



**Powermodul for RV45-3, 24V, sensorless**  
Material number: 9920640004

**INDEX**

<b>1</b>	<b>Mechanics</b> .....	<b>2</b>
1.1	Connections .....	2
<b>2</b>	<b>Operating Data</b> .....	<b>3</b>
2.1	Electrical Interface - Input .....	3
2.2	Electrical Operating Data .....	4
2.3	Electrical Interface - Output .....	6
2.4	Electrical Features .....	7
<b>3</b>	<b>Environment</b> .....	<b>8</b>
3.1	General .....	8
3.2	Climatic Requirements.....	8
3.3	Mechanical Requirements .....	8
<b>4</b>	<b>Safety</b> .....	<b>8</b>
4.1	Electrical Safety .....	8

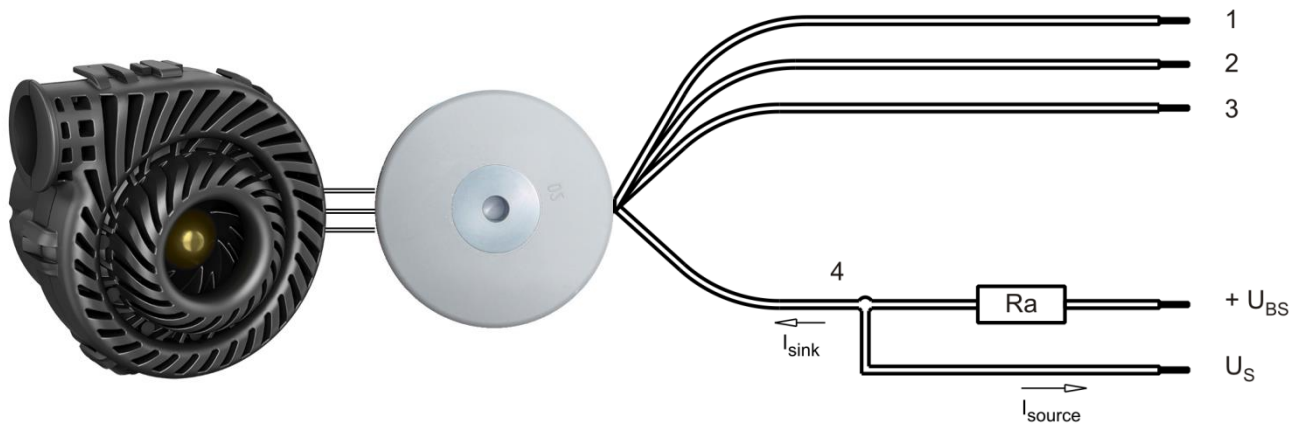
**Note:** This Powermodul sensorless is made for the fan RV45-3, 24V-version.  
Hall sensors are not needed but if they are on board it doesn't matter because they will not be used.  
(The hall sensors are connected to the 6 pin connector and no used)

Due to the high input power of the RV45 at free air operation, the drive electronic limits the speed to maximum 40,000 rpm. The RV45 is designed for up to 50,000 rpm but the max input power may not exceed 43 W. The speed limitation causes a drop in the air performance for operation points above 3500 Pa, if more air performance is requested please contact ebm-papst for support.

## 1 Mechanics

### 1.1 Connections

Electrical connection	Plug wire	
Lead wire length	L = 365 mm	
Tolerance	+/- 10 mm	
Wire size (AWG)	22	
Insulation diameter	1,7 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 22	1,7 mm
2	blue	- GND	AWG 22	1,7 mm
3	violet	CONTR	AWG 22	1,7 mm
4	white	Tacho	AWG 22	1,7 mm

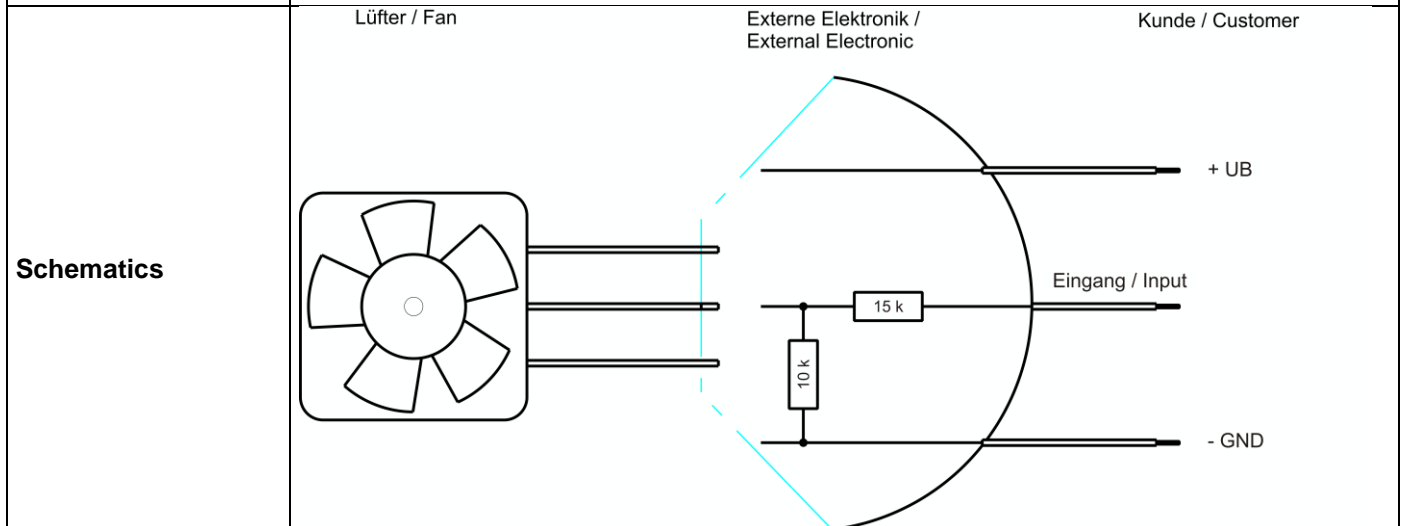
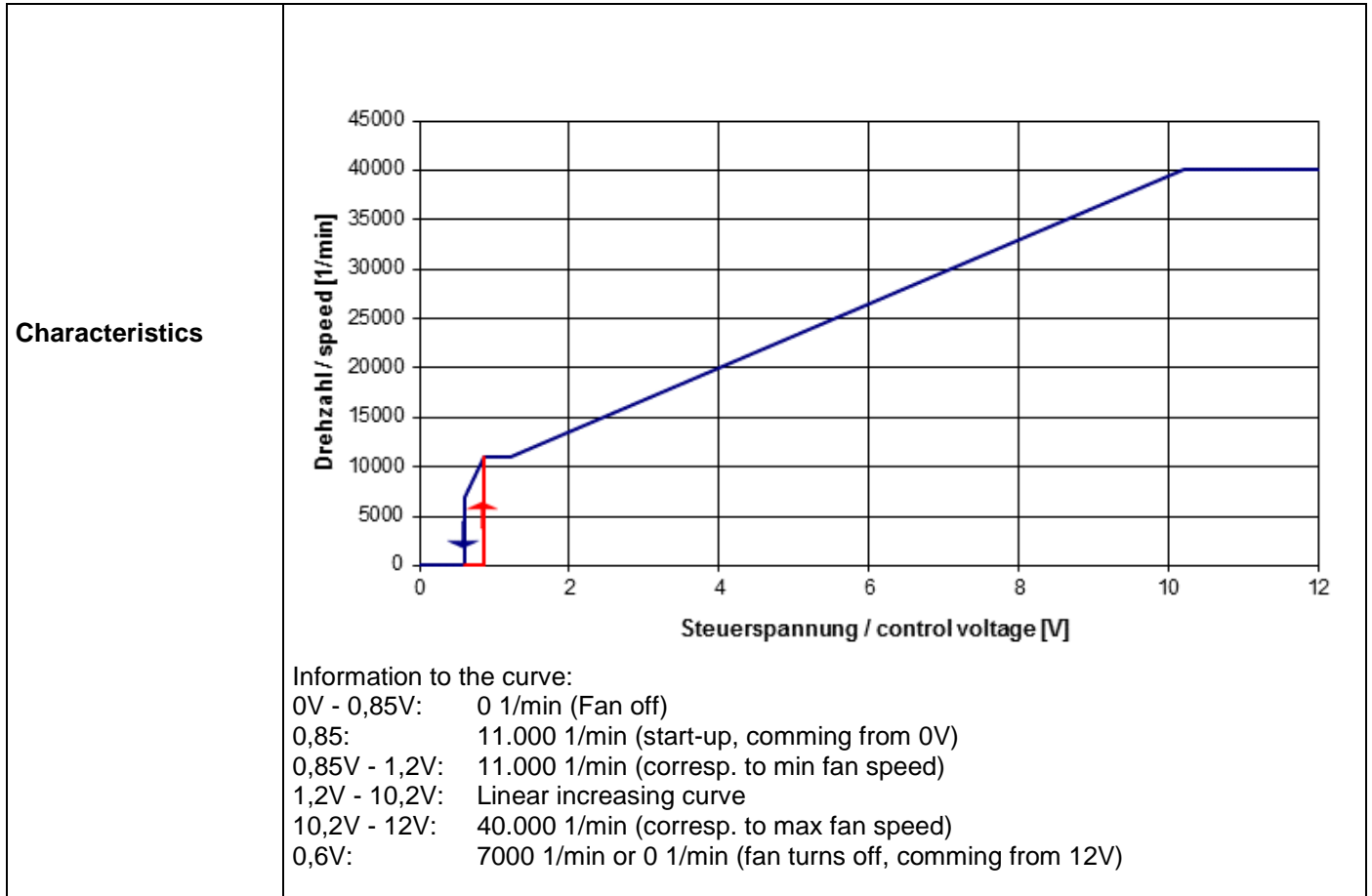
2 Operating Data

2.1 Electrical Interface - Input

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

Features

Input voltage range	0 V - 12 V
---------------------	------------



## 2.2 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

Designation	Condition
Analog 1	Input voltage: 12V

Features	Condition	Symbol	Values		
Voltage range		U	16 V		30 V
Nominal voltage		U <sub>N</sub>		24 V	
Power consumption	$\Delta p = 0$	P	14,8 W +- 10 %	42 W +- 10 %	47 W +- 10 %
Tolerance					
Current consumption	$\Delta p = 0$	I	930 mA +- 10 %	1.750 mA	930 mA +- 10 %
Tolerance					
Speed	$\Delta p = 0$	n	27.000 1/min +- 3 %	40.000 1/min +- 3 %	41.000 1/min +- 3 %
Tolerance					

Designation	Condition
Analog 2	Input voltage: 6V

Features	Condition	Symbol	Values		
Voltage range		U	16 V		30 V
Nominal voltage		U <sub>N</sub>		24 V	
Power consumption	$\Delta p = 0$	P	14,4 W +- 10 %	15 W +- 10 %	16 W +- 10 %
Tolerance					
Current consumption	$\Delta p = 0$	I	900 mA +- 10 %	625 mA	540 mA +- 10 %
Tolerance					
Speed	$\Delta p = 0$	n	26.500 1/min +- 3 %	26.500 1/min +- 3 %	26.500 1/min +- 3 %
Tolerance					

Designation	Condition
Analog 3	Input voltage: 1V

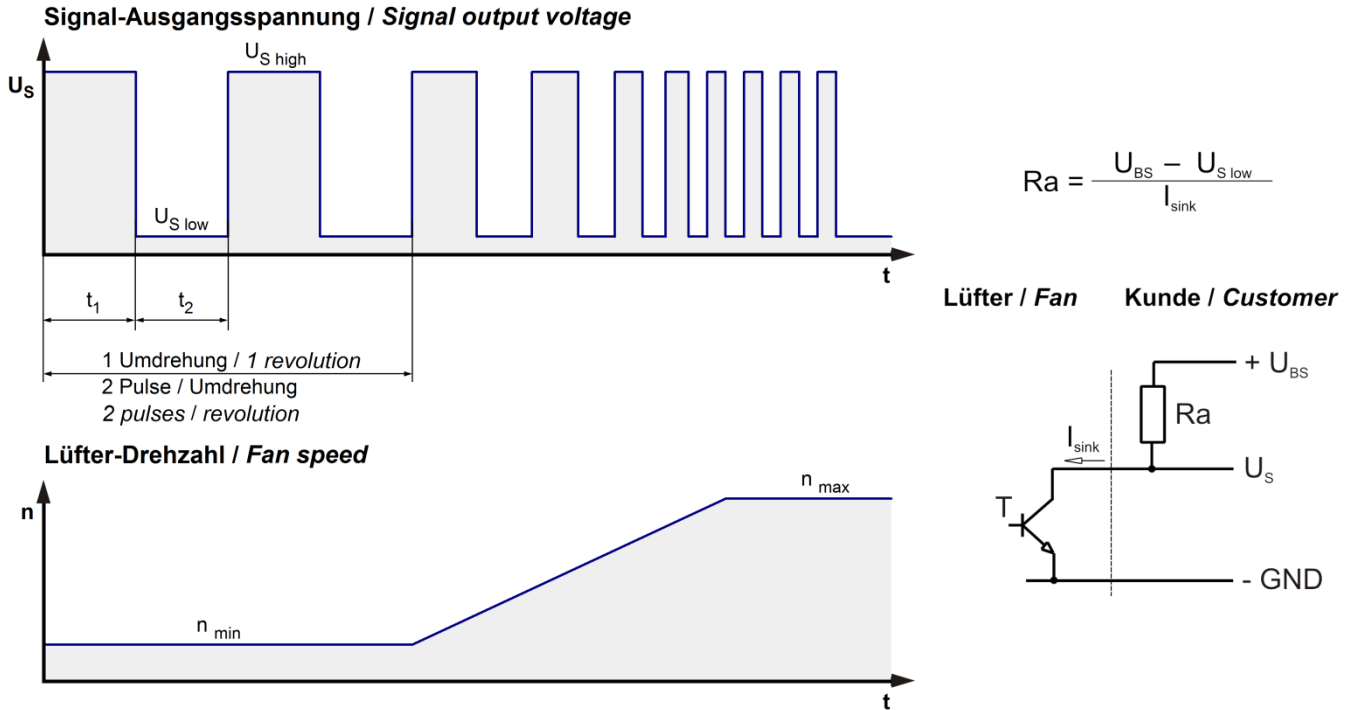
Features	Condition	Symbol	Values		
Voltage range		U	16 V		30 V
Nominal voltage		$U_N$		24 V	
Power consumption	$\Delta p = 0$	P	2,2 W +- 10 %	2,7 W +- 10 %	2,9 W +- 10 %
Tolerance					
Current consumption	$\Delta p = 0$	I	140 mA +- 10 %	107 mA	96 mA +- 10 %
Tolerance					
Speed	$\Delta p = 0$	n	11.000 1/min +- 5 %	11.000 1/min +- 5 %	11.000 1/min +- 5 %
Tolerance					

Designation	Condition
Analog 4	Input voltage: 0V

Features	Condition	Symbol	Values		
Voltage range		U	16 V		30 V
Nominal voltage		$U_N$		24 V	
Power consumption	$\Delta p = 0$	P	0,27 W +- 10 %	0,4 W +- 10 %	0,6 W +- 10 %
Tolerance					
Current consumption	$\Delta p = 0$	I	17 mA +- 10 %	18 mA	20 mA +- 10 %
Tolerance					
Speed	$\Delta p = 0$	n	0 1/min	0 1/min	0 1/min
Tolerance					

2.3 Electrical Interface - Output

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



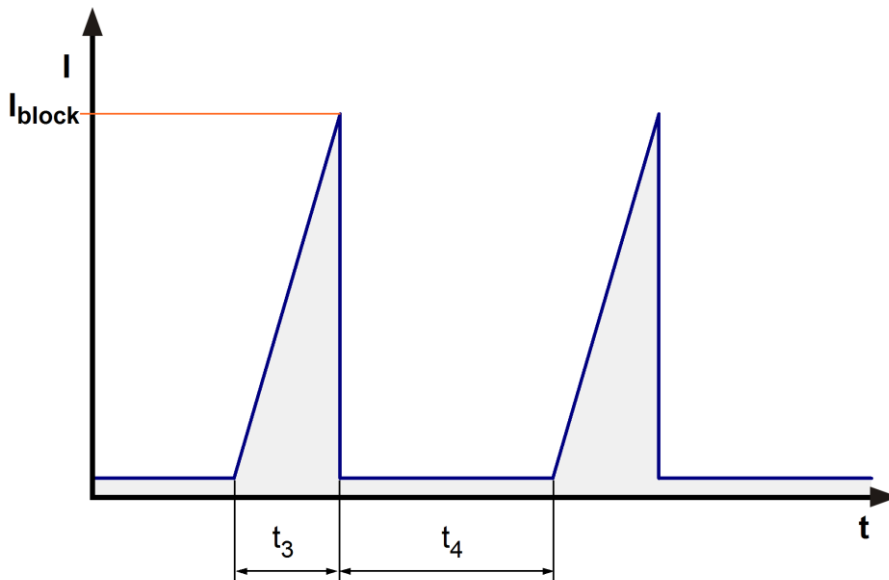
Features	Note	Values
Tacho operating voltage	$U_{BS}$	$\leq 30\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$30\text{ V}$
Maximum sink current	$I_{sink}$	$\leq 20\text{ mA}$
External resistor	External resistor $R_a$ from $U_{BS}$ to $U_S$ required. All voltages measured to GND.	
Tacho frequency	$(2 \times n) / 60$	$133\text{ Hz @ }40.000\text{ 1/min}$
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\text{ V/us}$

n = revolutions per minute (1/min)

2.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	N-CH FET	
Max. residual current at $U_N$	$I_F \leq 5 \text{ mA}$	
Locked rotor protection	Auto restart	
Locked rotor current at $U_N$	$I_{\text{block}}$ approx. 1.500 mA	
Clock signal at locked rotor	$t_3/t_4$ typical: 2,2 s / 11 s	
Internal fuse	Littelfuse NANO2 > Very Fast-Acting > 452/454 Series 10A / 125V (Art.No.: 0452004.MRL)	
Voltage control *)	Einschalten bei $U_B > 12 \text{ V}$ oder $< 32 \text{ V}$ Ausschalten bei $U_B < 11 \text{ V}$ oder $> 33 \text{ V}$	

\*) This fan has an undervoltage and overvoltage control circuit integrated which turns the motor off if the voltage is out of range.



## 3 Environment

### 3.1 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	
MTBF @ 70°C	> 1.5 x 10 <sup>6</sup> hours	

### 3.2 Climatic Requirements

Humidity requirements	humid heat, constant; according to DIN EN 60068-2-78, 14 days	
Radiation exposure	None	
Salt fog requirements	None	
Harmful gas requirements	None	
Oxygen requirements	Upon request	

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.

### 3.3 Mechanical Requirements

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

## 4 Safety

### 4.1 Electrical Safety

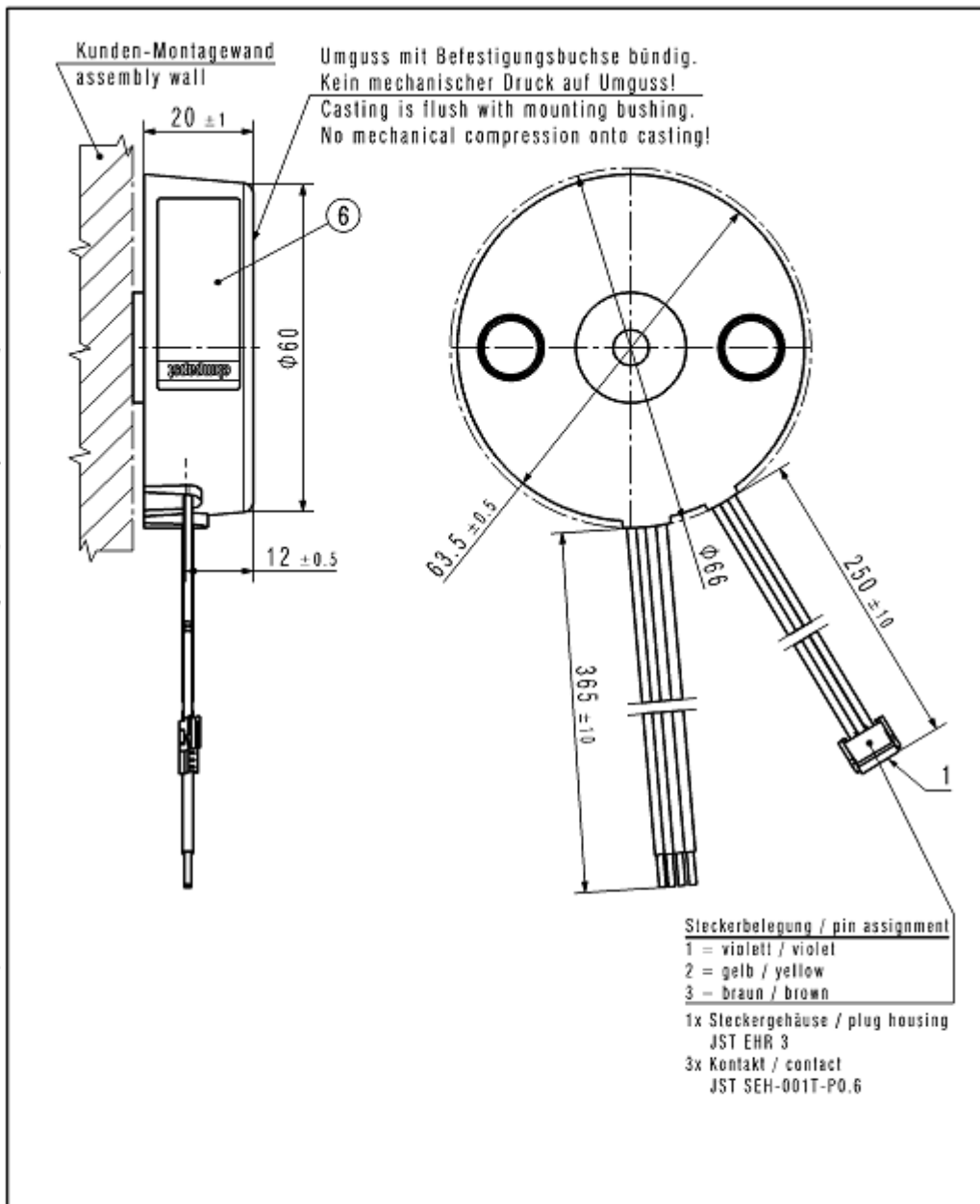
A verification of thermal conditions (normal and abnormal operation) as well as the protection against electric shock, ingress of solid foreign objects and water has to be done in conjunction with the appliance.
---

Protection class	III
------------------	-----



Copying of this document, and giving it either in whole or in part to a third party, is prohibited without express written permission from the manufacturer of the concerned product, and in the event of the grant of a patent or the registration of a utility model or design.

Schutzvermerk nach DIN ISO 15000:2000 /  
Refer to protection notice DIN ISO 15000 /



<b>FR</b>		V5R24	PAPST	Werkstoff / Material:		Mengen / Quantity (nrs): 64.849,874	
Dokument-Status / Document-Status		GAZIK-Version/ GAZIK-Version	CAD-Lagebuch/ CAD-Einzeldruckt			Gewicht / Mass (g):	
392064004 (P/N)		392064004 (P/N)		Artikel / Title:			
Tolerierung / Tolerances: Size ISO 14435		Datum / Name		<b>Powermodul 24V sensorlos</b> <b>Powermodul 24V sensorless</b>			
Allgemeintoleranzen / Gen. tolerances: DIN ISO 2768-mK		Gez./ Drawn	20.03.2017	RAGG	Zug.-Nr. / Drawing No.:	Ers.f./Zchg. / Replaces:	
		Gez./ Checked	11.07.2017	RAGG	<b>9920640004</b>		
		Freig./ Released	11.07.2017	FLEIG AR			
<b>ebmpapst</b>		Documenttyp / Type of Document		Tilg./Abw./ (Blatt/Seite)		Form / Size:	
ebm-papst St. Georgen Gabel & Co. KG		<b>C2D</b>		<b>002</b>		<b>A4</b>	
				Index / Index		Maßstab/Scale	
				-		1:1	