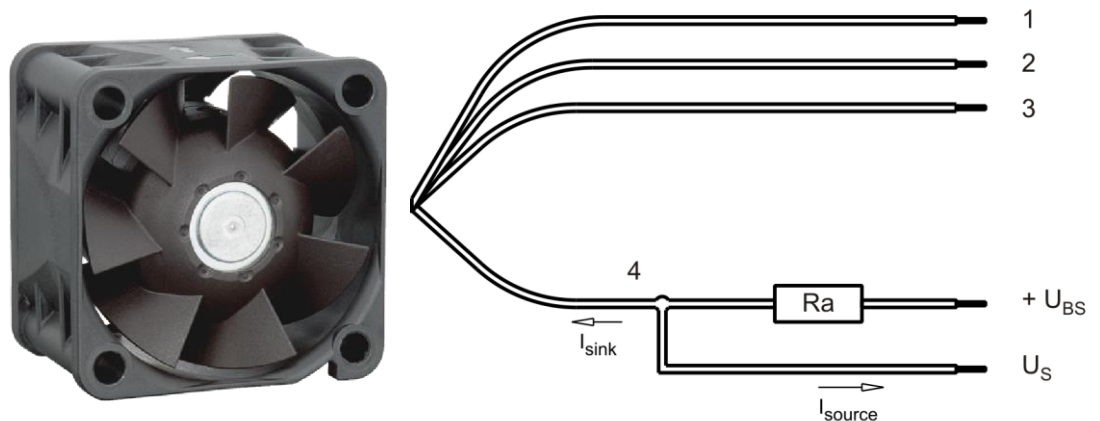
2 Mechanics

2.1 General

Width	40,0 mm	
Height	40,0 mm	
Depth	28,0 mm	
Mass	0,045 kg	
Housing material	Plastic	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	Wire outlet corner: 40 Ncm Remaining corners: 60 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	+ - 10,0 mm	
Wire size (AWG)	28	
Insulation diameter	0,9 mm	



Wire	Color	Operation
1	red	+ UB
2	blue	- GND
3	violet	PWM
4	white	Tacho

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: 25 kHz
Max. voltage for logic "Low"		0,2 V
Maximum source current	short circuit current	$\leq 1 \text{ mA}$

<p><b>Characteristics</b></p>	<table border="1"> <caption>Approximate data from the speed vs PWM graph</caption> <thead> <tr> <th>PWM [%]</th> <th>Speed [1/min]</th> </tr> </thead> <tbody> <tr><td>0</td><td>3500</td></tr> <tr><td>10</td><td>3500</td></tr> <tr><td>20</td><td>5500</td></tr> <tr><td>30</td><td>7500</td></tr> <tr><td>40</td><td>9500</td></tr> <tr><td>50</td><td>11500</td></tr> <tr><td>60</td><td>13000</td></tr> <tr><td>70</td><td>14500</td></tr> <tr><td>80</td><td>16000</td></tr> <tr><td>90</td><td>17000</td></tr> <tr><td>100</td><td>17000</td></tr> </tbody> </table>	PWM [%]	Speed [1/min]	0	3500	10	3500	20	5500	30	7500	40	9500	50	11500	60	13000	70	14500	80	16000	90	17000	100	17000
PWM [%]	Speed [1/min]																								
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<p><b>Schematics</b></p>	<p>The schematic shows the fan's electrical interface. On the left is a fan symbol. On the right, a circuit diagram shows the connection between the fan and the customer's control system. The fan's power supply is <math>+U_B</math>. The fan has an internal reference terminal. A resistor <math>R1</math> is connected between the internal reference and the power supply. The fan's input terminal is connected to the customer's input terminal through a resistor <math>R2</math>. A capacitor <math>C</math> is connected between the input terminal and ground. An NPN transistor <math>T</math> is connected between the input terminal and ground.</p>																								

### 3.2 Electrical Operating Data

Measurement conditions: Normal air density = 1,2 kg/m<sup>3</sup>; 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)

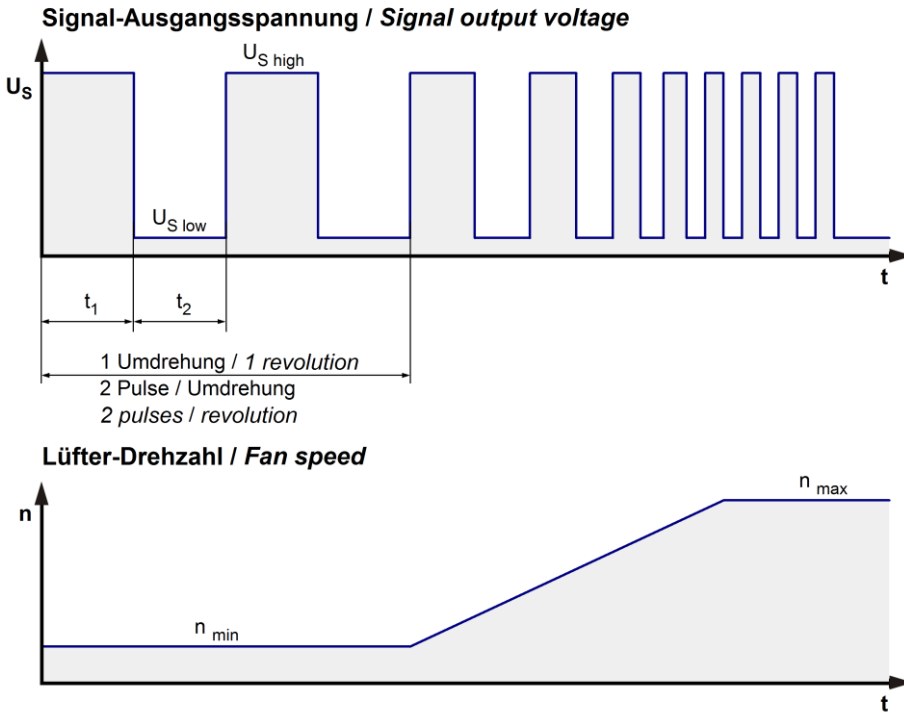
I: corresp. to arithm. mean current value

Name	Condition
PWM 0001	PWM: 100 %; f: 25 kHz

Features	Condition	Symbol	Values		
Voltage range		U	8,0 V		13,8 V
Nominal voltage		$U_N$		12 V	
Power consumption	$\Delta p = 0$	P	3,2 W	6,9 W	9 W
Tolerance	PWM 0010		+/- 20 %	+/- 15 %	+/- 15 %
Current consumption	$\Delta p = 0$	I	400 mA	575 mA	650 mA
Tolerance	PWM 0010		+/- 20 %	+/- 15 %	+/- 15 %
Speed	$\Delta p = 0$	n	12.900 1/min	17.250 1/min	18.700 1/min
Tolerance	PWM 0010		+/- 15 %	+/- 10 %	+/- 10 %
Starting current consumption				<= 1.800 mA	

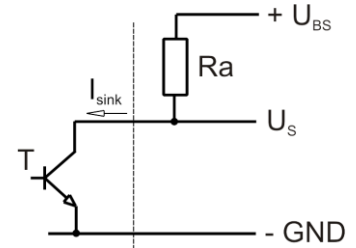
3.3 Electrical Interface - Output

Tacho type	/2 (open collector)
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$$R_a = \frac{U_{BS} - U_{S\ low}}{I_{sink}}$$

Lüfter / Fan      Kunde / Customer

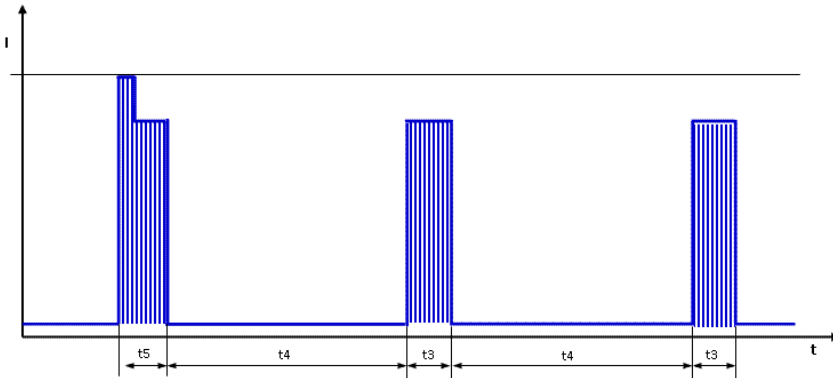


Features	Note	Values
Tacho operating voltage	$U_{BS}$	$\leq 15\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$15\text{ V}$
Maximum sink current	$I_{sink}$	$\leq 4\text{ mA}$
External resistor	External resistor $R_a$ from $U_{BS}$ to $U_S$ required. All voltages measured to GND.	
Tacho frequency	$(2 \times n) / 60$	
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\text{ V/us}$

n = revolutions per minute (1/min)

### 3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	Rectifying diode	
Max. residual current at $U_N$	$I_F \leq 5 \text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at $U_N$	$I_{\text{block}}$ approx. 1.650 mA	
Clock signal at locked rotor	$t_3 / t_4$ typical: 0,45 s / 4,5 s	



First pulse  $t_5$  typical 0.7s (0.5 .. 1.0s) followed by  $t_4$ . Afterwards cyclical  $t_3/t_4$ .

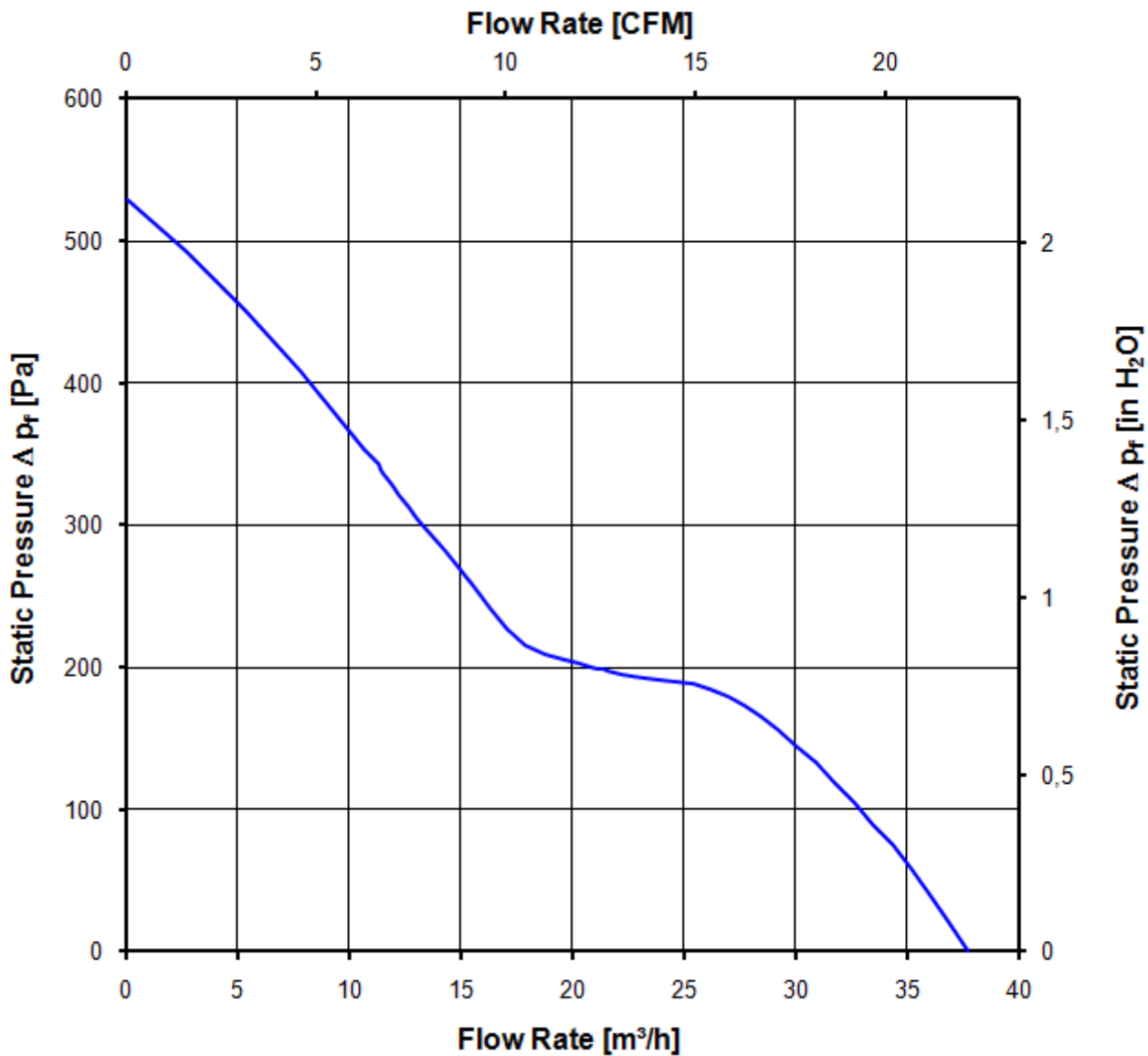
### 3.5 Aerodynamics

Measurement conditions: Measured with a double chamber intake rig acc. to DIN EN ISO 5801.  
 Normal air density = 1,2 kg/m<sup>3</sup>; 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:

17.250 1/min at free air flow	PWM 100 %; f: 25 kHz		
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Max. free-air flow ( $\Delta p = 0 / \dot{V} = \text{max.}$ )	38,0 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \text{max.} / \dot{V} = 0$ )	530 Pa	







**3.6 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:

17.250 1/min at free air flow	PWM 100 %; f: 25 kHz		
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Optimal operating point	26,0 m <sup>3</sup> /h @ 164 Pa	
Sound power level at the optimal operating point	6,6 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	54,0 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**

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.

**4.3 Mechanical Requirements**

severity level	stationary use		
1	storage / transportation	Random vibration not in use IEC 60068-2-64 Frequency range / ASD  $G_{RMS}$ Axes of vibration	Random vibration 5 - 20 Hz : 1,0 m <sup>2</sup> / s <sup>3</sup> 20 - 500 Hz : - 3 dB / Oct 0,91 G 3

		Test duration	3 x 30 min
storage / transportation	Bump not in use IEC 60068-2-29 Shock spectrum Acceleration Duration Number of bumps (+X, -X, -Y, +Y, -Z, +Z) Total bumps		Bump half sine 18 G 6 ms 100 in each direction 600
stationary use	Random vibration in use IEC 60068-2-64 Frequency range / ASD  $G_{RMS}$ Axes of vibration Test duration		Random vibration 5 - 10 Hz : +6 dB / Oct 10 - 50 Hz : $1,0 \text{ m}^2 / \text{s}^3$ 50 - 200 Hz : -6 dB / Oct 0,65 G 3 3 x 30 min
stationary use	Bump in use IEC 60068-2-29 Shock spectrum Acceleration Duration Number of bumps (+X, -X, -Y, +Y, -Z, +Z) Total bumps		Bump half sine 5 G 11 ms 100 in each direction 600

## 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
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

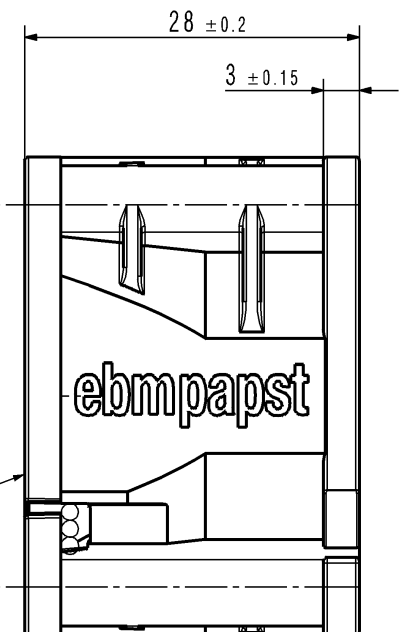
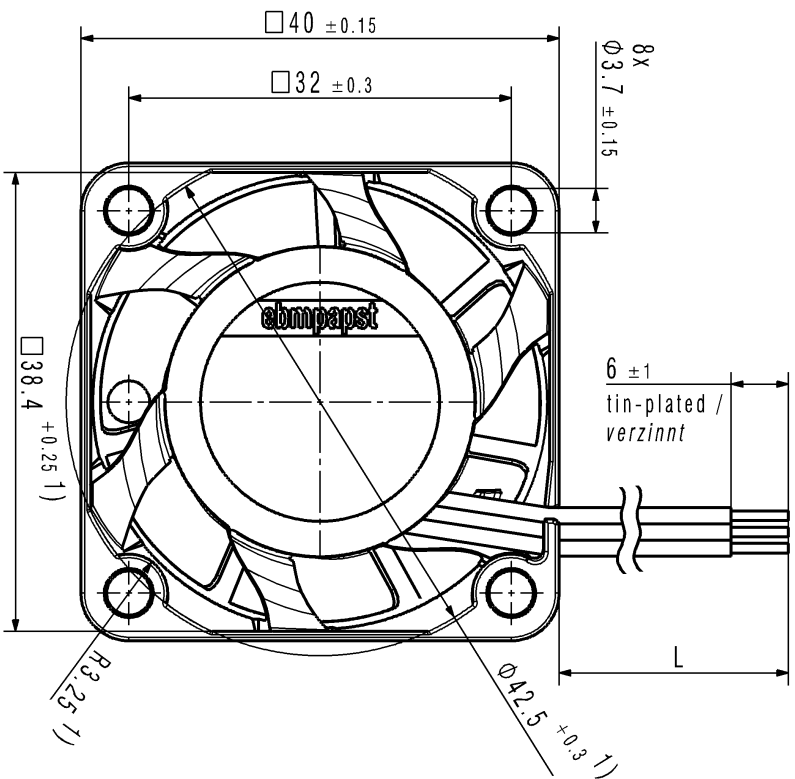
## 6 Reliability

### 6.1 General

Life expectancy L10 at TU = 40 °C	60.000 h	
Life expectancy L10 at TU max.	30.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	102.500 h	

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Schutzvermerk nach DIN ISO 16016 beachten!  
Refer to protection notice DIN ISO 16016!



1) Maße für Montagewand / Dimensions for assembly wall  
- mit Feder spielfrei axial verspannt / tensioned without axial clearance by spring  
- Anzahl und Länge der Litzen siehe Produktspezifikation Blatt 1  
*Number and length of the wires see design specification sheet 1 /*

Sup-Status/State	Art.-Nr. / Change-No.	CDTIA-System-Version/ CDTIA-System-Version	CDP-Umgebung/ CDP-Environment	Werkstoff / Material:	Volume / Volume (m <sup>3</sup> ):
		9291908002 07A0000			gezeichnet / Mass (g):
Tolerierung / Tolerances:		3D-Referenzmodell / 3D-Referenzmodell		Artikel / Title:	
		Bearb. / Drawn	DATE	Name	
Allgemeintoleranzen / Gen. Tolerances:		Zölg.-Nr. / Drawing No:		Ers. f. Zölg.- / Replaces:	
Freig. / Released		Checked		Released / (Blatt / Page)	
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Index / Index		Index / Index		Massstab/Scale	

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