

**Product Data Sheet**    **9694314031**  
**VUCF119YJJRS**  
**4154N/2H8P**

4154N/2H8P (9694314031) ebmpapst Datasheet  
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4154N/2H8P

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**1 General**

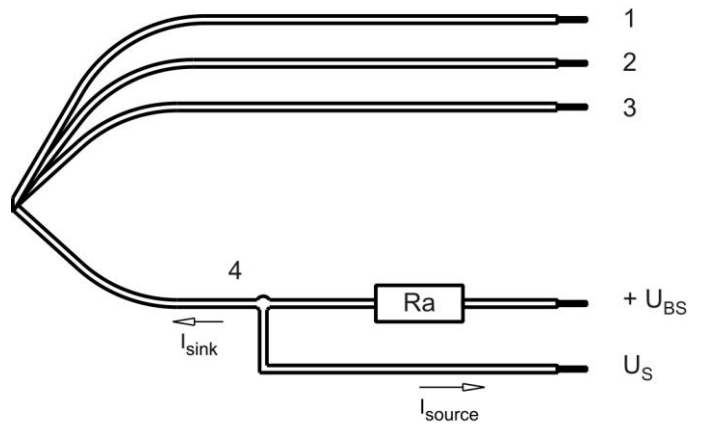
Fan type	Axial-Panel-Fan	
Rotating direction looking at rotor	Clockwise	
Airflow direction	Air intake over struts	
Bearing system	Ball bearing	
Mounting position - shaft	Any	

**2 Mechanics****2.1 General**

Width	119,0 mm	
Height	119,0 mm	
Depth	38,0 mm	
Mass	0,425 kg	
Housing material	Metal	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges Screw size	Wire outlet corner: 420 Ncm Remaining corners: 600 Ncm ISO 4762 - M4 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	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 20	2,05 mm
2	blue	- GND	AWG 20	2,05 mm
3	violet	PWM	AWG 22	1,7 mm
4	white	Tacho	AWG 22	1,7 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 - 20 kHz typical: 2 kHz

<b>Characteristics</b>	
<b>Schematics</b>	

The shown pull-up resistor R1 to the internal reference voltage (+5V) has 10kOhm.

#### Speed control:

PWM = 0...100%; f = 1...20kHz; n = 500...11.000 1/min.

**Transistor requirements:** VCE max.  $\geq 12V$ ; Isink max  $> 5mA$ ; VCEsat  $< 0,15V$

Alternatively to the PWM signal the fan can be controlled by an analog control signal of 0...5V (5V corresponds to 100% PWM)

It must be ensured that the power supply is "sink-able" and can operate with the internal pull-up resistor.

### 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: 95 %; f: 2 kHz

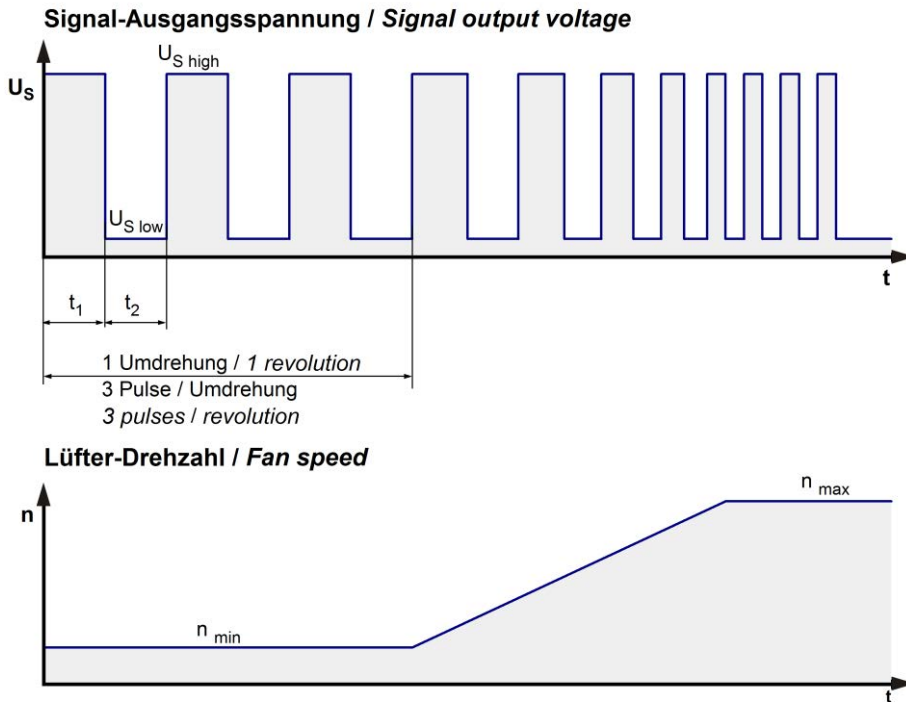
**Information to the inrush current:**

The inrush current depends on the internal capacitor (270uF), the resistance of the wires and the power supply. When using an external capacitor the inrush current rises accordingly.

Features	Condition	Symbol	Values		
			16 V	24 V	30 V
Voltage range		U	16 V		30 V
Nominal voltage		U <sub>N</sub>		24 V	
Power consumption	$\Delta p = 0$	P	60 W	120 W	132,0 W
Tolerance	PWM 0010		+/- 12,5 %	+/- 10 %	+/- 10 %
Current consumption	$\Delta p = 0$	I	3.750 mA	5.000 mA	4.450 mA
Tolerance	PWM 0010		+/- 12,5 %	+/- 10 %	+/- 10 %
Speed	$\Delta p = 0$	n	8.500 1/min	11.000 1/min	11.000 1/min
Tolerance	PWM 0010		+/- 7,5 %	+/- 5 %	+/- 5 %

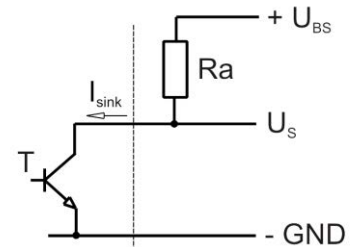
3.3 Electrical Interface - Output

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	$U_{BS}$	$\leq 32\ V$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\ V$
Tacho signal High	$U_{S\ high}$	$\leq 32\ V$
Maximum sink current	$I_{sink}$	20 mA
External resistor	External resistor $R_a$ from $U_{BS}$ to $U_S$ required. All voltages measured to GND.	
Tacho frequency	$(3 \times n) / 60$	550 Hz @ 11.000 1/min
Tacho isolated from motor	No	
Slew rate		$\geq 0,5\ V/\mu s$

$n$  = revolutions per minute (1/min)

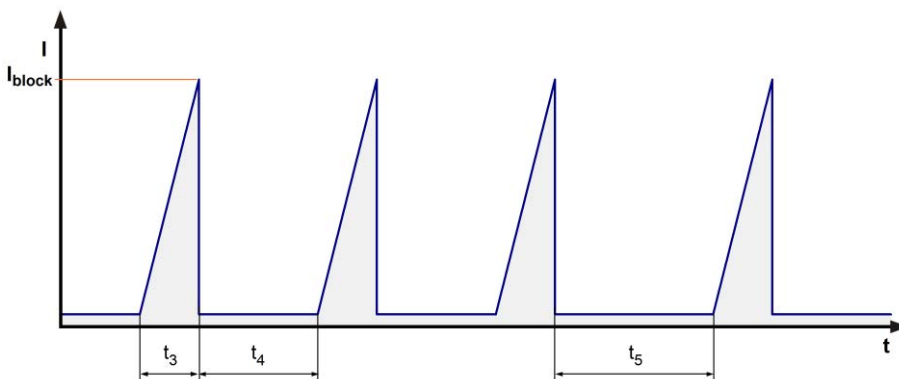
**Note to the tacho frequency:** 3 pulses per revolution.

When the fan starts up or the rotor is locked the tacho is off. After a successful start-up the tacho output signal turns on.

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. 2.000 mA	
Clock signal at locked rotor Extended Downtime	$t_3 / t_4$ typical: 1,7 s / 5,0 s $t_5$ : 30 s after 5 start-up tests	
Internal fuse	Littelfuse NANO2 > Very Fast-Acting > 451/453 Series 10A / 125V (Art.No.: 0451010.MRL)	
Voltage control *)	Fan turns on at $U_B > 13 \text{ V}$ or $< 34 \text{ V}$ Fan turns off at $U_B < 12 \text{ V}$ or $> 35 \text{ V}$	

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



After 5 failed start-ups there is an extended timeout of 30 s.

When several fans are operated together (in a fan tray) and one fan starts after the other and the starting current is eventually limited, it can happen that the not yet operated fan is driven in reverse by the counter pressure. This can lead to a failure of the first start-up. The fan detects this and makes another start with an increased current.

The locked rotor current is denoted as peak-current at nominal voltage.

3.5 Data According ErP Directive

Installation / Efficiency category	A / static
Speed control	integrated
Specific ratio	1,00766
Target overall efficiency 2015	28,9 %
Overall efficiency	38,0 %
Efficiency grade	40
Power input	174,8 W
Speed	11.000 1/min

All values measured in optimum energy efficiency point.

Productiondatecode is printed on the fan label.

### 3.6 Aerodynamics

Measurement conditions:

Measured with a double chamber intake rig acc. to DIN EN ISO 5801.

Air density = 1,2 kg/m<sup>3</sup>; Temperature 23°C +/- 3°C;

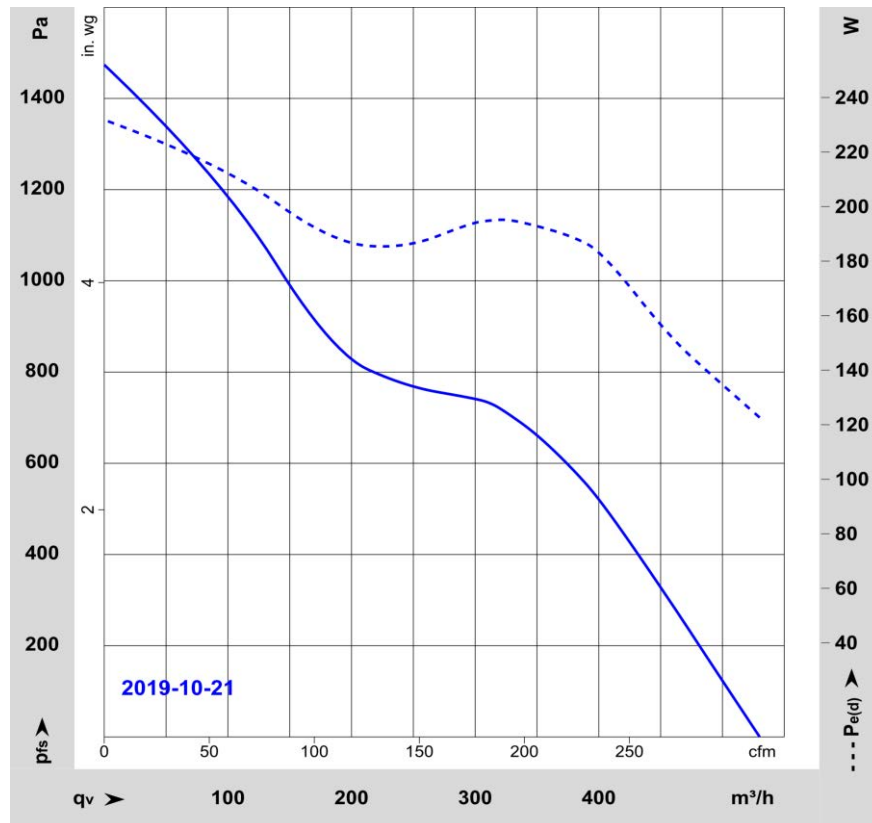
In the intake and outlet area should not be any solid obstruction within 0,5 m. Motor shaft horizontal.

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. 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:

11.000 1/min at free air flow	PWM 95 %; f: 2 kHz		
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Max. free-air flow ( $\Delta p = 0 / \dot{V} = \text{max.}$ )	535 m <sup>3</sup> /h	
Max. static pressure ( $\Delta p = \text{max.} / \dot{V} = 0$ )	1.470 Pa	



**3.7 Sound Data**

Measurement conditions: Sound pressure level: 1 meter distance between microphone and the air intake.  
 Sound power level: According to ISO 13347-3.  
 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:

11.000 1/min at free air flow	PWM 95 %; f: 2 kHz		
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Optimal operating point	400 m3/h @ 510 Pa		
Sound power level at the optimal operating point	9 bel(A)		
Sound pressure level at free air flow, measured in rubber bands	81 dB(A)		

**4 Environment**

**4.1 General**

Min. permitted ambient temperature TU min.	-20 °C		
Max. permitted ambient temperature TU max.	75 °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.

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.	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	No
UKCA	UK Conformity Assessed	Not applicable
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 / C22.2 No. 113 Fans and Ventilators
China	CCC - China Compulsory Certification or CQC - China Quality Certification	Not applicable

The approval tests are observed to:

U approval max.: 30,0 V @ TU approval max.: 75,0 °C

**6 Reliability**

**6.1 General**

**Attention!**

In order to achieve the specified life time figure, it is necessary to connect an external capacitor.

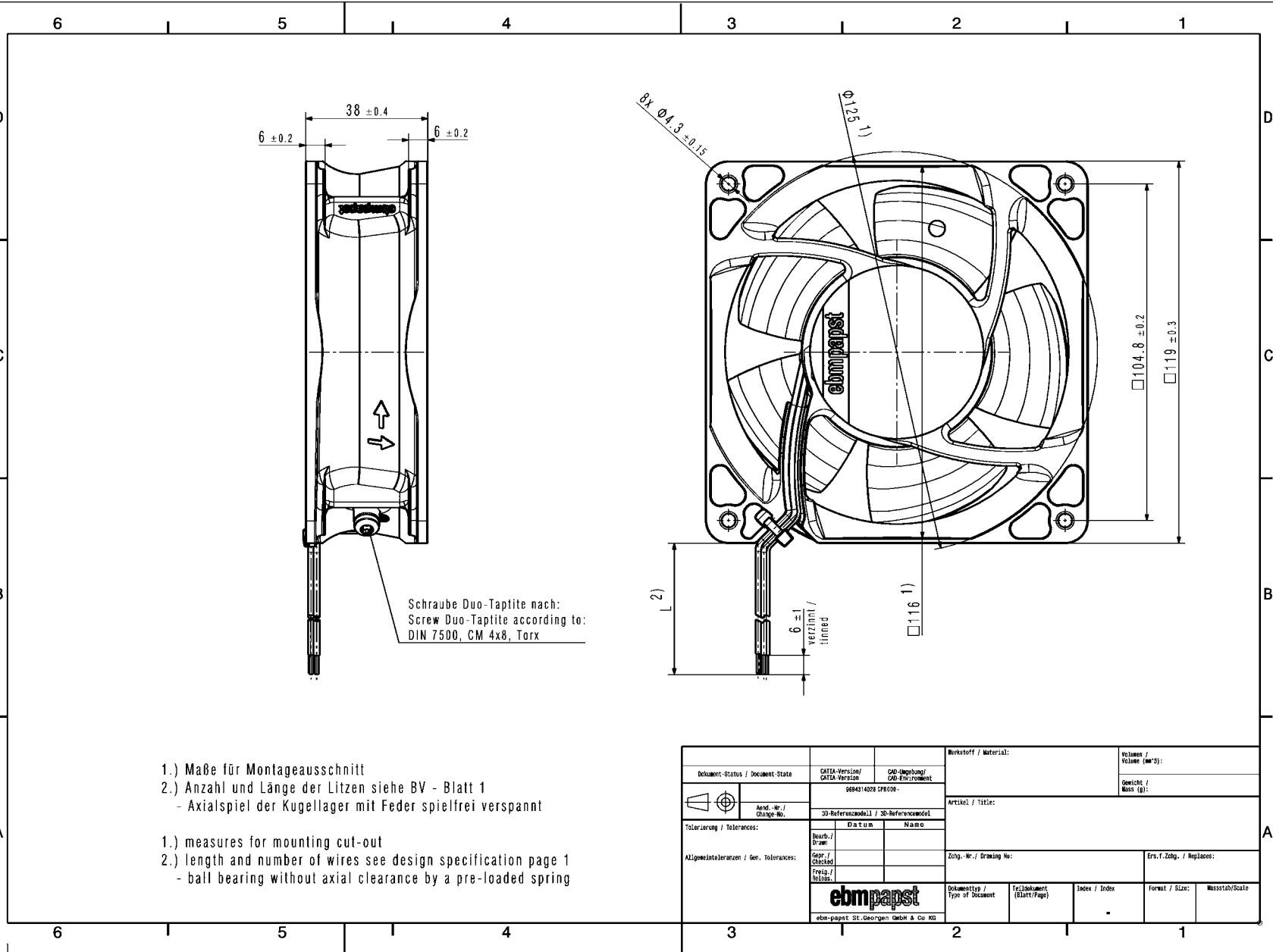
Complexity, connection, components and configuration must be checked at the project.

As a basis a capacitor of 220... 1000 uF to the supply voltage between plus and minus can be used. Max. lead length between fan and capacitor: 300 mm.

Life expectancy L10 at TU = 40 °C	55.000 h	
Life expectancy L10 at TU max.	22.500 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	92.500 h	

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SONNENWÄRMEDICHEN FÜR DEN SONNE-WECHSELN /  
 HEIßER- KÜHLSCHWELLEN WECHSELN 200 16516 /



- 1.) Maße für Montageausschnitt
  - 2.) Anzahl und Länge der Litzen siehe BV - Blatt 1  
 - Axialspiel der Kugellager mit Feder spielfrei verspannt
- 1.) measures for mounting cut-out
  - 2.) length and number of wires see design specification page 1  
 - ball bearing without axial clearance by a pre-loaded spring

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9694314031		9694314031		Weight / Mass (g)	
Art. Nr. / Change No.		3D-Referenzmodell / 3D-Reference Model		Article / Title	
Tolerierung / Tolerances:		Datum	Name	Zug.-Nr. / Drawing No.	
Allgemeintoleranzen / Gen. Tolerances:		Bearb. / Drawn		Ers.-Zug. / Replaces:	
		Gepr. / Checked			
		Freig. / Released			
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