

Product Data Sheet **9692300193**
VWC0060AUEBS
638/2HPU

ebmpapst
The engineer's choice



638/2HPU

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1 General

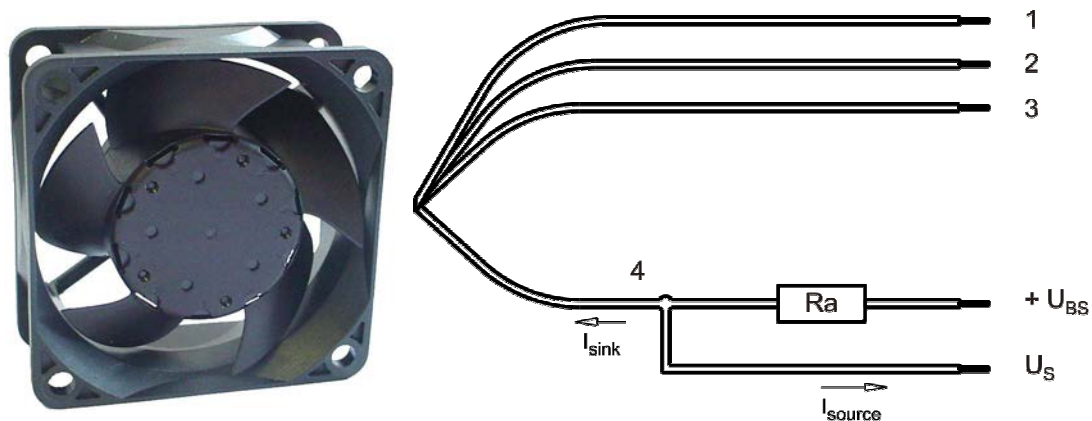
Fan type	Fan	
Rotating direction looking at rotor	Clockwise	
Airflow direction	Air outlet over struts	
Bearing system	Stainless steel bearing	
Mounting position - shaft	Any	

2 Mechanics**2.1 General**

Width	60,0 mm	
Height	60,0 mm	
Depth	25,4 mm	
Mass	0,070 kg	
Housing material	Plastic	
Impeller material	Plastic	
Max. torque when mounted across both mounting flanges	Wire outlet corner: 30 Ncm Remaining corners: 70 Ncm	
Screw size	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 24	1,10 mm
2	blue	- GND	AWG 24	1,10 mm
3	violet	PWM	AWG 24	1,10 mm
4	white	Tacho	AWG 24	1,1 mm

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

3 Operating Data

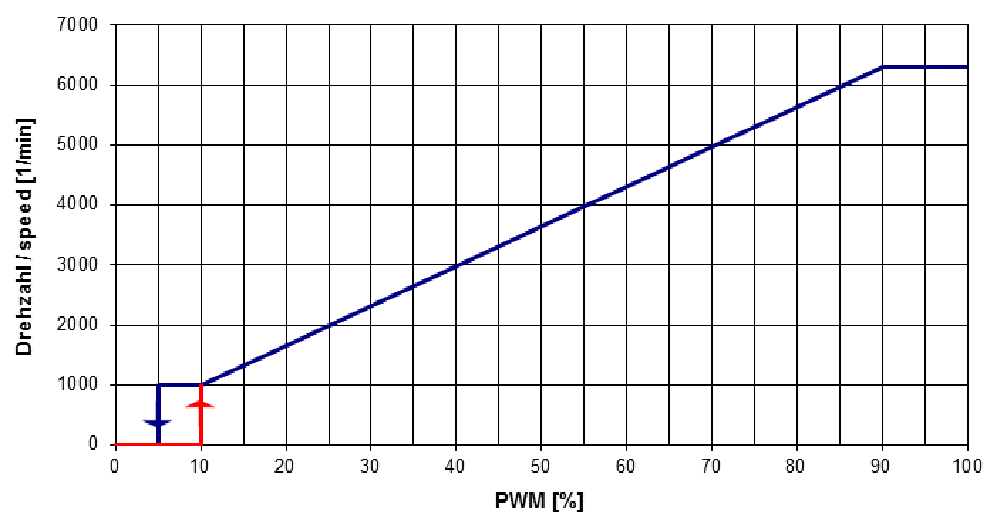
3.1 Electrical Interface - Input

Control input	PWM
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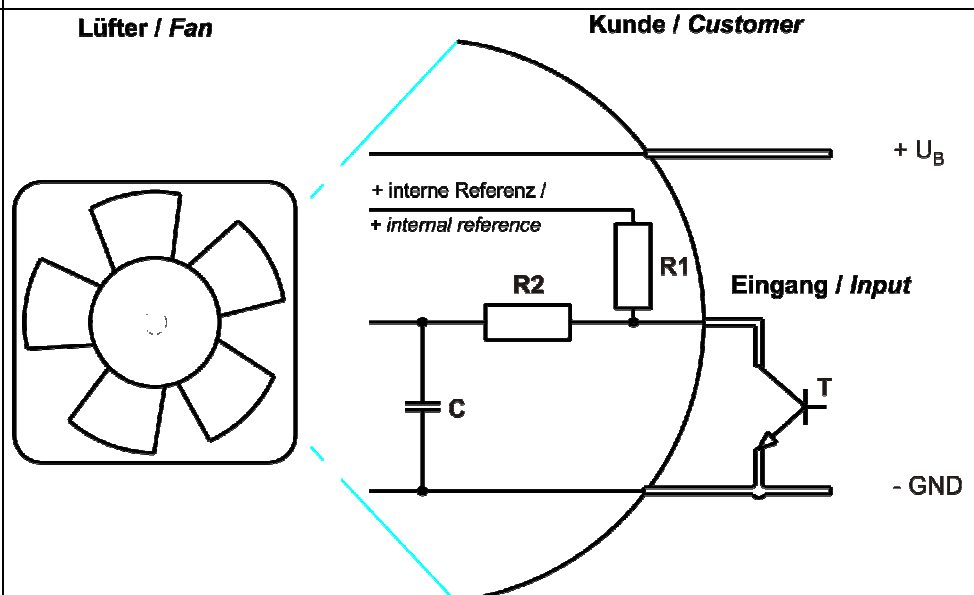
Features

Input type	Open collector	
PWM - Frequency		1 kHz - 30 kHz

Characteristics



Schematics



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.

$\Delta p = 0$: corresp. to free air flow (see chapter aerodynamics)
 I: corresp. to arithm. mean current value

Name	Condition
PWM 0001	PWM: $\geq 90\%$;

Startup peakpulse current: $I_{pmax} = 350\text{mA}$

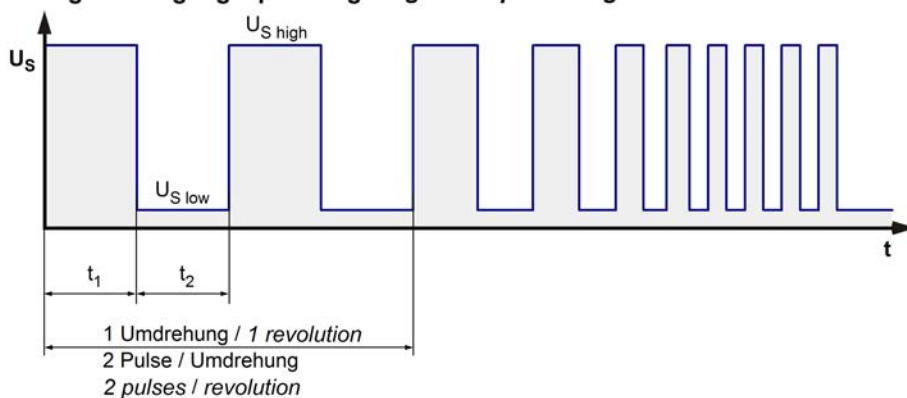
Startup peakpulse duration: $t_p = 6 \times 1\text{ms}$

Features	Condition	Symbol	Values		
Voltage range		U	40 V		60 V
Nominal voltage		U_N		48 V	
Power consumption	$\Delta p = 0$	P	1,5 W	1,8 W	2,1 W
Tolerance	PWM 0010		+/- 17,5 %	+/- 17,5 %	+/- 17,5 %
Current consumption	$\Delta p = 0$	I	37 mA	38 mA	35 mA
Tolerance	PWM 0010		+/- 17,5 %	+/- 17,5 %	+/- 17,5 %
Speed	$\Delta p = 0$	n	5.950 1/min	6.300 1/min	6.300 1/min
Tolerance	PWM 0010		**)	**)	**)
Starting current consumption				$\leq 315\text{ mA}$	

3.3 Electrical Interface - Output

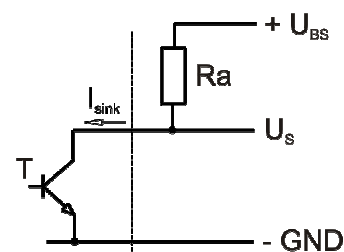
Tacho type	/2 (open collector)
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Signal-Ausgangsspannung / Signal output voltage

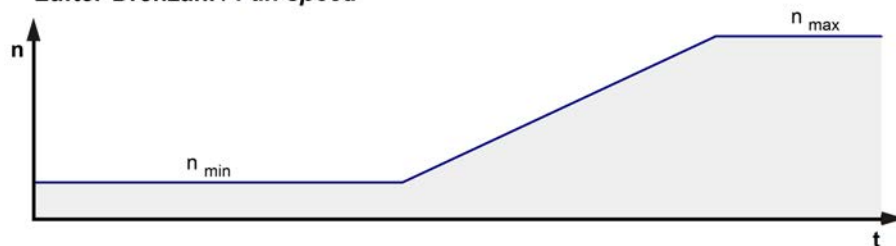


$$R_a = \frac{U_{BS} - U_{S\ low}}{I_{sink}}$$

Lüfter / Fan Kunde / Customer



Lüfter-Drehzahl / Fan speed

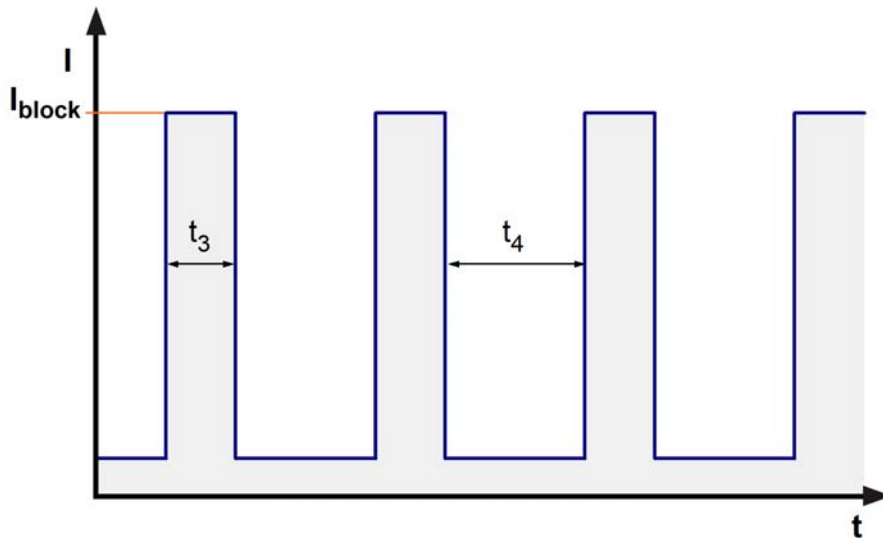


Features	Note	Values
Tacho operating voltage	U_{BS}	$\leq 60\text{ V}$
Tacho signal Low	$U_{S\ low}$	$\leq 0,4\text{ V}$
Tacho signal High	$U_{S\ high}$	$\leq 60\text{ V}$
Maximum sink current	I_{sink}	4 mA
External resistor	External resistor R_a from U_{BS} to U_S required. All voltages measured to 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

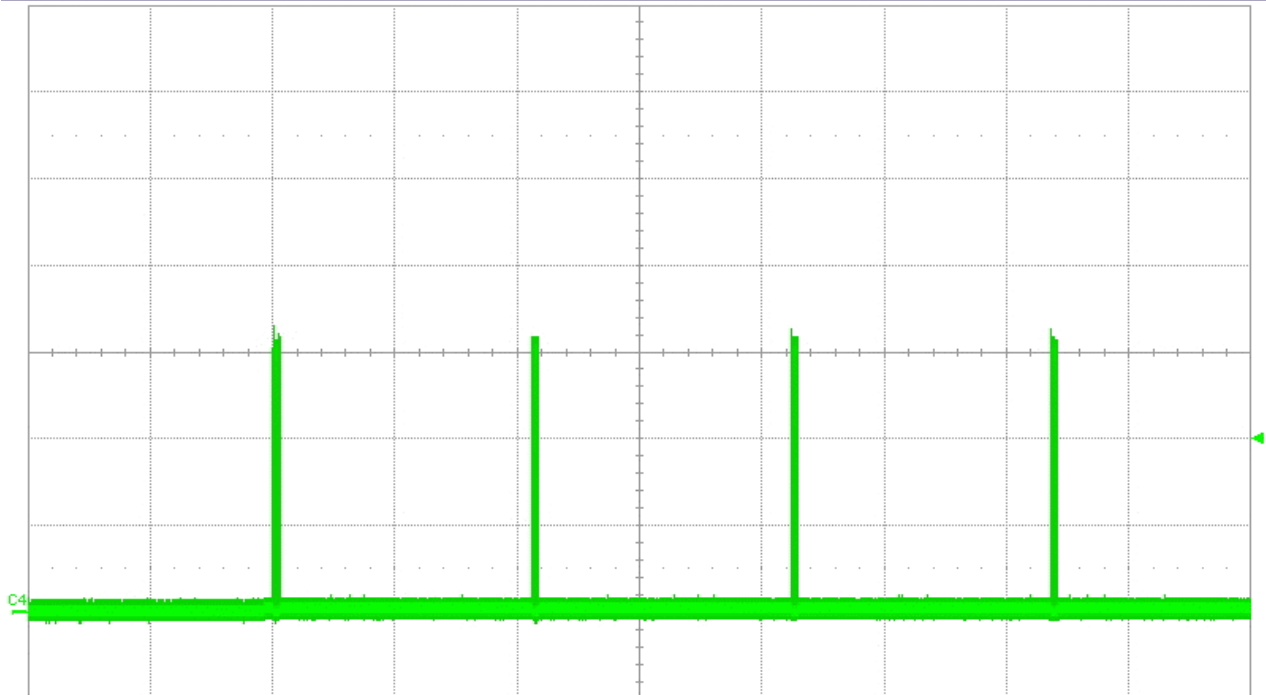
Electronic function	Speed-Controlled	
Reversed polarity protection	Rectifying diode	
Max. residual current at U_N	$I_F \leq 900 \mu A$	
Locked rotor protection	Auto restart	
Locked rotor current at U_N	I_{block} approx. 315 mA	
Clock signal at locked rotor	t_3 / t_4 typical: 0,3 s / 10 s	



The fan has a special blocking cycle. The behavior of this cycle differs marginally between a blocked rotor when the fan gets started and a blocked rotor during the running operation of the fan. The following figures describe this characteristic.

1. Blocked rotor at the start of the fan

Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



Measure

value
statusC4 BwL DC
100 mA/div
~301.0 mA

TELEDYNE LECROY

P1:freq(C1)

P2:duty(C1)

P3:mean(C4)

P4:max(C3)

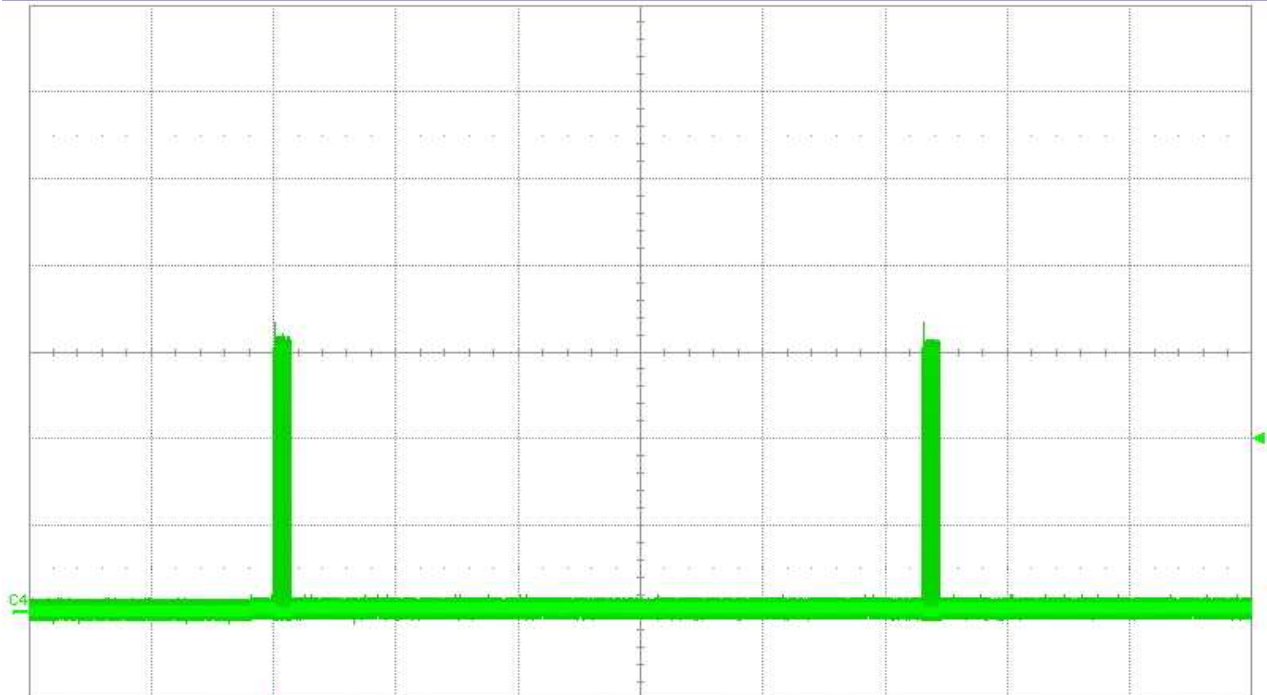
P5:freq(C1)

P6:duty(C1)

Zeitbasis -15.0 s Trigger C4 DC
Roll 5.00 s/div Stopp 200 mA
5.00 MS 100 kS/s Edge Negativ

4/27/2017 11:43:23 AM

Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



Measure

value
statusC4 BwL DC
100 mA/div
-301.0 mA

TELEDYNE LECROY

P1:freq(C1)

P2:duty(C1)

P3:mean(C4)

P4:max(C3)

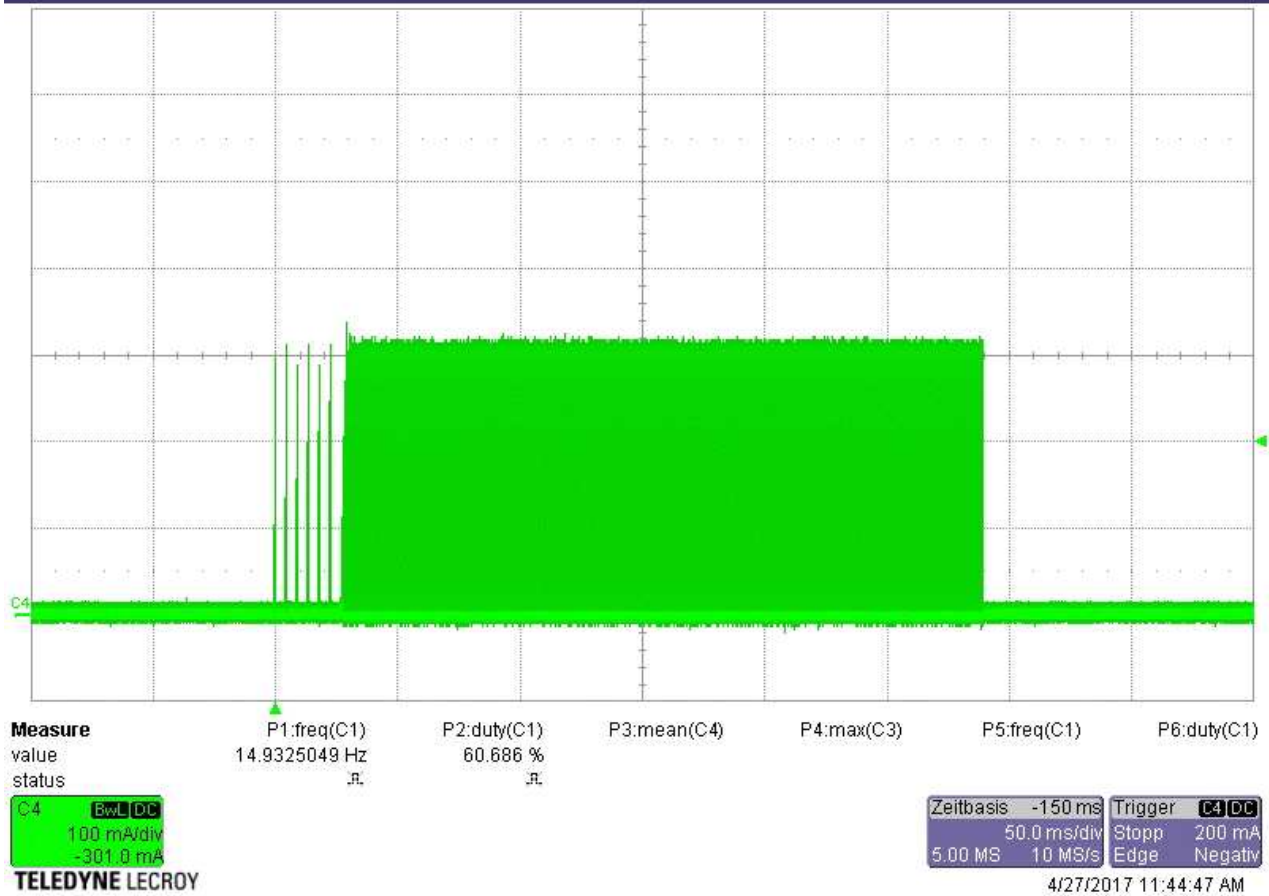
P5:freq(C1)

P6:duty(C1)

Zeitbasis -6.00 s Trigger C4 DC
Roll 2.00 s/div Stopp 200 mA
5.00 MS 250 kS/s Edge Negativ

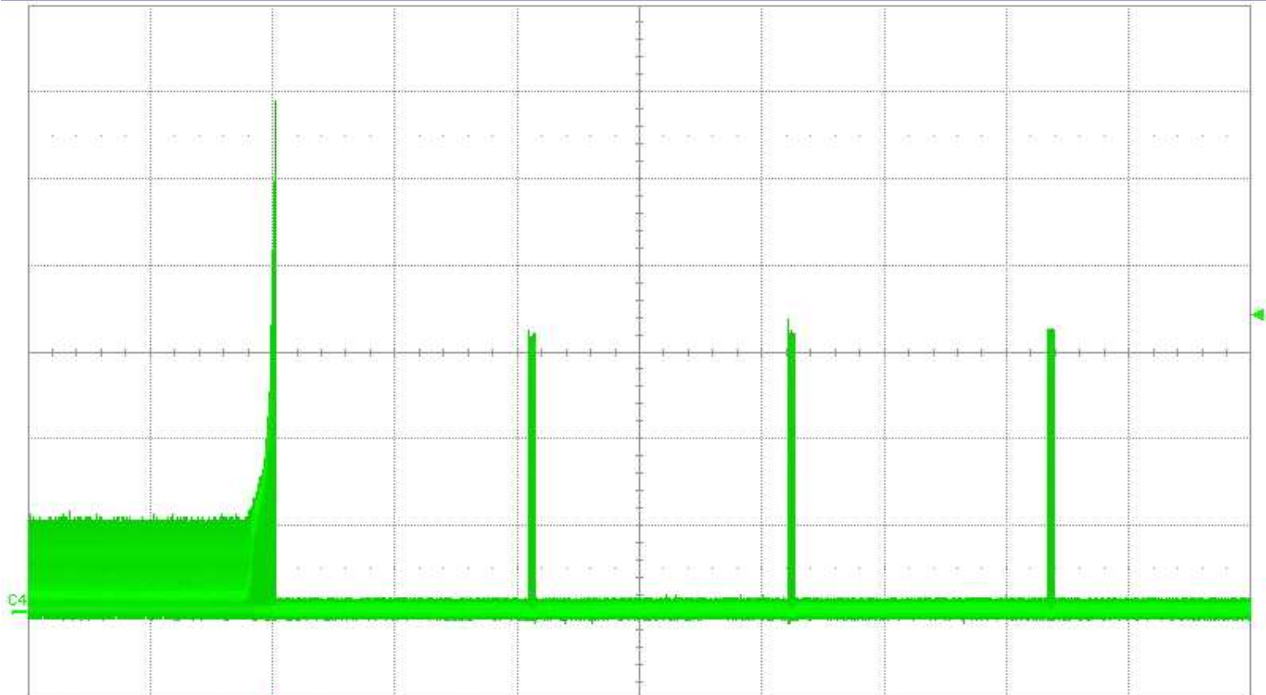
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2. Blocked rotor after the normal operation of the fan

Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



Measure

value
statusC4 BwL DC
100 mA/div
-301.0 mA

TELEDYNE LECROY

P1:freq(C1)
395.93212 mHz
⌵P2:duty(C1)
1.670 %
⌵

P3:mean(C4)

P4:max(C3)

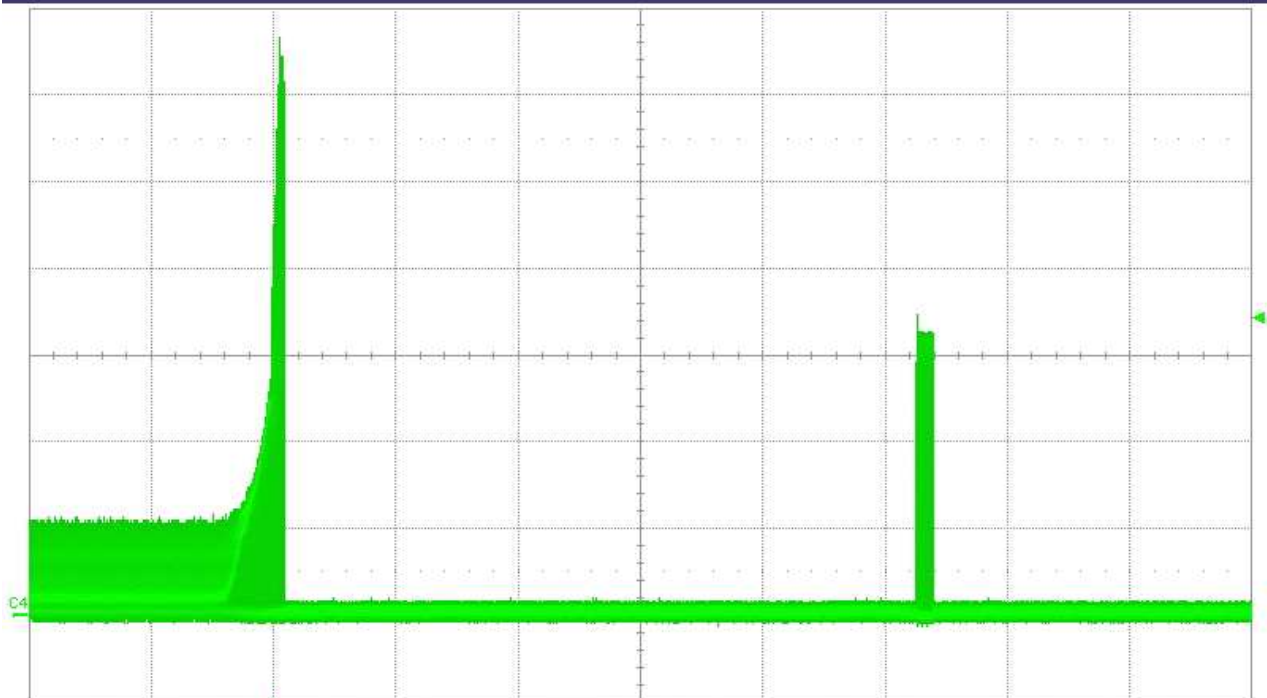
P5:freq(C1)

P6:duty(C1)

Zeitbasis -15.0 s Trigger C4 DC
Roll 5.00 s/div Stopp 343 mA
5.00 MS 100 kS/s Edge Negativ

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Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



Measure

value
statusC4 BwL DC
100 mA/div
-301.0 mA

TELEDYNE LECROY

P1:freq(C1)

A

P2:duty(C1)

36.000 %

A

P3:mean(C4)

P4:max(C3)

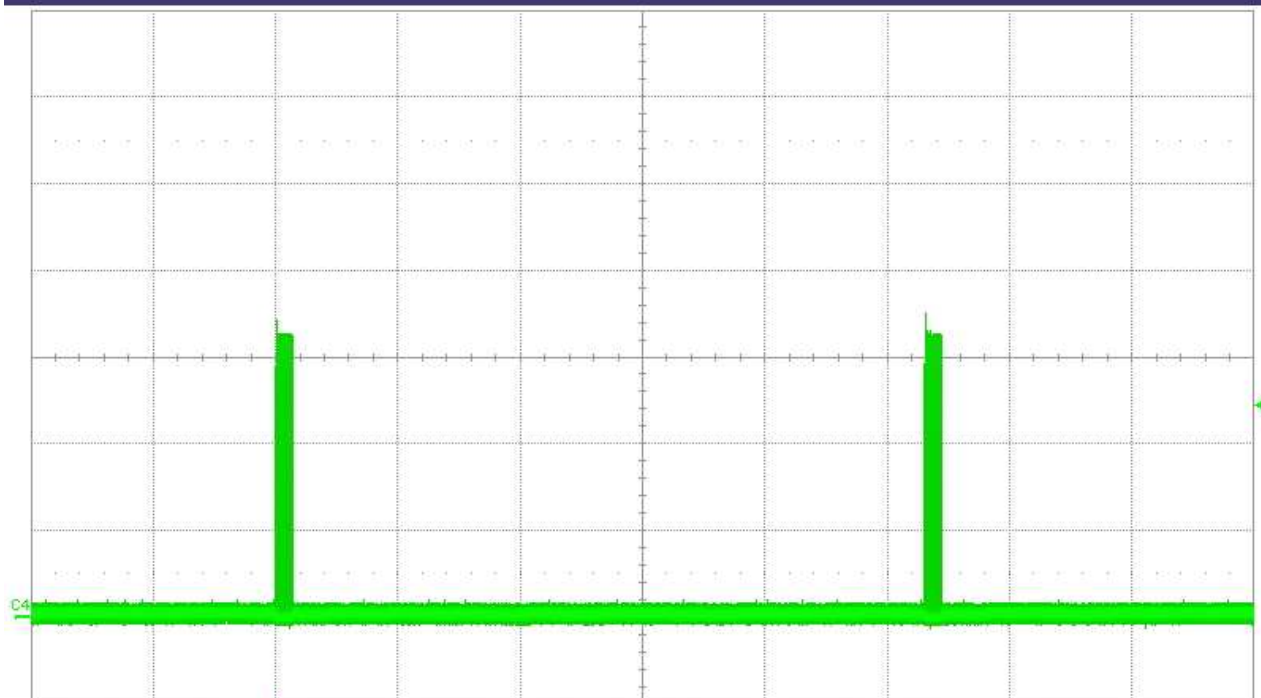
P5:freq(C1)

P6:duty(C1)

Zeitbasis -6.00 s Trigger C4 DC
Roll 2.00 s/div Stopp 343 mA
5.00 MS 250 kS/s Edge Negativ

4/27/2017 11:39:57 AM

Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



Measure

value
statusC4 BwL DC
100 mA/div
-301.0 mA

TELEDYNE LECROY

P1:freq(C1)

A

P2:duty(C1)

83.461 %

A

P3:mean(C4)

P4:max(C3)

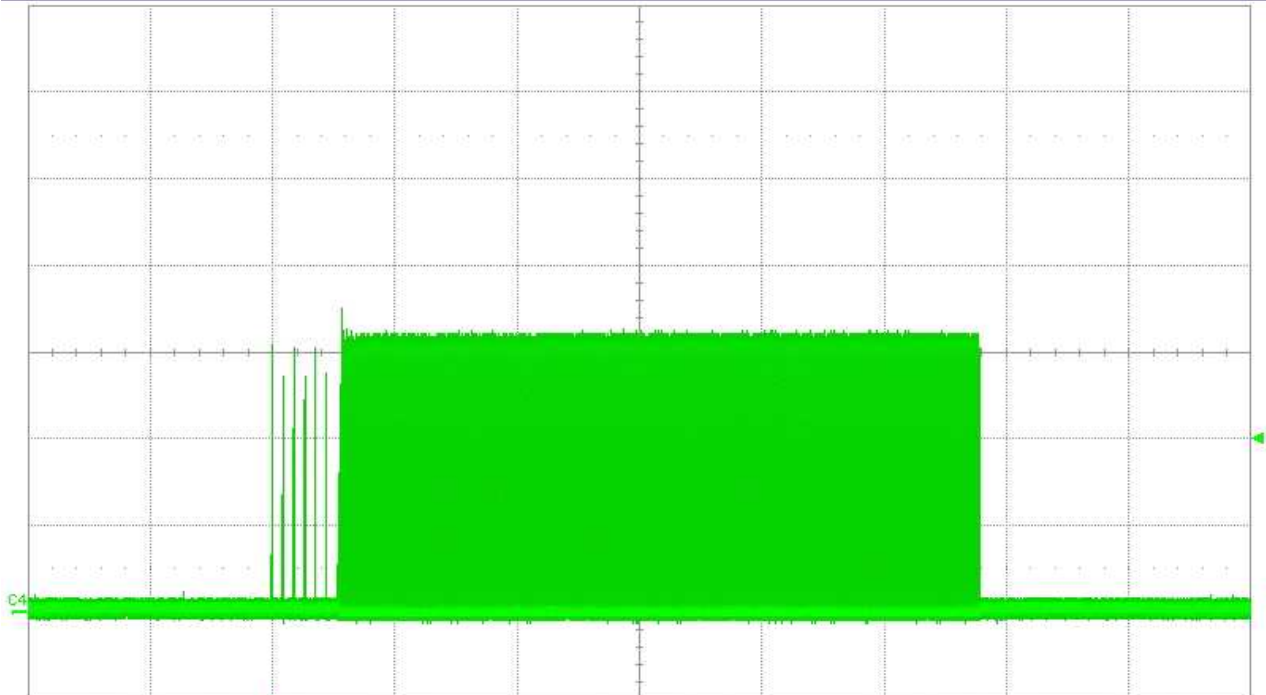
P5:freq(C1)

P6:duty(C1)

Zeitbasis -6.00 s Trigger C4 DC
Roll 2.00 s/div Stopp 243 mA
5.00 MS 250 kS/s Edge Negativ

4/27/2017 11:40:45 AM

Datei Vertikal Zeitbasis Trigger Anzeige Cursor Messung Mathe Analyse Utilities Hilfe



Measure

value
statusP1:freq(C1)
21.8692342 HzP2:duty(C1)
96.305 %

P3:mean(C4)

P4:max(C3)

P5:freq(C1)

P6:duty(C1)

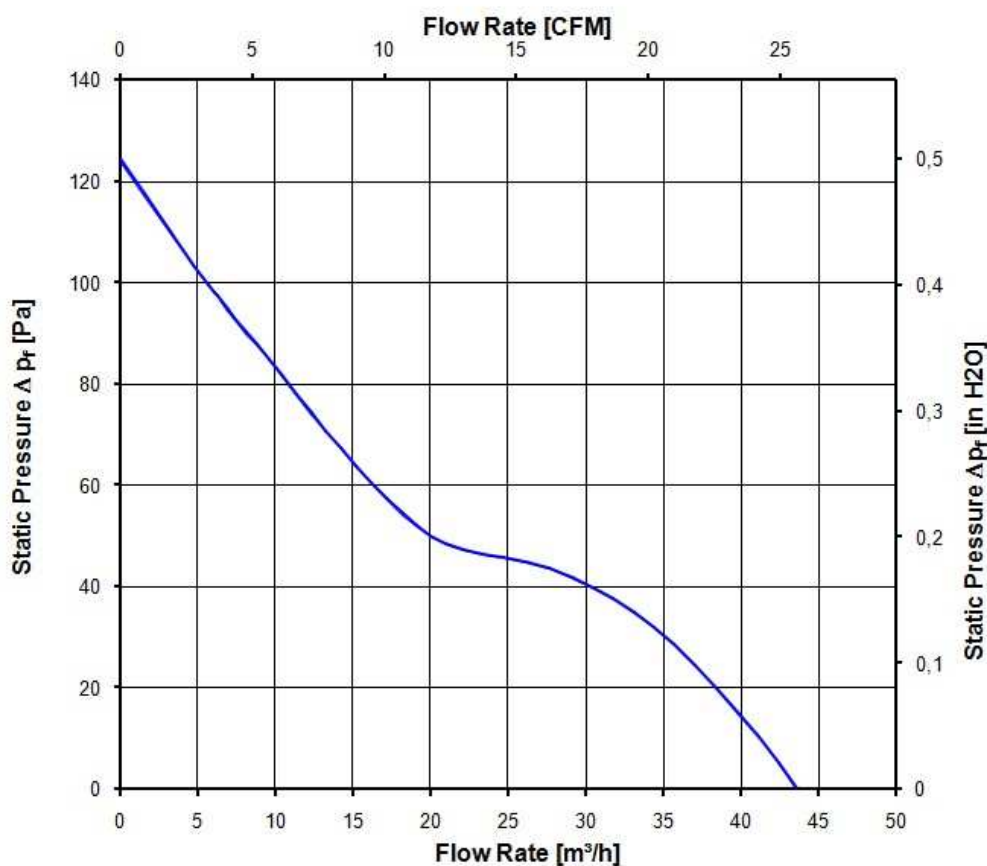
C4 BwL DC
100 mA/div
~301.0 mA
TELEDYNE LECROYZeitbasis -150 ms Trigger C4 DC
50.0 ms/div Stopp 200 mA
5.00 MS 10 MS/s Edge Negativ
4/27/2017 11:41:43 AM

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.

a.) Operation condition:

6.300 1/min at free air flow	PWM >= 90 %;		
Max. free-air flow ($\Delta p = 0 / \dot{V} = \max.$)		44,0 m ³ /h	
Max. static pressure ($\Delta p = \max. / \dot{V} = 0$)		125 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:

6.300 1/min at free air flow	PWM $\geq 90 \%$;		
------------------------------	--------------------	--	--

Optimal operating point	41,0 m ³ /h @ 10 Pa	
Sound power level at the optimal operating point	5,4 bel(A)	
Sound pressure level at free air flow, measured in rubber bands	35,0 dB(A)	

4 Environment

4.1 General

Min. permitted ambient temperature TU min.	-40 °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 temperature, cyclic; according to DIN EN 60068-2-38, 10 cycle and condensation water check; according to DIN EN ISO 6270-2, 14 days	
Water exposure	Immersion test IPX8; according to DIN EN 60529 VDE 0470, not certified	
Dust requirements	Dust check IP6X; according to DIN EN 60529 VDE 0470, not certified	
Salt fog requirements	Salt fog, constant, (Bellcore II); according to DIN EN 60068-2-22, 30 days, operation at nominal speed	

Permitted application area:

The product is for the use in open and unsheltered areas. Direct exposure to water as well as saline ambient conditions are allowed provided that this does not prevent the normal operation.

Pollution degree 4 (according DIN EN 60664-1)

It occurs permanent conductivity caused by conductive dust, rain or moisture.

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. 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 / 1,5 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 E38324
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	Yes / GB 12350 Safety Requirements for small Power Motors

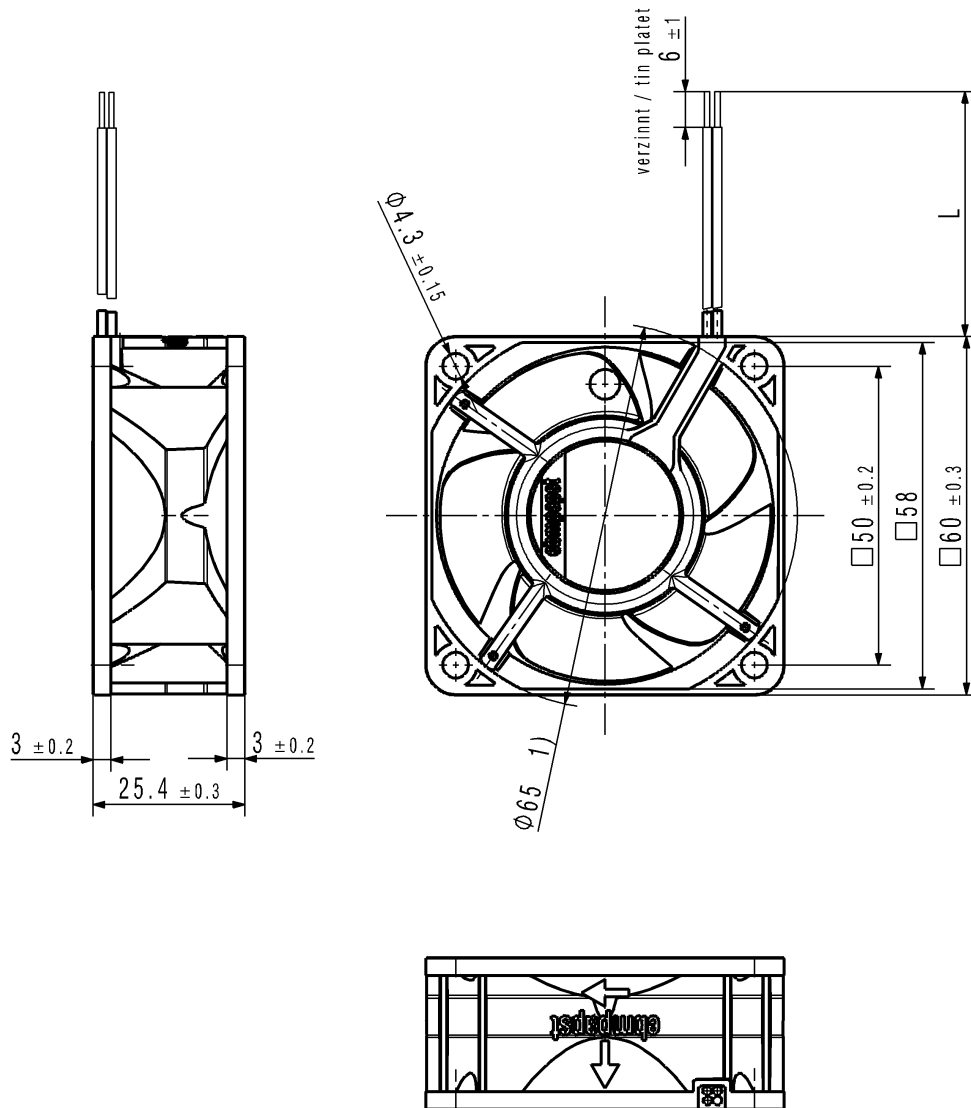
6 Reliability**6.1 General**

Life expectancy L10 at TU = 40 °C	85.000 h	
Life expectancy L10 at TU max.	42.500 h	
Life expectancy L10 acc. to IPC 9591 at TU = 40 °C	142.500 h	

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

Anzahl und Länge der Litzen siehe BV - Blatt 1
length and number of wires see design specification page 1



1) Maße fuer Montagewand / measures for mounting plate
Axialspiel bei Kugellagerung (K): 0 (mit Federausgleich) /
by ballbearing (K): 0 (by pre-loaded spring)

SAP-Status/State		Aend.-Nr./ Change-No.		CATIA-System-Version/ CATIA-System-Version		CAD-Umgebung/ CAD-Environment		Werkstoff / Material:		Volumen / Volume (mm³):	
9292308001 CPR000										Gewicht / Mass (g):	
Tolerierung / Tolerances:		3D-Referenzmodell / 3D-Referenzmodell		Datum		Name		Artikel / Title:			
Allgemeintoleranzen / Gen. Tolerances:		Bearb./ Drawn						Zchg.-Nr. / Drawing No:		Ers.f.Zchg. / Replaces:	
		Gepr./ Checked									
		Freig./ Released									
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