

Structure-Borne Noise Sensor BKS 03



August 2007

Construction Basics

The BKS03 uses the MMF charge sensor KS 91D, which has a sensitivity of 2.4pC/g. The MMF ICP sensor KS 91E may also be used. It has a sensitivity of 10 mV/g and needs no additional charge amplifier. Alternatively the B&K charge sensor 4393 may be used, which has a sensitivity of 3.1 pC/g.

All these sensors weigh only 1,7 g and responds to frequencies up to 16.5 kHz.

The sensor is mounted on a silicon ball, the top of it's casing contacting the unit under test. A small steel plate is attached to the device and electrically isolated to prevent malfunction.

Because of the small weight, the relatively large contact area, and the absorption of vibration by the rubber ball, resonance remains at a minimum.

For the two figures below the transfer function of the Discom sensor and the transfer function of reference sensor were subtracted. Both sensors measured the structure-borne noise within a gear box. For figure A the Discom sensor was applied to the reference sensor, thereby ensuring that both sensors measure the same signal. For figure B the Discom sensor was applied to the gear box approximately 2cm from the reference sensor. Figure A exhibits almost linear transfer, both sensors being fed the same signal. Figure B is necessarily less perfect, because the difference actually measured owes in part to the varying signal at the two points on the gear box. Nevertheless no typical resonance frequencies were measured.

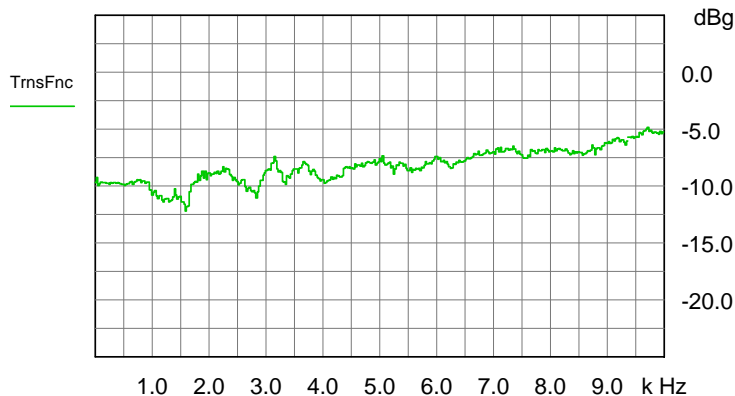


Fig. A. Deviation of transfer function of Discom-sensor to transfer-function of reference sensor. Discom sensor applied directly to reference sensor.

Function shows no resonance frequencies.

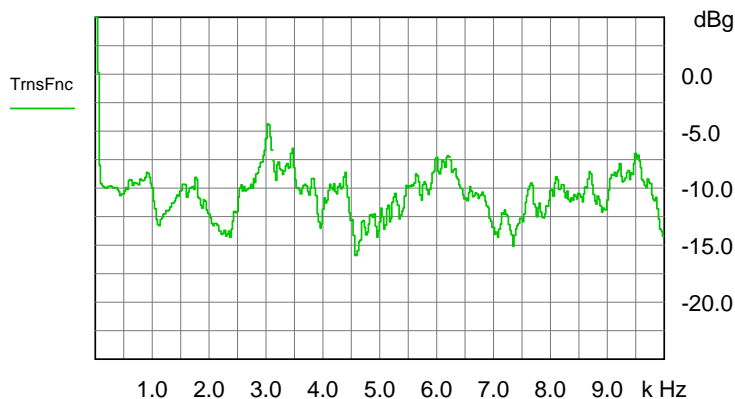
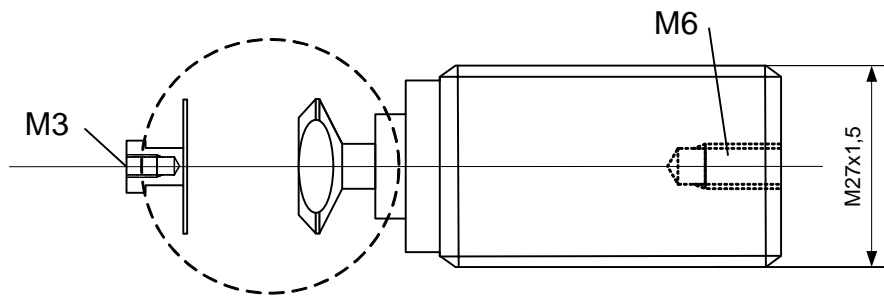
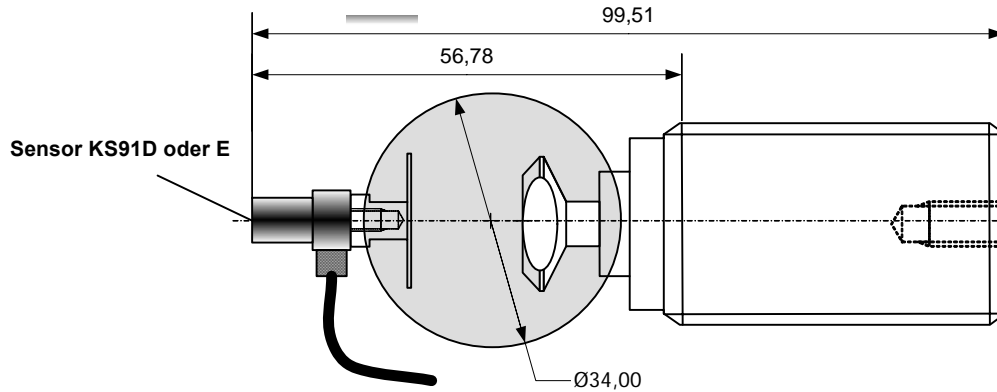


Fig. B. Deviation of transfer function of Discom sensor to transfer function of reference sensor. Discom sensor applied to a point on the gear box a short distance from the reference sensor.

Function shows no resonance frequencies.



Engineering Drawing BKS03



DIS/COM Tel=0551/548330 Fax=0551/5483343 gez.:J. Lorenz	Körperschallsensor BKS03		
	MATERIAL:	Aluminium/Silikon	
	MASSTAB 1:1	2009-03-03	ZEICHN.NR. 090303-02
			BLATT 1 von 1



Technical Data BKS03

Sensitivity:

- KS91D ~2.4 pC/g
- KS91E ~10 mV/g
- B&K4393 ~3.1 pC/g

Upper frequency limit: approx. 8 kHz

Can be connected to Rotas systems equipped with:

- KS91E directly supplied with ICP
- KS91D and charge amplifier

Minimum resonance due to small weight of 1.7 g and resonance absorption by silicon ball.

Adapts to uneven surfaces.

Tightening moment of all sensors:

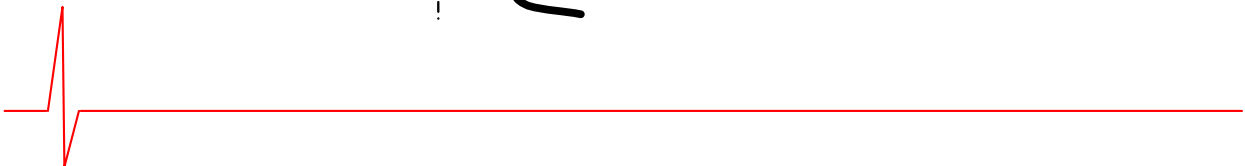
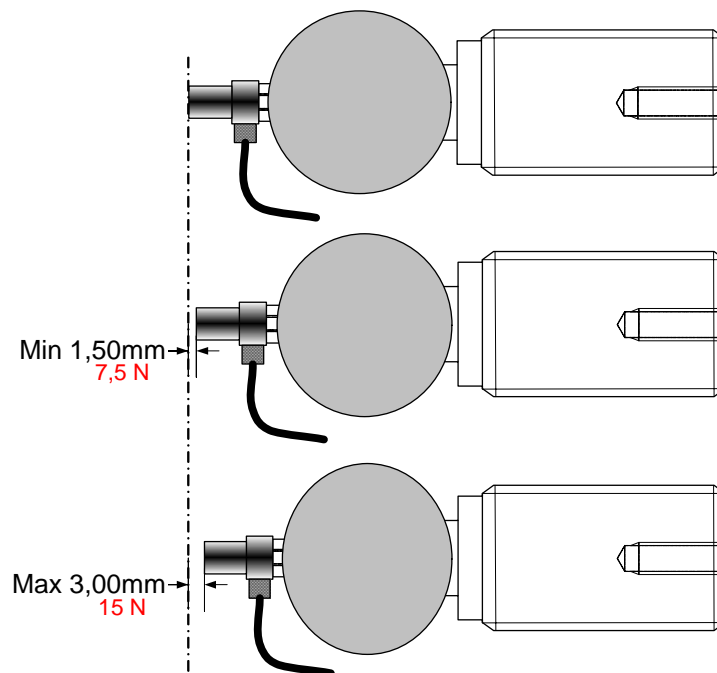
min. 0,3 Nm max. 1 Nm

Axial force on sensor:

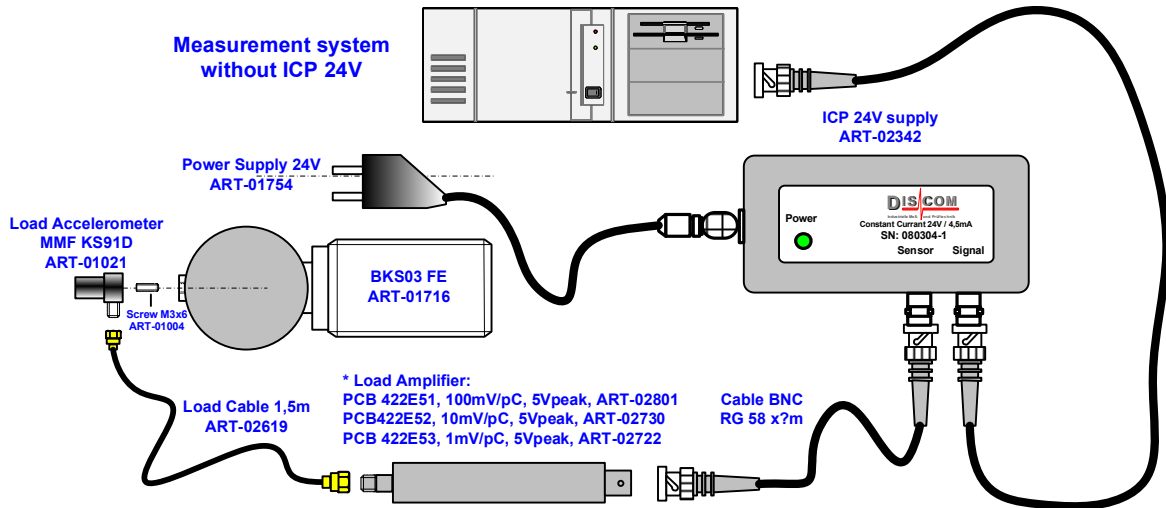
min. 7,5 N - max. 15 N

Preload of sensor on the device body:

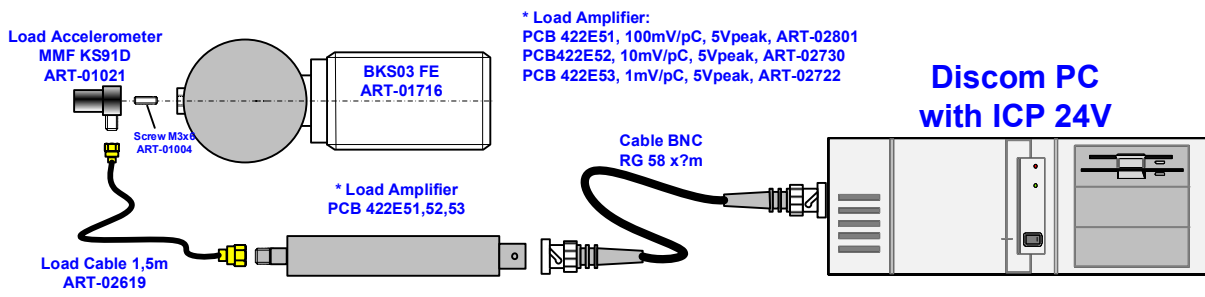
min. 1,5 mm - max. 3mm



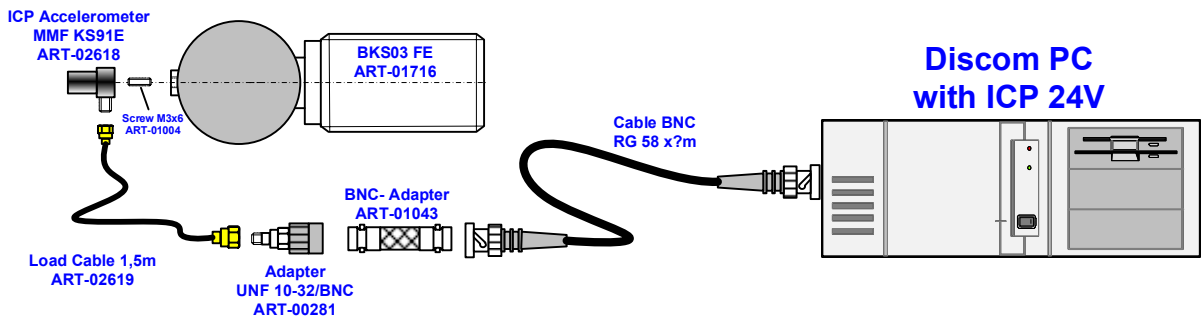
Spare parts for old systems without 24V ICP:



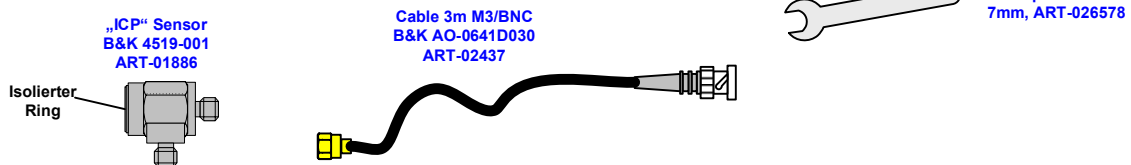
Spare parts for systems with 24V ICP and load accelerometer:



Spare parts for systems with 24V „ICP“ and „ICP“ accelerometer:



Spare parts special edition Bosch



Spare parts all systems:



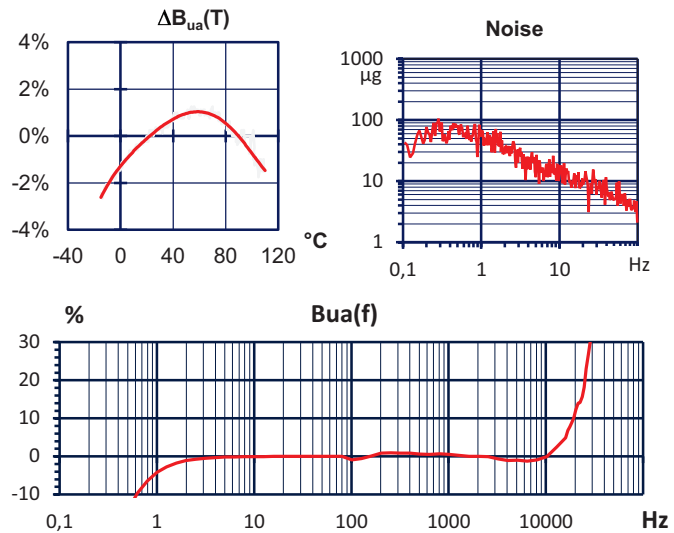
KS91E (Vers. 09/12)

geringes
Rauschen
geringer TK
ab 0,3 Hz

- ICP®-Subminiaturaufnehmer mit ringförmiger Tastfläche
- geringer TK(B_{ua})
- geringes Rauschen
- Isolierte Tastfläche aus Edelstahl



- ICP®-Subminiature accelerometer with ring-shaped probe
- Low TK(B_{ua})
- Low noise level
- Insulated probe made of stainless steel



Arbeitstemperaturbereich	T _{min} /T _{max}	-30 / 120	°C
Piezsystem • Piezo design		Scherprinzip • Shear design	
Spannungsübertragungsfaktor • Voltage sensitivity	B _{ua}	10 ± 10%	mV/g
Linearer Frequenzgang (am Messkopf) • Linear frequency range (on the probe)	±3dB ±10% ±5%	0,3... 30.000 0,6... 18.000 0,9... 15.000	Hz
Resonanzfrequenz • Resonant frequency	f _r	> 50 (+25dB)	kHz
Messbereich • Range	a ₊ / a ₋	±600	g (pk)
Bruchbeschleunigung • Destruction limit	a _{max}	8000	g (pk)
Querrichtungsfaktor • Transverse sensitivity	G _{90max}	< 5	%
Keramikkapazität • Ceramic Capacitance	C _i	200	pF
Ausgang • Output		ICP®-kompatibel • ICP® compatible	
Konstantstromversorgung • Constant current supply	I _{CONST}	2..20	mA
Arbeitspunktspannung • Output bias voltage	U _{BIAS} @4mA; @25°C @Tmin - Tmax	12..14 ± 10	V %
Nichtlinearität • Total harmonic distortions	THD @a ₊ /a ₋	2	%
Ausgangsimpedanz • Output resistance	r _a @4mA	< 60	Ω
Untere Grenzfrequenz • Low cut-off frequency	f _{ug} -3dB	0,3	Hz
Störgrößen • Environmental characteristics			
Eigenrauschen • Residual noise	a _{n,RMS} (0,5 .. 20k) Hz	< 3	mg
	a _n @0,1 Hz	100	μg/√Hz
	@1 Hz	60	
	@10 Hz	15	
@100 Hz	6		
Temperaturkoeffizient der Empfindlichkeit • Temperature coefficient of sensitivity	TK(B _{ua}) @T=(-30..20)°C	0,07	% / K
	@T=(20..60)°C	0,05	
	@T=(60..120)°C	±0,02	
Temperatursprungempfindlichkeit • Temperature transient sensitivity	b _{aT}	2	ms ⁻² /K
Magnetfeldempfindlichkeit • Magnetic field sensitivity	b _{aB}	4,5	ms ⁻² /T
Mechanische Daten • Mechanical data			
Abmessungen • Dimensions	∅ / h	7,8 / 11 / 11,6	mm
Masse ohne Kabel • Weight without cable	m	1,6	g
Gehäusematerial • Case material		Aluminium / Edelstahl • Stainless steel	
Kabelanschluss • Cable connection		radial	
Kontaktbuchse • Socket		Subminiatur M3 • Subminiature M3	
Befestigung • Mounting	Messkopf • probe Boden • base	adhesive / antasten • touch M3	
Schutzgrad / Isolation • Protection grade / Insulation		- / Isolierter Messkopf • insulated probe	
Anschlusszubehör • Connection Accessories		054 / 013 / 013T / 017 / 016 + 051/x	
Befestigungszubehör • Mounting Accessories		002 / (021 / 106 / 129 / 108 / 130)	
Passende Messgeräte • Suitable Electronics		M28 / M32 / M68 / M208 / M12 / M302 / M312	
Bestellinformation • Ordering Information		KS91E: Aufnehmer mit B _{ua} ±10% • Sensor with B _{ua} ±10%	



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Ausgabe / Edition: 09/12

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Email: Info@MMF.de

KS91D		<ul style="list-style-type: none"> ■ Subminiatur Charge Accelerometer ■ Electrically isolated stainless steel ring to connect to the measurement surface. ■ Sensoric element directly adjacent to contact surface 	Unit	Remark
Piezo System		Shearing		
Gain	B_{ua}	$2,5 \pm 10 \%$	pC/g	
Range	a_+ / a_-	± 4000	g	
Breaking accelerometer	a_{max}	8000	g	
Resonance Frequency	f_r	> 50	kHz	
90 degree sensitivity	Γ_{90max}	< 5	%	
Capacity	C_i	200	pF	
Output		Charge output		
Isolation Resistance	R_{iso}	> 1	G Ω	
Environmental data				
Temperature Range	T_{min}/T_{max}	-20 / 120	°C	
Temperature Coefficient	TK(B_{ua})	T < 23°C	+0,06	%/K
		T > 23°C	+0,10	%/K
Temperature Sensitivity	b_{aT}	-	ms ² /K	
Magnetic Sensitivity	b_{aB}	-	ms ² /T	
Mechanical Data				
Dimensions	$\varnothing / h / b$	7,8 / 11 / 11,6		
Mass without cable	m	1,8 g		
Cable		radial		
Mounting	Top	Press against surface		
	Bottom	M3		
Electrical Connection		Subminiatur M3		
Case	Sensor/Ring	Aluminium / Stainless Steel		
Isolation		Unit electrically isolated		

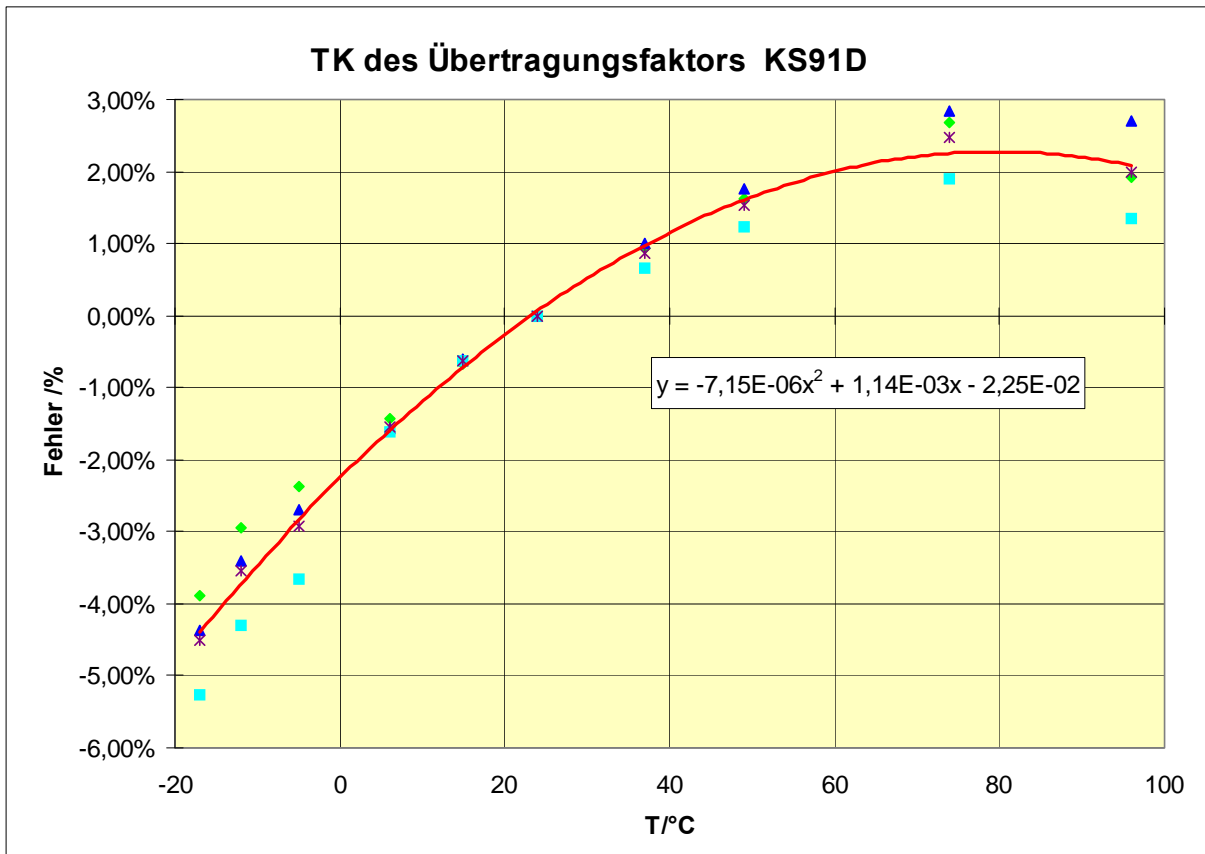


Abbildung 1 Temperature Chart KS91E / 04005

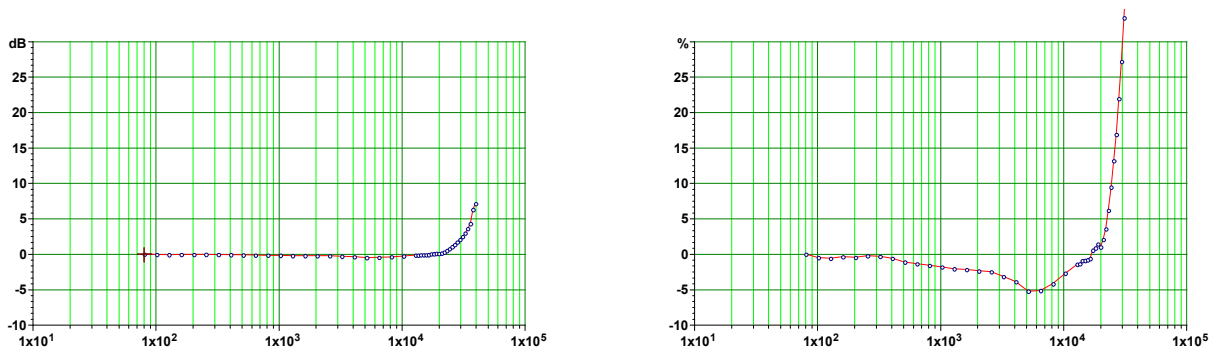


Abbildung 2 Frequency Chart KS91D / 04002 – Coupling to shaker surface with glue