

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	

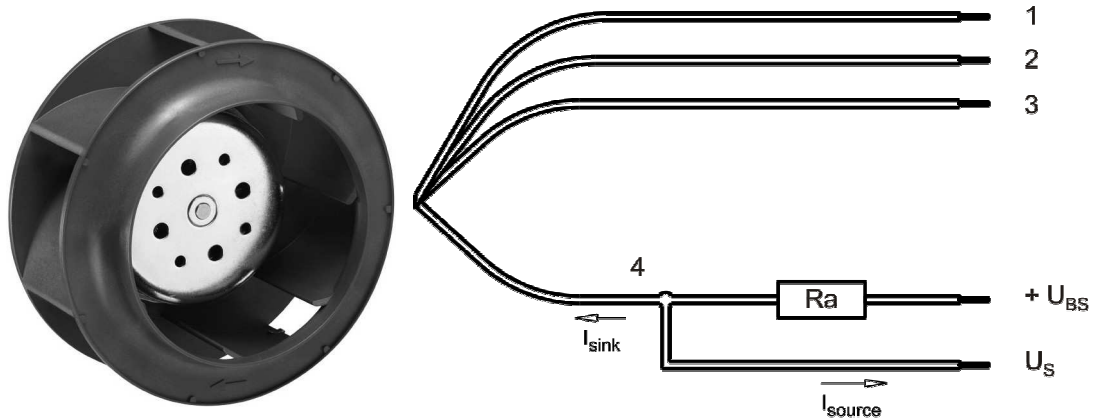
2 Mechanics

2.1 General

Depth	91,0 mm	
Diameter	133,0 mm	
Mass	0,890 kg	
Housing material		
Impeller material	Plastic	

2.2 Connections

Electrical connection	Wires	
Lead wire length	L = 425 mm	
Tolerance	+/- 10 mm	
Tube length	S = 115 mm	
Tolerance	+/- 5,0 mm	
Wire size (AWG)	22	
Insulation diameter	1,70 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.

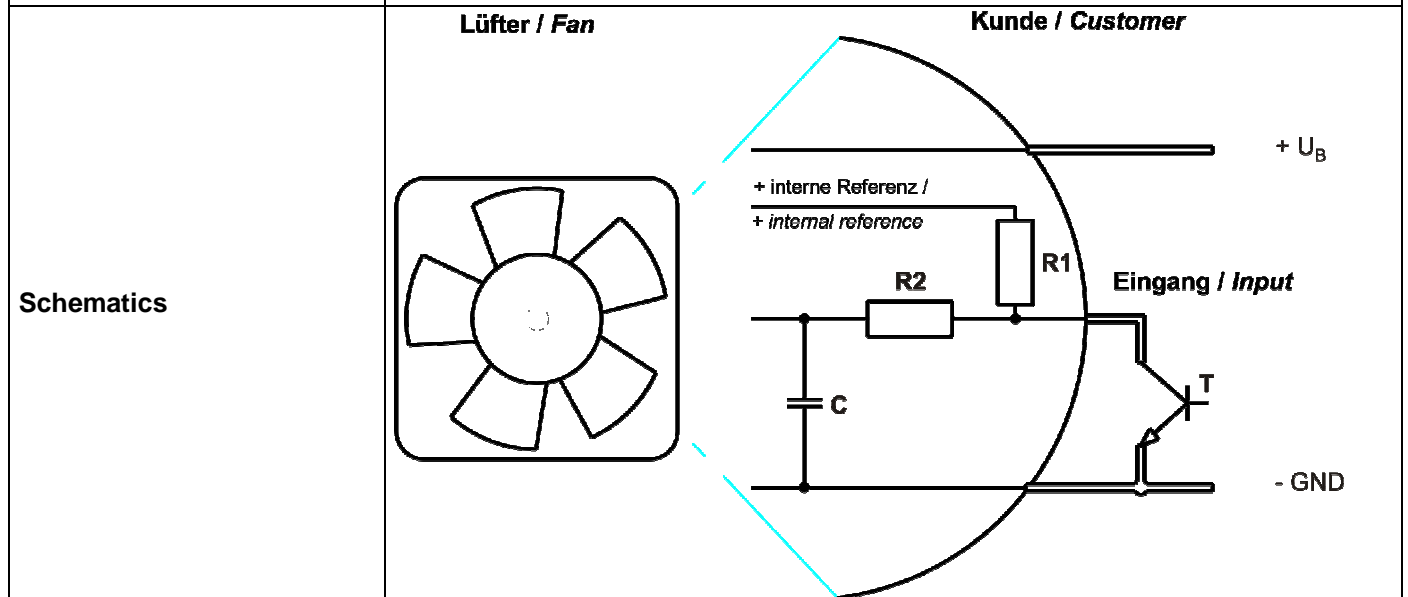
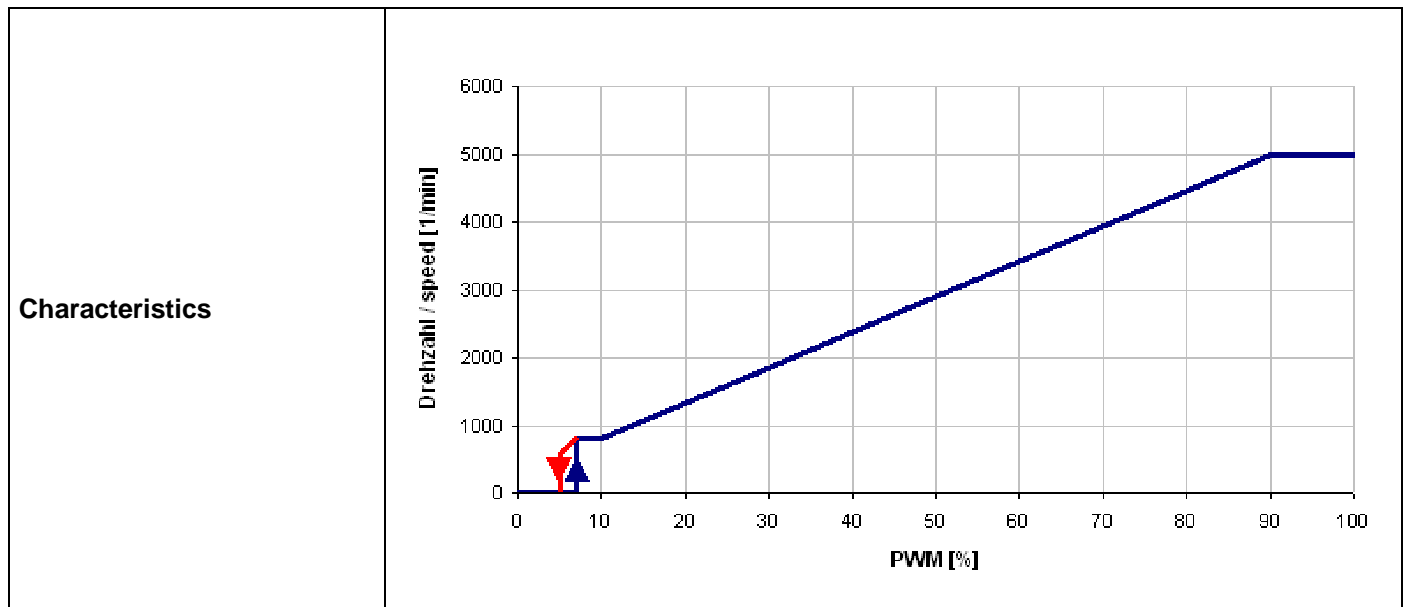
3 Operating Data

3.1 Electrical Interface - Input

Control input	PWM
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Features

Input type	Open collector	
PWM - Frequency		1 kHz - 20 kHz typical: 2 kHz



Speed control:

By Puls width modulation (PWM) 0 ... 100%
Open collector in relation to signal-ground

Please note:

It's possible to control the fan by a control voltage of 0... 5 V. (5 V corresponds to 100 % PWM).

The power supply must be able to "sink" and works together with an internal pull-up resistor (4,7 kOhm).

Information to the curve:

- 0 % - 7% PWM: 0 1/min
- 7 % PWM: 800 1/min (Fan on, comming from 0% PWM)
- 7 % - 10% PWM: 800 1/min (corresponding to min. speed)
- 10 % - 90% PWM: linear increasing curve
- 90 % - 100% PWM: 5.000 1/min (corresponding to max. speed)
- 7 % - 5 % PWM: linear decreasing curve (comming from 100% PWM)
- 5 % PWM: 600 1/min or 0 1/min (Fan off, comming from 100% PWM)

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:	140 mm x 140 mm
Intake nozzle:	D: 87 mm; R: 7 mm
Distance between bottom and top plate:	101 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
PWM 0001	PWM: 95 %; f: 2 kHz

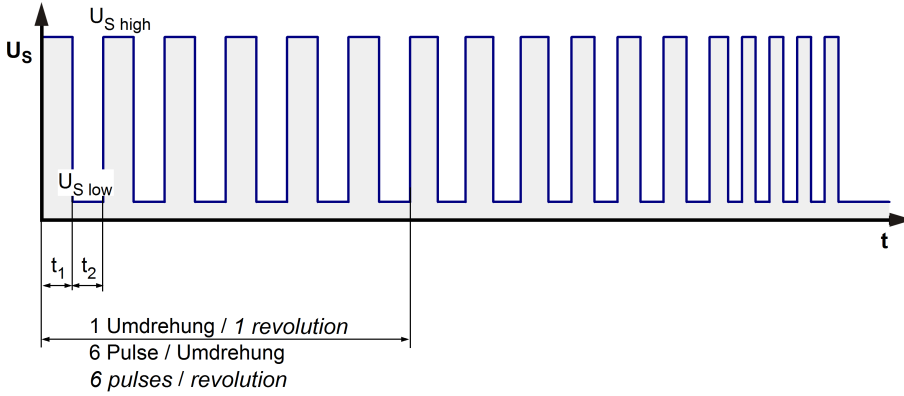
100% PWM; f = 2 kHz or broken lead wire (open control input)
The data at 50% PWM are no FK features and need not be tested.

Features	Condition	Symbol	Values		
Voltage range		U	16 V		30 V
Nominal voltage		U _N		24,0 V	
Power consumption	$\Delta p = 0$	P	38,4 W	58,0 W	60,5 W
Tolerance	PWM 0010		+/- 10 %	+/- 10 %	+/- 10 %
Current consumption	$\Delta p = 0$	I	2.400 mA	2.400 mA	2.000 mA
Tolerance	PWM0010		+/- 10 %	+/- 10 %	+/- 10 %
Speed	$\Delta p = 0$	n	4.330 1/min	5.000 1/min	5.000 1/min
Tolerance	PWM 0010		+/- 7,5 %	+/- 5 %	+/- 5 %

3.3 Electrical Interface - Output

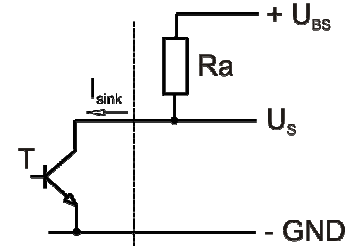
Tacho type	/2 (open collector)
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Signal-Ausgangsspannung / Signal output voltage

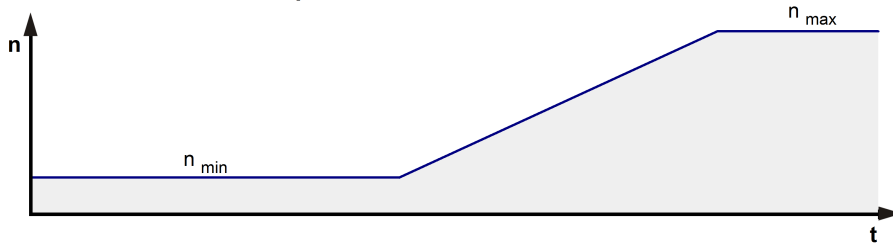


$$R_a = \frac{U_{BS} - U_{S\ low}}{I_{sink}}$$

Lüfter / Fan Kunde / Customer



Lüfter-Drehzahl / Fan speed



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.

Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 60,0\ V$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\ V$
Tacho signal High	$U_{S\ high}$	$\leq 60,0\ V$
Maximum sink current	I_{sink}	$\leq 20\ mA$
External resistor	External resistor R_a from U_{BS} to U_S required. All voltages measured to GND.	
Tacho frequency	$(6 \times n) / 60$	
Tacho isolated from motor	No	
Slew rate		$\Rightarrow 0,5\ V/\mu s$

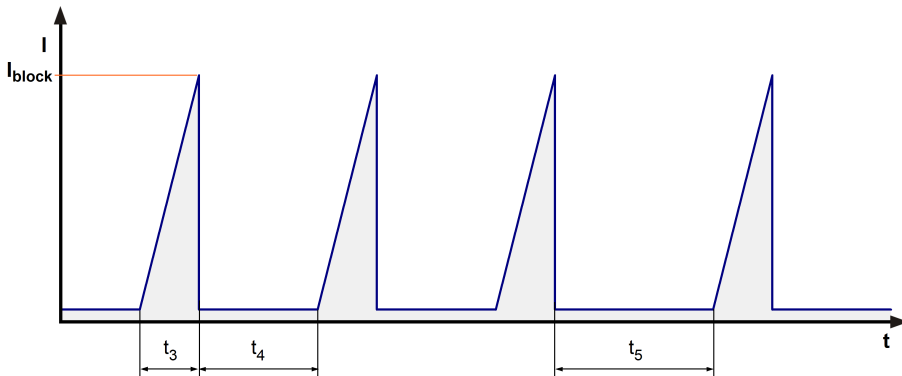
n = revolutions per minute (1/min)

Note to the tacho-frequency: (6 Pulse per revolution!)

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_{block} approx. 3.200 mA	
Clock signal at locked rotor	t_3 / t_4 typical: 6,3 s / 10,0 s	



Locked rotor signal t_5 : 40.0 s

After 4 failed start-ups of t_3 to t_4 there is an extended timeout t_5 of 40s.

The first off-time t_4 is reduced to 3s.

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°C +/- 3°C;

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

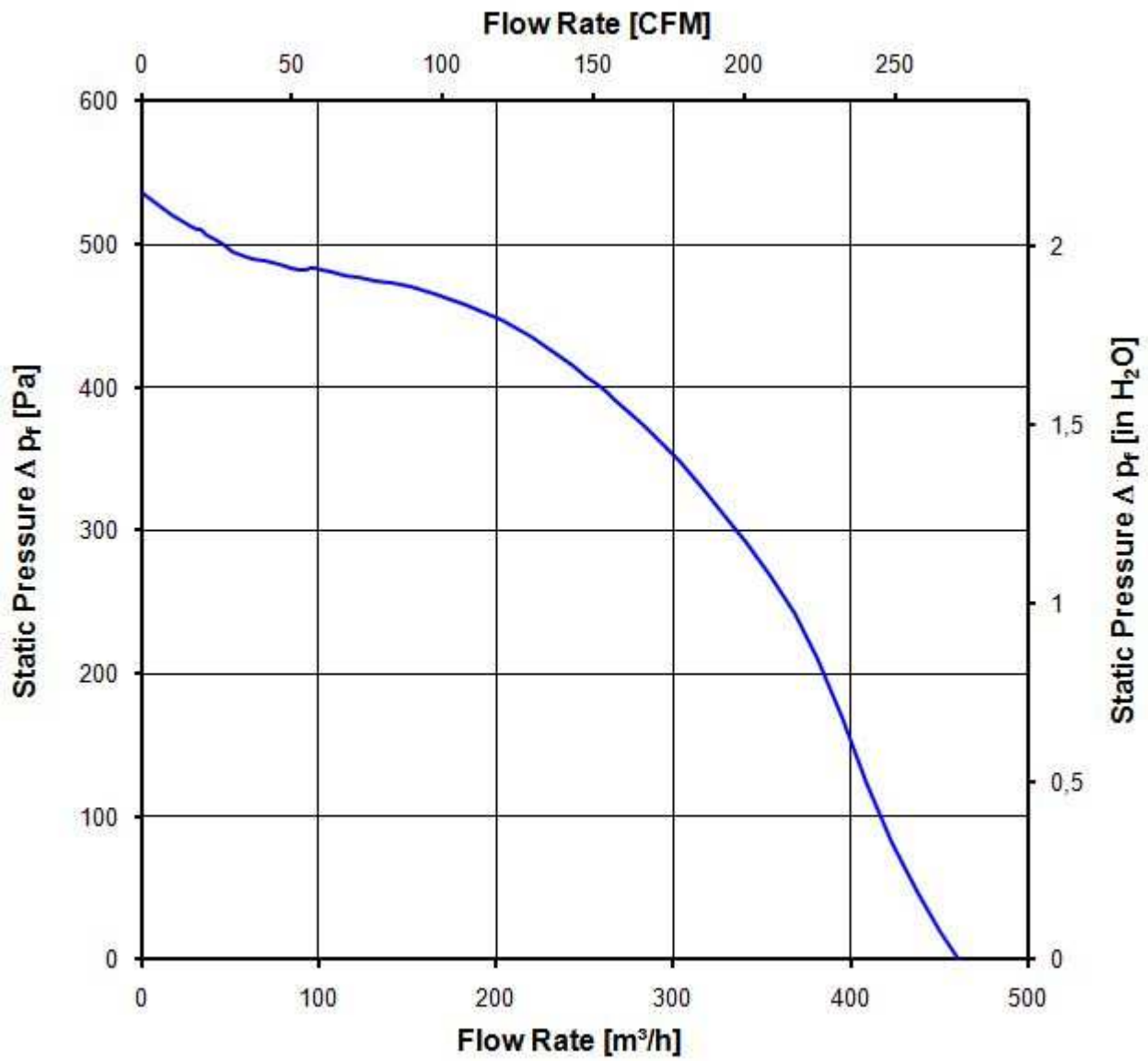
The information is only valid under the specified test conditions and may be changed by the installation conditions. If there are deviations from the standard test conditions, the characteristic values must be checked under the installed conditions.

Measurement setup:	Measured between two steel plates
Steel plate:	140 mm x 140 mm
Intake nozzle:	D: 87 mm; R: 7 mm
Distance between bottom and top plate:	101 mm
Overlapping impeller / nozzle:	2 mm

a.) Operation condition:

5.000 1/min at free air flow	PWM 95 %; f: 2 kHz		
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Max. free-air flow ($\Delta p = 0 / \dot{V} = \max.$)	460,0 m ³ /h	
Max. static pressure ($\Delta p = \max. / \dot{V} = 0$)	535 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:

5.000 1/min at free air flow	PWM 95 %; f: 2 kHz		
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Optimal operating point	316,0 m ³ /h @ 290 Pa	
Sound power level at the optimal operating point	7,8 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.	65 °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, cyclic; according to DIN EN 60068-2-30, 6 cycle	
Water exposure	None	
Dust requirements	Dust check; according to DIN EN 60068-2-68, 6g/m ² d, 1 day	
Salt fog requirements	None	

Permitted application area:

The product is for the use in sheltered rooms with limited controlled temperature. Occasionally condensed water is allowed. Direct exposure to water must be avoided. Saline ambient conditions must be avoided.

Pollution degree 2 (according DIN EN 60664-1)

It occurs only non-conductive pollution. Occasionally, temporary conductivity caused by condensation occurs.

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°C. No arcing or breakdown is allowed! All connections together to ground.	500 VAC / 1 Min.	
B.) Routine test Measuring conditions: At indoor climate. No arcing or breakdown is allowed! All connections together to ground.	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
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

The approval tests are observed to:

U approval max.: 30,0 V @ TU approval max.: 65,0 °C

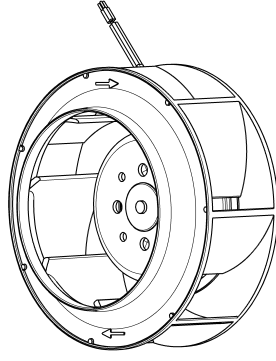
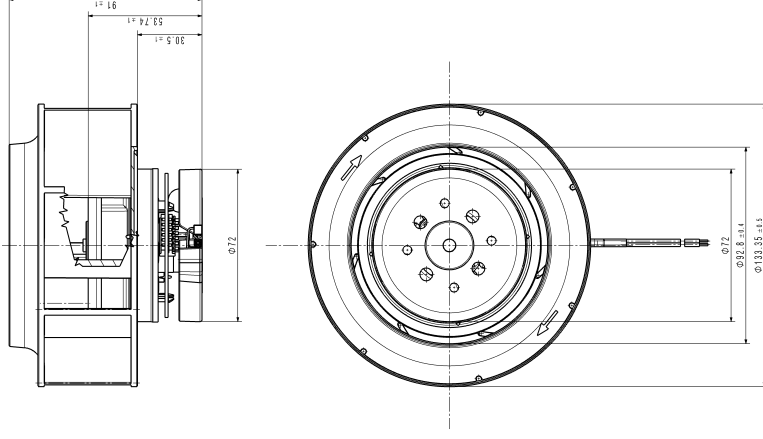
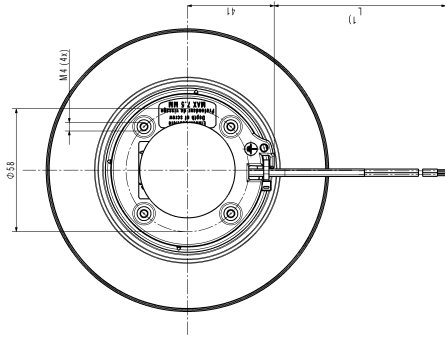
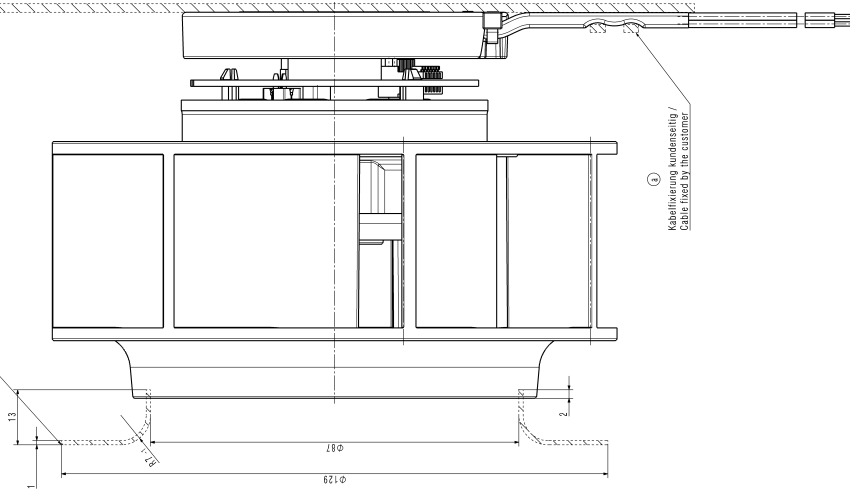
6 Reliability

6.1 General

Life expectancy L10 at TU = 40 °C	72.500 h	
Life expectancy L10 at TU max.	40.000 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	122.500 h	

2:1

Einbaubasis und Befestigungsbasis kundenspezifisch /
Mounting base and mounting plate provided
by customer



Bei Übergabe von Daten bleibt diese Zeichnung
unverändert. Bei Unklarheiten gelten die
Angaben in der Zeichnung.
In case of handover of data is this drawing
unchanged. In case of uncertainties the
specifications in this drawing are binding.

DRINGENDE MASSGENAUIGKEITEN CRITICAL DIMENSIONS	PROJEKTIONSSYSTEM PROJECTION SYSTEM	PROJEKTION PROJECTION	PROJEKTIONSWEG PROJECTION PATH	PROJEKTIONSWEG PROJECTION PATH	PROJEKTIONSWEG PROJECTION PATH	PROJEKTIONSWEG PROJECTION PATH	PROJEKTIONSWEG PROJECTION PATH
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1) = Anzahl und Länge der Litzen sowie Länge des Schlauches ab Einbaubasis /
Length and number of wires and length of tube frame edge see design specification
- Anzahl: mit Feder spannen / Without axial clearance by a pre-loaded spring

Alle Maße sind in mm angegeben, es sei denn, es ist anders angegeben.
All dimensions are given in mm, unless otherwise specified.