

1 General

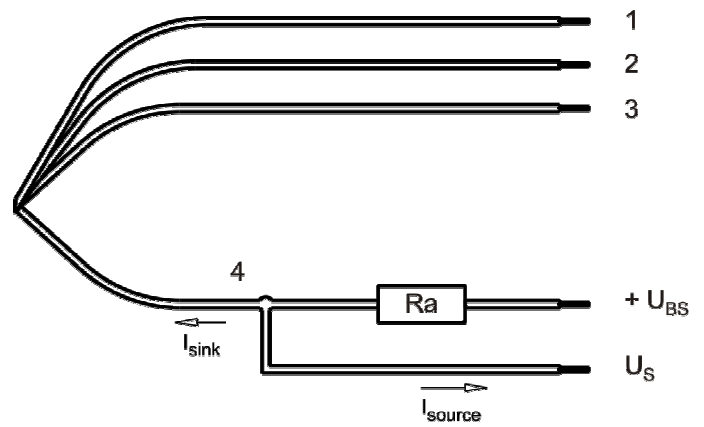
Fan type	Blower without chassis with intake nozzle	
Rotating direction looking at rotor	Clockwise	
Airflow direction	Air in axially, Air out radially	
Bearing system	Ball bearing	
Mounting position - shaft	Any	

2 Mechanics**2.1 General**

Depth	99,0 mm	
Diameter	225,0 mm	
Mass	1,29 kg	
Housing material		
Impeller material	Plastic	

2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 410 mm	
Tolerance	+ - 10,0 mm	
Tube length	S = 120 mm	
Tolerance	+ - 5,0 mm	



Wire	Color	Operation	Wire size	Insulation diameter
1	red	+ UB	AWG 18	2,2 mm
2	blue	- GND	AWG 18	2,2 mm
3	violet	CONTR	AWG 22	1,30 mm
4	white	Tacho	AWG 22	1,30 mm

The auxiliaries shown on the schematic diagram (which are required for the intended use) are not part of our delivery.

3 Operating Data

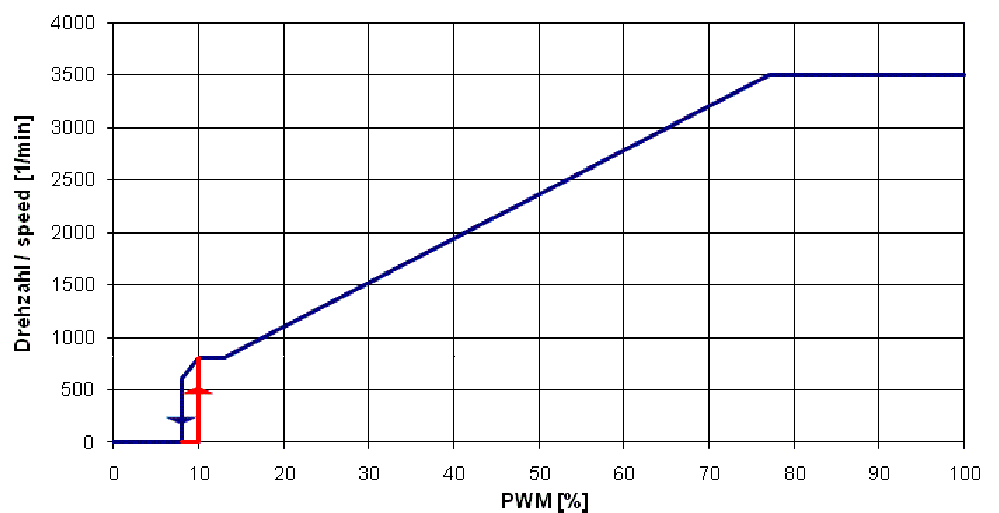
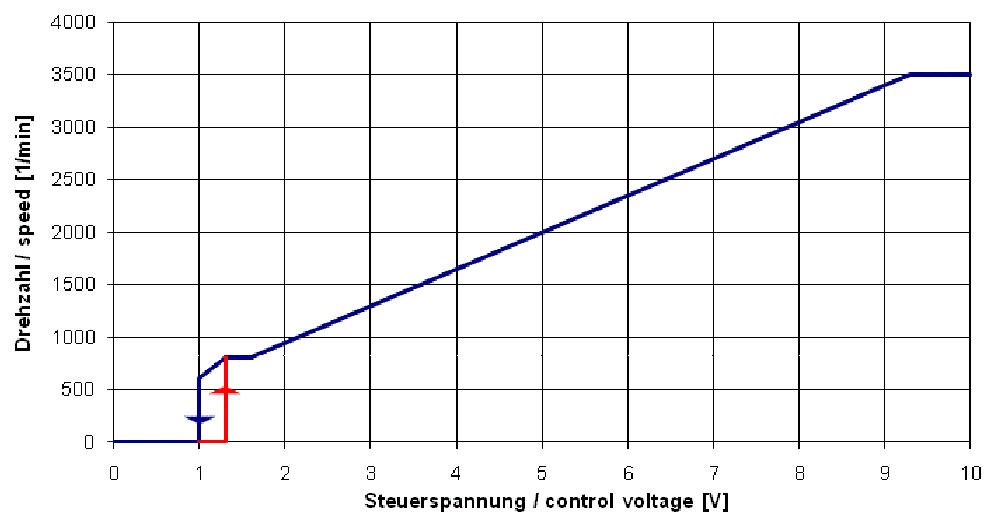
3.1 Electrical Interface - Input

Control input	Analog
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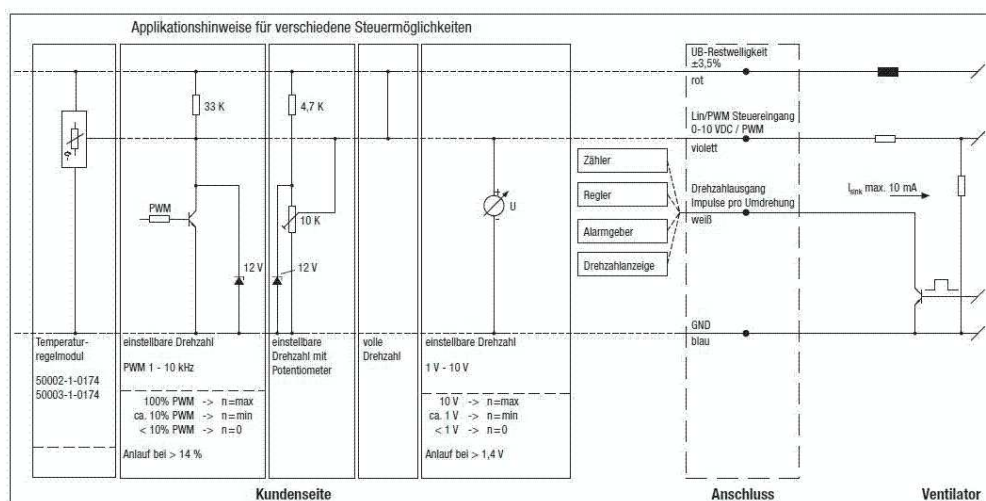
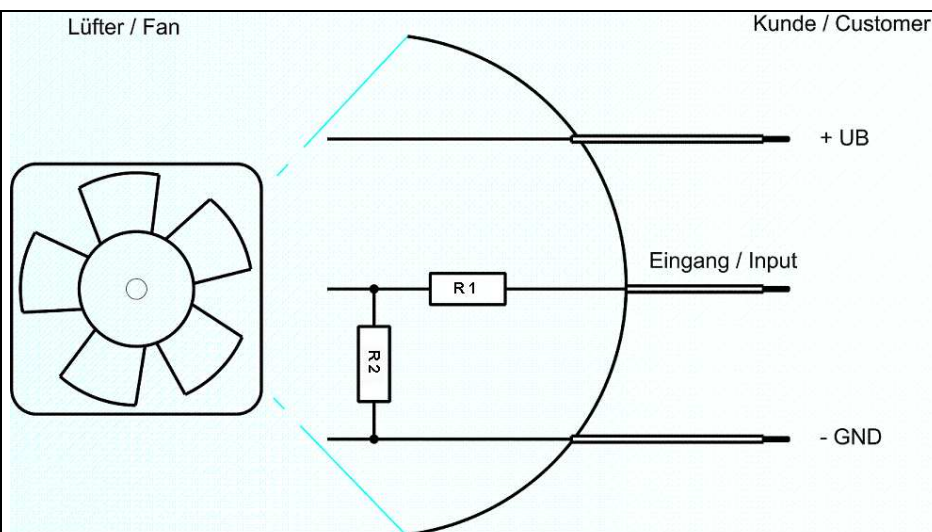
Features

PWM - Frequency	1 kHz - 10 kHz typical: 2 kHz
Input voltage range	0 V - 10 V

Characteristics



Schematics



Input voltage divider:

R1 = 47 kOhm

 $R_2 = 36 \text{ k}\Omega$

For protection: There is parallel to R2 a 5,1 V Z-Diode

Speed control:

By pulse-width modulation (PWM) 0 ... 100%

with switching transistor in emitter circuit and collector resistance to 12 V

Frequency = 2 kHz (1 - 10 kHz)

Information to the curve PWM:

0% - <10% PWM:	0 1/min
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10% PWM: 800 1/min (Fan on, comming from 0% PWM)

10% - 13% PWM: 800 1/min (corresponding to min. speed)

13% - 78% PWM: linear increasing curve

78% - 100% PWM: 3.500 1/min (corresponding to max. speed)

10% - >8% PWM: linear decreasing curve (comming from 100% PWM)

8% PWM: 600 1/min or 0 1/min (Fan off, comming from 100% PWM)

or:

Speed control:

By analog voltage 0 - 10 V

Information to the curve analog:

0 V - < 1,3 V:	0 1/min
1,3 V:	800 1/min (Fan on, coming from 0 V)
1,3 V - 1,6 V:	800 1/min (corresponding to min. speed)
1,6 V - 9,4 V:	linear increasing curve
9,4 V - 10 V:	3.500 1/min (corresponding to max. speed)
1,3 V - > 1,0 V:	linear decreasing curve (coming from 10 V)
1,0 V:	600 1/min or 0 1/min (Fan off, coming from 10 V)

The fan have no sensor break detection!**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 5 minutes (unless otherwise specified).
In the intake and outlet area should not be any solid obstruction within 0,5 m.

Measurement setup:	Measured between two steel plates
Steel plate:	266 mm x 266 mm
Intake nozzle:	D: 146 mm; R: 25 mm
Distance between bottom and top plate:	123,5 mm
Overlapping impeller / nozzle:	2 mm

 $\Delta p = 0$: corresp. to free air flow (see chapter aerodynamics)

I: corresp. to arithm. mean current value

Name	Condition
U Contr. 0001	U Contr.: 10 V

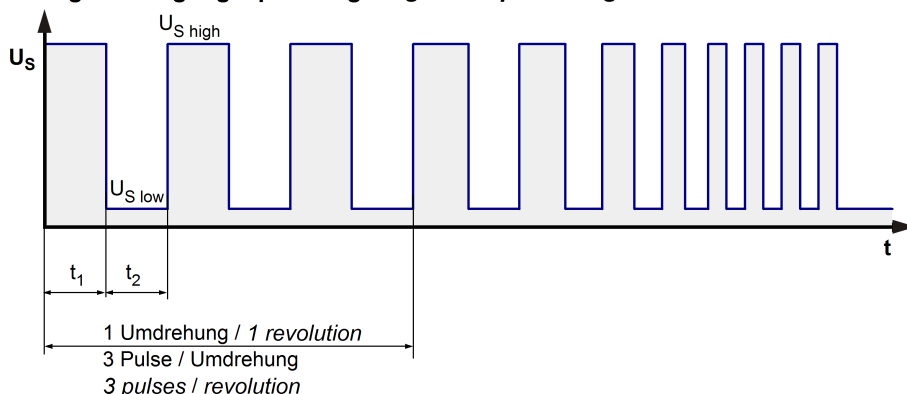
The data at 5V are no FK features and need not be tested.

Features	Condition	Symbol	Values		
Voltage range		U	36 V		72 V
Nominal voltage		U_N		48 V	
Power consumption	$\Delta p = 0$	P	123 W	226 W	230 W
Tolerance	U Contr. 0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Current consumption	$\Delta p = 0$	I	3.500 mA	4.700 mA	3.200 mA
Tolerance	U Contr. 0010		+/- 10,0 %	+/- 10,0 %	+/- 10,0 %
Speed	$\Delta p = 0$	n	2.960 1/min	3.500 1/min	3.500 1/min
Tolerance	U Contr. 0010		+/- 7,5 %	+/- 5,0 %	+/- 5,0 %

3.3 Electrical Interface - Output

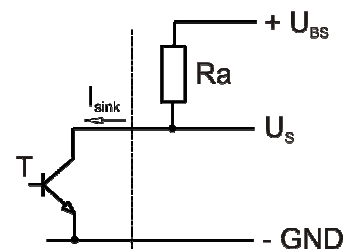
Tacho type	/2 (open collector)
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Signal-Ausgangsspannung / Signal output voltage

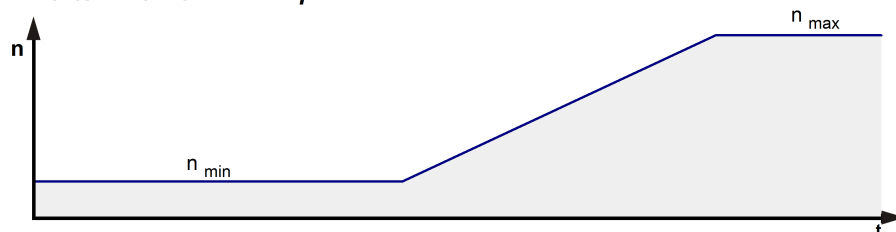


$$R_a = \frac{U_{BS} - U_{S\ low}}{I_{sink}}$$

Lüfter / Fan Kunde / Customer



Lüfter-Drehzahl / Fan speed



Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 60,0\text{ V}$
Tacho signal Low	$U_{S\ low}$	$I_{sink}: 2\text{ mA}$ $\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$I_{source}: 0\text{ mA}$ $\leq 60,0\text{ V}$
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	$(3 \times n) / 60$	175 Hz @ 3.500 1/min
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\text{ V/us}$

n = revolutions per minute (1/min)

Please note:

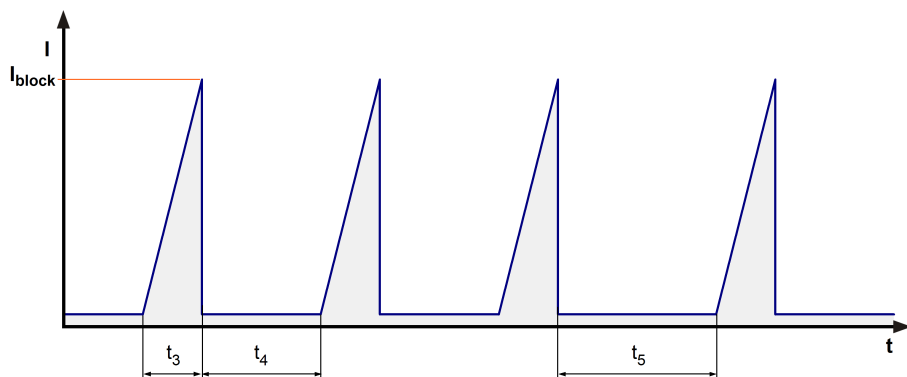
At zero speed the tacho signal is at a static HIGH. It will be also HIGH when the fan is still spinning, but the speed control signal is set to zero speed already.

The tacho signal is only activated after the start-up is completed.

3.4 Electrical Features

Electronic function	Speed-Controlled	
Reversed polarity protection	P-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_{block} approx. 2.000 mA	
Clock signal at locked rotor	t_3 / t_4 typical: 7,2 s / 10,0 s	
Internal fuse	Littelfuse NANO2 > Very Fast-Acting > 451/453 Series 10A / 125V (Art.No.: 0451010.MRL)	



Locked rotor signal t_5 :

After 2 failed start-ups there is an extended timeout of 50 s.

3.5 Data According ErP Directive

Installation / Efficiency category	A / static
Speed control	integrated
Specific ratio	1,00640
Target overall efficiency 2015	45,6 %
Overall efficiency	59,4 %
Efficiency grade	62
Power input	273,8 W
Speed	3.450 1/min

All values measured in optimum energy efficiency point.

Productiondatecode is printed on the fan label.

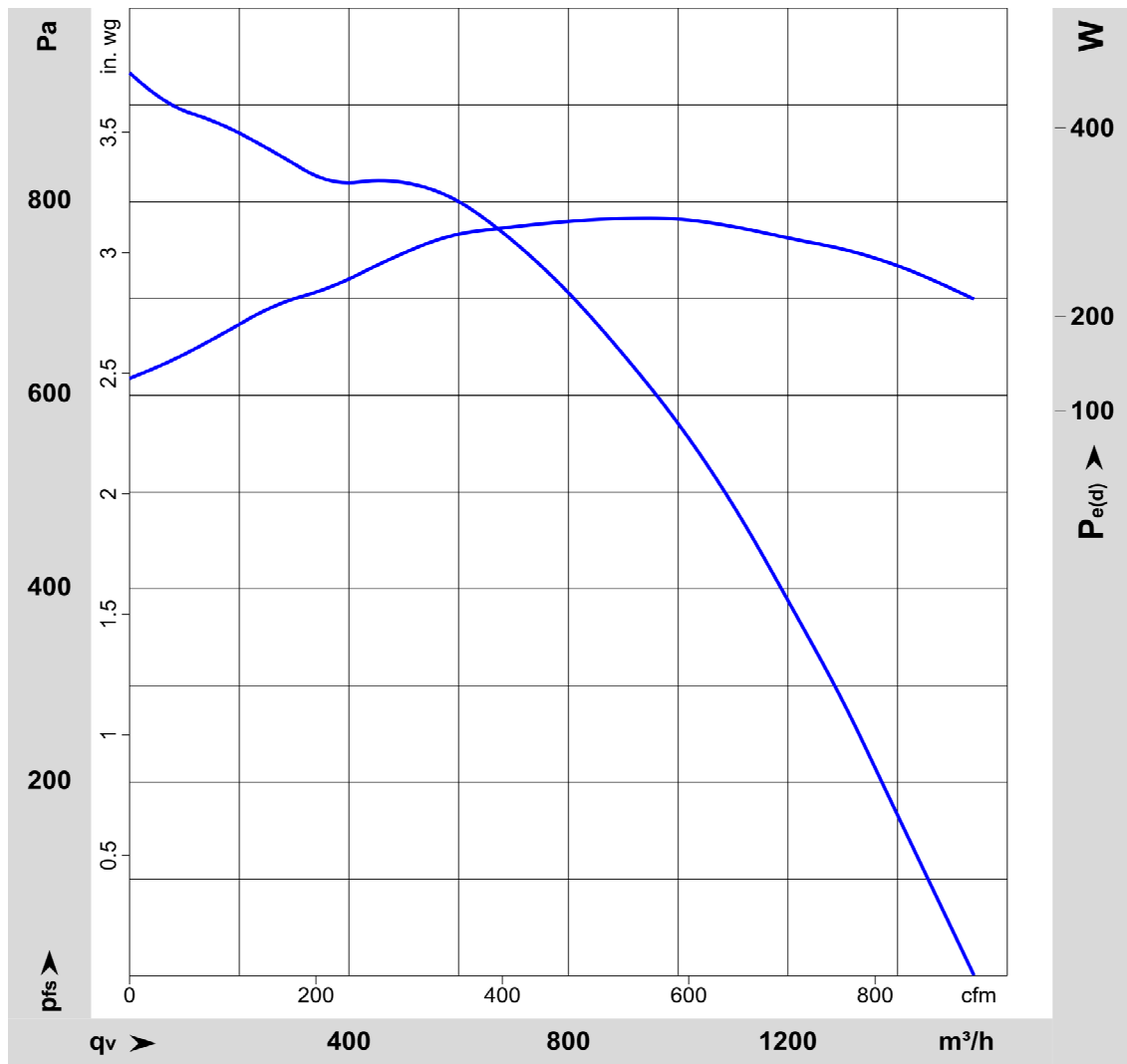
3.6 Aerodynamics

Measurement conditions: Measured with a double chamber intake rig acc. to DIN EN ISO 5801.
 Normal 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.

Measurement setup:	Measured between two steel plates
Steel plate:	266 mm x 266 mm
Intake nozzle:	D: 146 mm; R: 25 mm
Distance between bottom and top plate:	123,5 mm
Overlapping impeller / nozzle:	2 mm

a.) Operation condition:

3.500 1/min at free air flow	U Contr. 10 V		
Max. free-air flow ($\Delta p = 0$ / $\dot{V} = \max.$)	1.540 m ³ /h		
Max. static pressure ($\Delta p = \max.$ / $\dot{V} = 0$)	935 Pa		



3.7 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:

3.500 1/min at free air flow	U Contr. 10 V		
Optimal operating point	1.002 m ³ /h @ 570 Pa		
Sound power level at the optimal operating point	8 bel(A)		
Sound pressure level at free air flow, measured in rubber bands			

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-20 °C	
Max. permitted ambient temperature TU max.	55 °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	

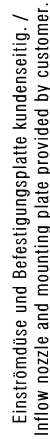
Permitted application area:

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.



Kabelfixierung
kundenseitig. /
Cable fixing
by customer.

4x M 4
max. 7.5 tief / deep
Anzugsmoment /
tightening torque:
max. 2 Nm

Dokument-Status / Document-Status 	CDTA-Version / CDTA-Version 955434400 CP1000A	CDTA-Upgrade / CDTA-Upgrade CDTA-Version / CDTA-Version	Minusoff / Material: 	Volumen / Volume (m³): Gewicht / Weight (kg): Masse (g):
Teilzeichnung / Teilzeichnung: 	3D-Referenzmodell / 3D-Referenzmodell: Datum / Datum Bauteil / Bauteil Spezifikation / Spezifikation Freigegeben / Freigegeben Abfertig / Abfertig	11/14 / 11/14: 	Zölg.-Nr. / Drawing No.: 	Ertz. / 220kV. / Replaces:
Alle Angaben in der Version / Ben. Toleranzen: 			Seiten / Pages 1 / 1	Formate / Sizes: A
ehm papier ehm-papier, St.-Bogen, Gestalt & Co AG			Massstab/Scale: 	

- Axialspiel der Kugellager spielfrei verspannt.
- 1.) Anzahl und Länge der Litzen sowie Länge des Schlauchs siehe Produktspezifikation.

-- Ball bearings without axial clearance by a pre-load spring.
1.) Number and length of wires and length of tube see product specification.