

Structure-Borne Noise Sensor BKS 10



BKS10 Sensor with adapter to BKS03 thread

Mai 2010

Design

The BKS10 implements the design of the BKS03 with a very light-weight sensor on top of an elastic element. As an enhancement, the BKS10 is much slimmer and attaches to surfaces that are close to ribs and other obstructing surfaces. Furthermore, the cable is protected as it is guided in an internal pipe.

The sensor used is of ICP type and has a sensitivity of 10 mV/g (1 mV/Nm/s²)

These sensors weigh about 2 g and respond to frequencies up to 12 kHz.

The sensor is mounted on a silicon element, 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 elastic element, 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.

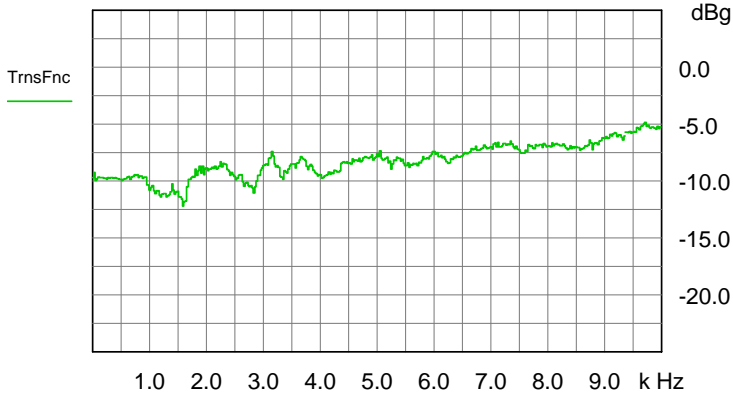


Fig. A. Deviation of transfer function of Discom-sensor to transfer-function of reference sensor. Discom sensor applied directly to reference sensor.

Function shows no resonance frequencies.

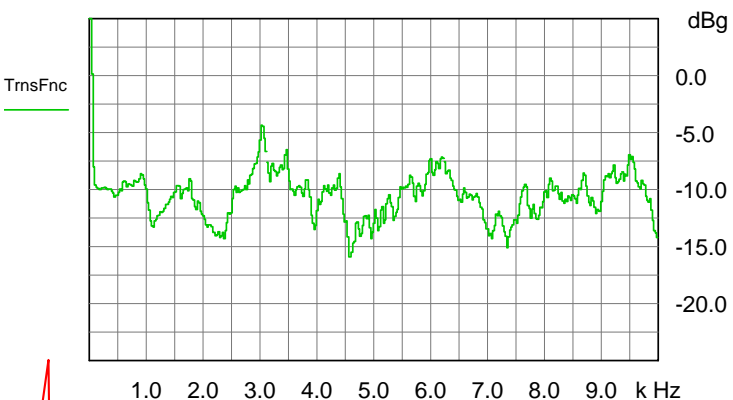
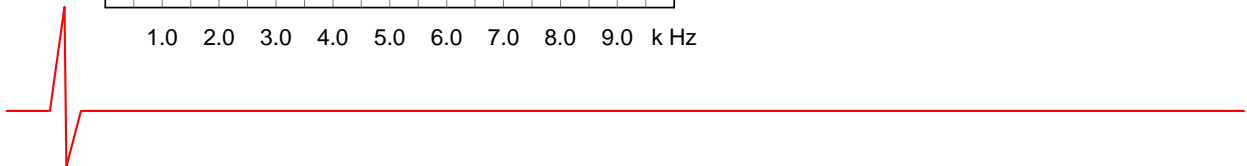
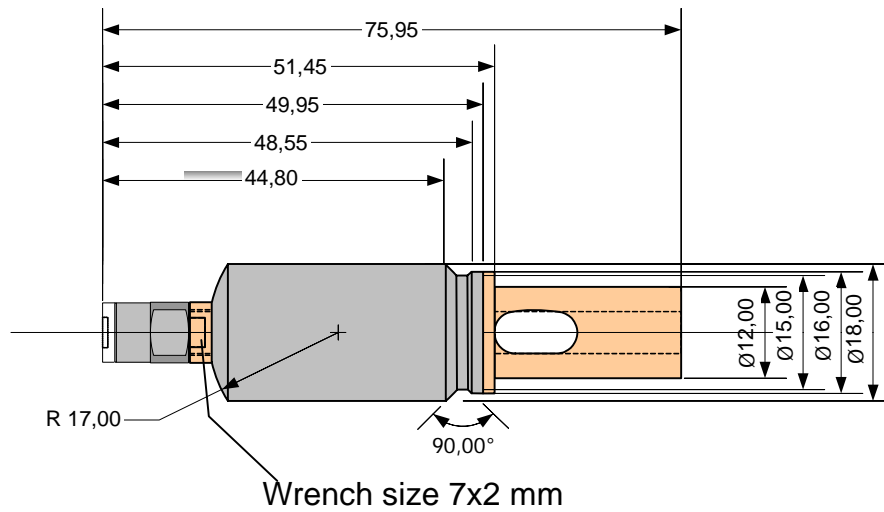


Fig. B. Deviation of transfer function of Discom sensor to transfer function of reference sensor. Discom sensor applied to a point on the gear box a short distance from the reference sensor.

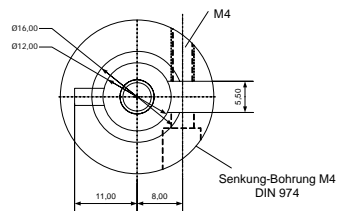
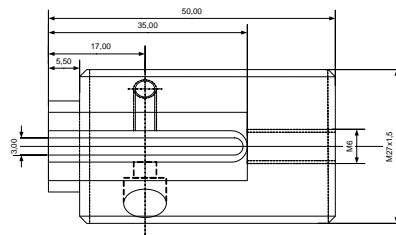
Function shows no resonance frequencies.



Mechanical Drawing BKS10



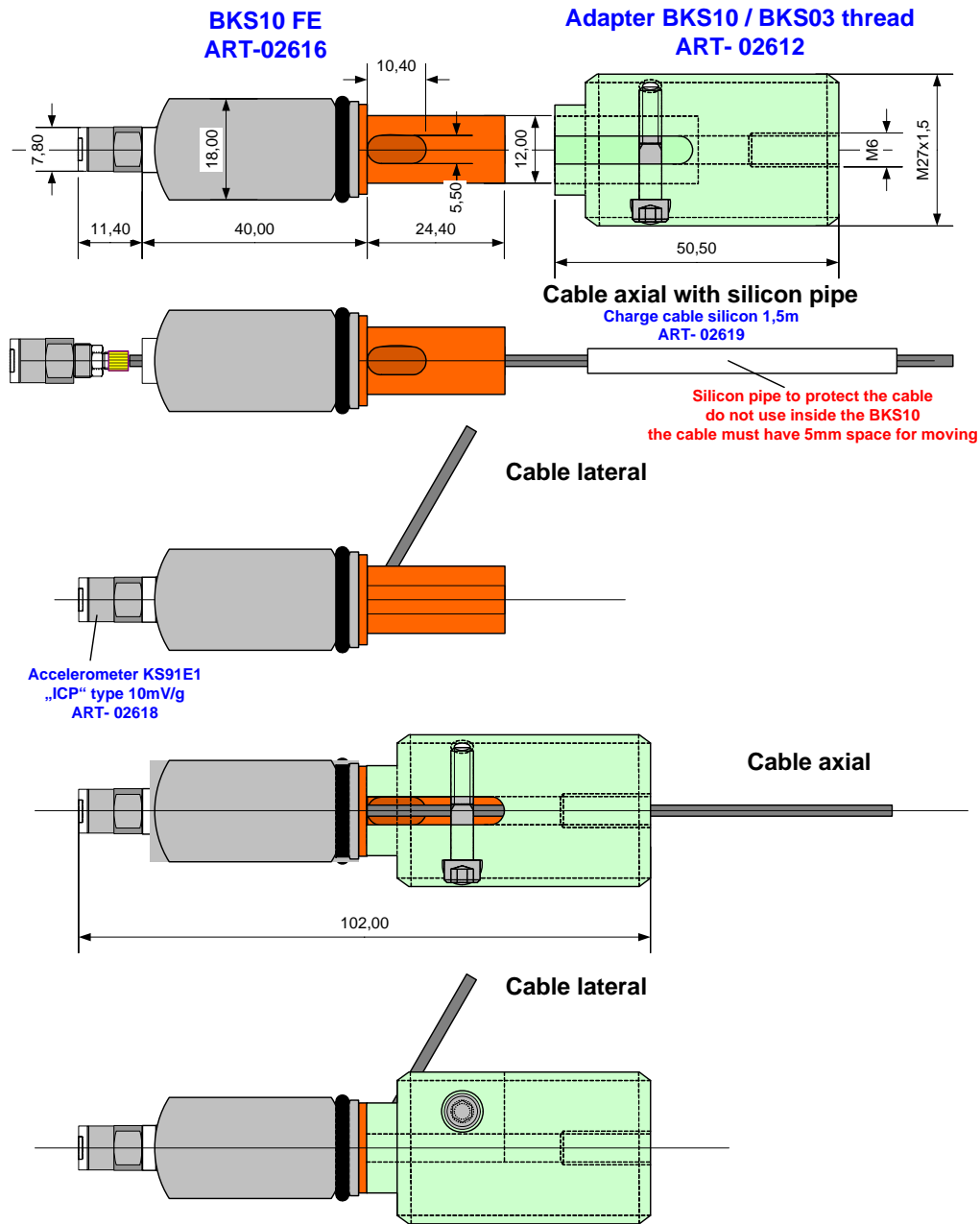
Details of BKS10, all dimensions in mm



Details of adapter BKS03-A for BKS10, all dimensions in mm



Adapter and Cable Configurations



DISCOM Tel. +49 551 548330 Fax. +49 551 5483343 gez.:J. Lorenz	BKS10 adapter		
	MATERIAL:	aluminium / silicon	
Scale: 1:1	2009-11-24	ZEICHN.NR. 091124-01	BLATT 1 von 1

Technical Data BKS10

Sensor axial•	KS91E1 ICP type accelerometer with 10 mV/g, or 1 mV/Nm/s ²
Sensor transversal•	KS91F2 ICP type accelerometer with 25 mV/g, or 2,5 mV/Nm/s ²

Upper frequency limit: approx. 10 kHz

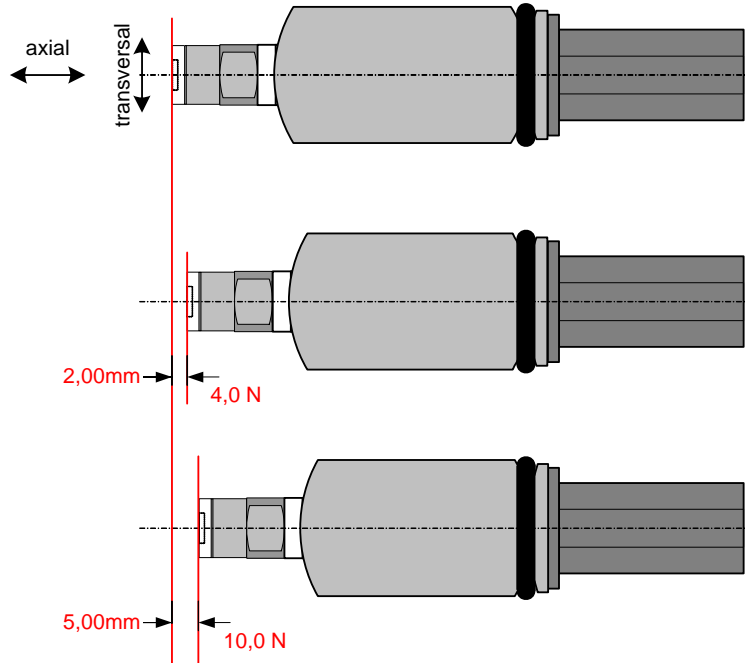
Can be connected to Rotas systems configured as:

▪ICP Input

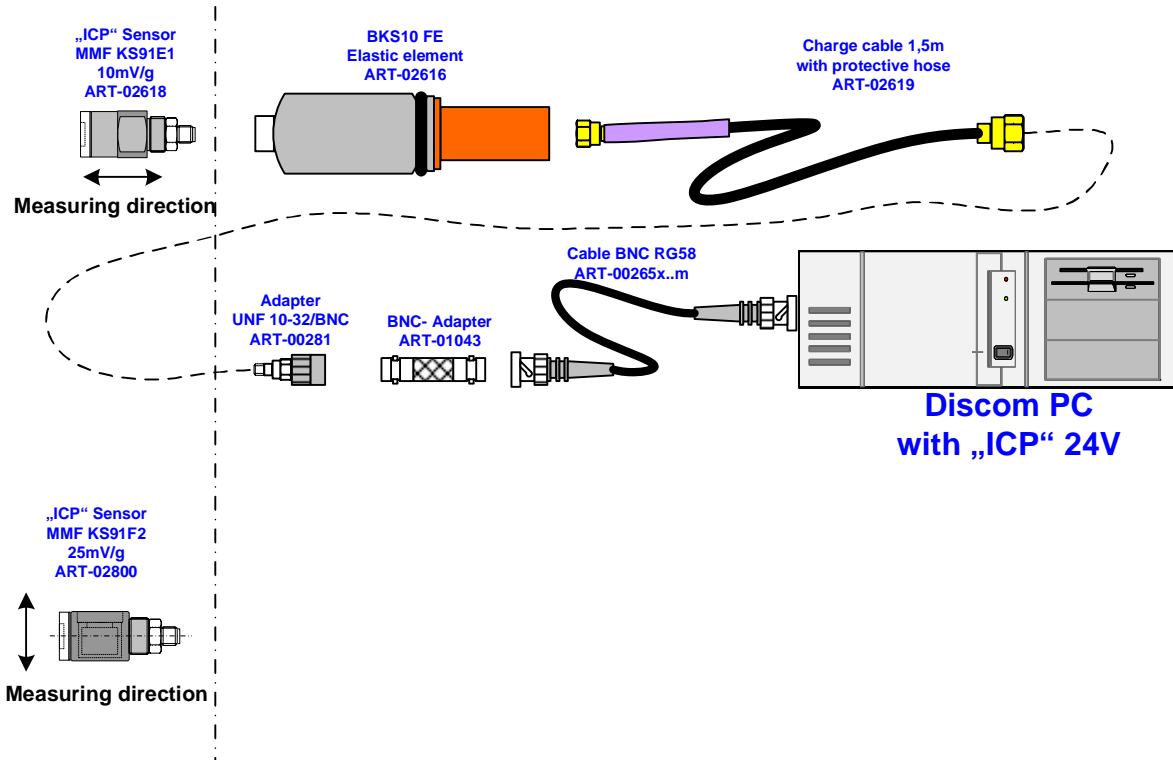
Minimum resonance due to small weight of 1,7 g and resonance absorption by silicon element.

Adapts to uneven surfaces.

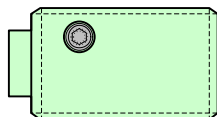
Preload advice.



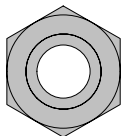
Components of BKS10



Supplies for all systems:



BKS10 Adapter
BKS10 / M27x1,5
ART-02612

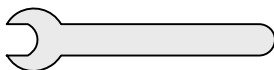


Lock nut
M27x1,5 DIN EN 24035
ART-02043

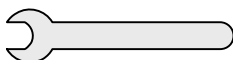


BKS10 Adapter
M3 / M6x0,5
ART-02623

Adapter to keep on using
KS91D, KS91E on BKS10



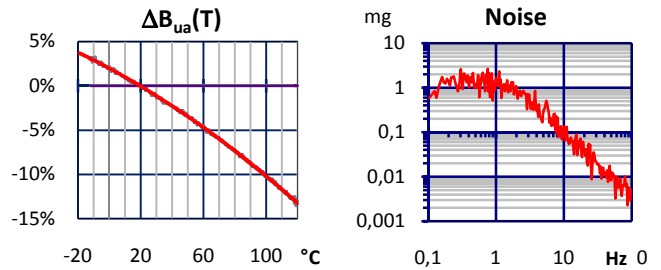
Spanner 8mm
ART-02657



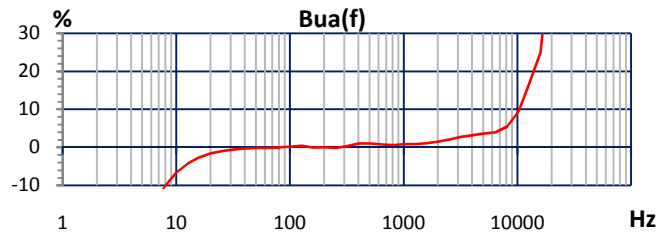
Spanner 7mm
ART-02732

KS91E1

- IEPE-Beschleunigungsaufnehmer mit ringförmiger, isolierter Tastfläche aus Edelstahl
- M6x0,5 Gewinde zur Befestigung des Tastkopfes
- Empfindlichkeit: 10 mV/g
- Hoher Dynamikbereich
- Hohe Resonanzfrequenz



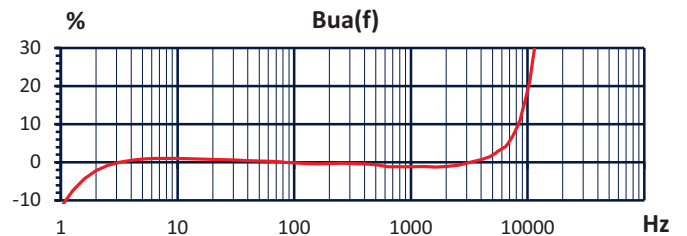
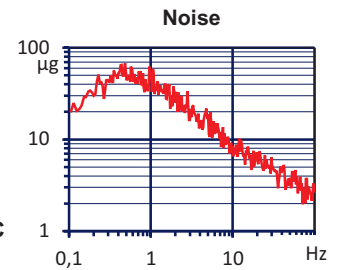
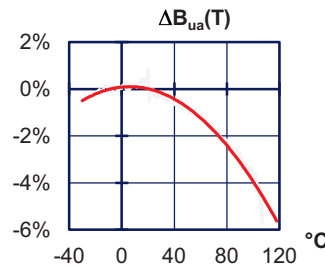
- IEPE accelerometer with ring-shaped, insulated probe made of stainless steel
- M6x0,5 thread to coupling the probe
- Sensitivity: 10 mV/g
- Wide dynamic range
- High resonant frequency



Arbeitstemperaturbereich	T _{min} /T _{max}	-20 / 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%	4... 18.000 8... 10.000 12... 8.000	Hz
Resonanzfrequenz • Resonant frequency	f _r	> 42 (+25dB)	kHz
Messbereich • Range	a ₊ / a ₋	± 700	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		IEPE kompatibel • IEPE compatible	
Konstantstromversorgung • Constant current supply	I _{CONST}	2..20	mA
Arbeitspunktspannung • Output bias voltage	U _{BIAS} @4mA; @25°C @Tmin @Tmax	10..12 +5 -15	V % %
Nichtlinearität • Total harmonic distortions	THD @a ₊ /a ₋	2	%
Ausgangsimpedanz • Output resistance	r _a @4mA	< 50	Ω
Untere Grenzfrequenz • Low cut-off frequency	f _{ug} -3dB	4	Hz
Störgrößen • Environmental characteristics			
Eigenrauschen • Residual noise	a _{n_RMS} (0,5 .. 20k)Hz	< 30	mg
	a _n @1 Hz	1000	μg ² /Hz
	@10 Hz	100	
	@100 Hz	10	
Temperaturkoeffizient der Empfindlichkeit • Temperature coefficient of sensitivity	TK(B _{ua}) @T< 20°C @T> 20°C	-0,10 -0,13	%/K
Temperatursprungempfindlichkeit • Temperature transient sensitivity	b _{aT}	0,15	ms ⁻² /K
Magnetfeldempfindlichkeit • Magnetic field sensitivity	b _{aB}	-	ms ⁻² /T
Mechanische Daten • Mechanical data			
Abmessungen • Dimensions	∅ / h	7,8 / 15,5	mm
Kopfflänsch für Sensoraufnahme • coupling flange	∅ / h	M6x0,5 / 2,2	mm
Masse ohne Kabel • Weight without cable	m	1,85	g
Gehäusematerial • Case material		Aluminium / Edelstahl • Stainless steel	
Kabelanschluss • Cable connection		axial	
Kontaktbuchse • Socket		Subminiatur M3 • Subminiature M3	
Befestigung • Mounting	Messkopf • probe	adhesive / antasten • touch	
Schutzgrad / Isolation • Protection grade / Insulation		- / Isolierter Messkopf • insulated probe	
Anschlusszubehör • Connection Accessories		054 / 013T / 017 / 016 + 051/x	
Befestigungszubehör • Mounting Accessories		002	
Passende Messgeräte • Suitable Electronics		M28 / M32 / M68 / M108 / M208 / M12 / VibroMetra	
Bestellinformation • Ordering Information		KS91E1: Aufnehmer mit B _{ua} ±10% • Sensor with B _{ua} ±10%	

KS91F2

- IEPE-Beschleunigungsaufnehmer mit ringförmiger, isolierter Tastfläche aus Edelstahl
- Messachse in **Querrichtung**
- M6x0,5 Gewinde zur Befestigung des Tastkopfes
- geringes Rauschen
- IEPE accelerometer with ring-shaped, insulated probe made of stainless steel
- Main sensitivity in **transverse direction**
- M6x0,5 thread to coupling the probe
- Wide dynamic range
- low noise level



Arbeitstemperaturbereich	T _{min} /T _{max}	-30 / 120	°C
Piezosystem • Piezo design		Schersprinzip • Shear design	
Spannungsübertragungsfaktor • Voltage sensitivity	B _{ua}	25 ± 20 %	mV/g
Messachse • Axis of main sensitivity		Querrichtung • Transverse direction	
Linearer Frequenzgang (am Messkopf) • Linear frequency range (on the probe)	±3dB ±10% ±5%	0,6... 12.500 1,1... 8.000 1,5 ... 6.800	Hz
Resonanzfrequenz • Resonant frequency	f _r	< 30 (+25dB)	kHz
Messbereich • Range	a ₊ / a ₋	± 240	g (pk)
Bruchbeschleunigung • Destruction limit	a _{max}	8000	g (pk)
Querrichtungsfaktor • Transverse sensitivity	C _{90max}	< 5	%
Keramikkapazität • Ceramic Capacitance	C _i	200	pF
Ausgang • Output		IEPE kompatibel • IEPE 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	0,6	Hz
Störgrößen • Environmental characteristics			
Eigenrauschen • Residual noise	a _{n,RMS} (0,5 .. 20k)Hz	< 1,5	mg
	a _n @1 Hz	60	μg/√Hz
	@10 Hz	15	
	@100 Hz	4	
Temperaturkoeffizient der Empfindlichkeit • Temperature coefficient of sensitivity	TK(Bua) @T=(-30..20)°C @T=(20..60)°C @T=(60..120)°C	± 0,01 - 0,03 - 0,05	%/K
Temperatursprungempfindlichkeit • Temperature transient sensitivity	b _{aT}	0,15	ms ⁻² /K
Magnetfeldempfindlichkeit • Magnetic field sensitivity	b _{aB}	2	ms ⁻² /T
Mechanische Daten • Mechanical data			
Abmessungen • Dimensions	∅ / h	□ 8,5 / 16	mm
Koppelflansch für Sensoraufnahme • coupling flange	∅ / h	M6x0,5 / 2,2	mm
Masse ohne Kabel • Weight without cable	m	2,6	g
Gehäusematerial • Case material		Aluminium / Edelstahl • Stainless steel	
Kabelanschluss • Cable connection		axial zum Tastkopf • axial to probe	
Kontaktbuchse • Socket		Subminiatur M3 • Subminiature M3	
Befestigung • Mounting		adhesive / antasten • touch	
Schutzgrad / Isolation • Protection grade / Insulation		- / Isolierter Messkopf • insulated probe	
Bestellinformation • Ordering Information	KS91F2: Aufnehmer mit B _{ua} ±20% • Sensor with B _{ua} ±20%		

