Microflown Technologies

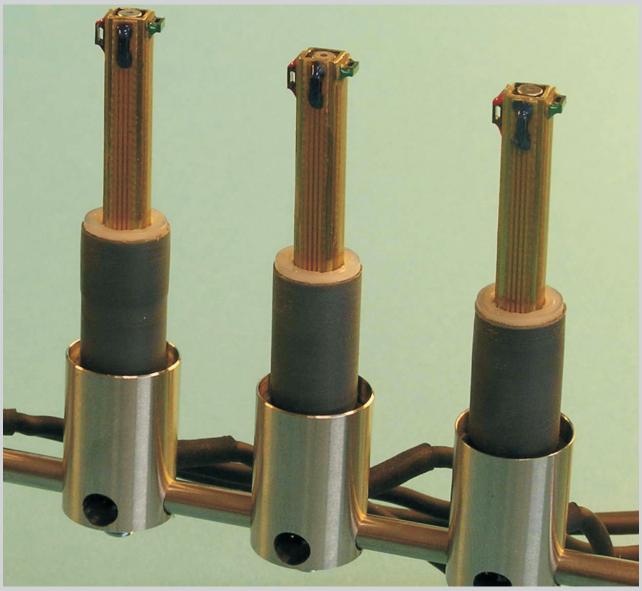
Charting sound fields **V1.0 2009-10**

Datasheet

USP mini

The three dimensional USP mini probe consists of a three orthogonally placed Microflown acoustical particle velocity sensors and a miniature sound pressure transducer (Knowles FG series).

The USP mini probe is mainly used as an AVS (Acoustic Vector Sensor). Acoustic vector sensors have come to play an increasingly significant role in this technology with application focus on border control, harbor protection, gunshot localization, and situation awareness.



Typical applications

- ✓ Sound intensity measurments
- ✓ Far field sound source localization
- ✓ Passive radar
- ✓ Sniper detection

Specification - USP mini

Sensor configuration:

- 3x Microflown Titan sensor element
- 1x miniature pressure microphone

Physical characteristics:

Diameter : ½ inch / 12,7mm
Length : 62mm
Weight : 30g

Electrical properties:

Powering : power is supplied by the MFSC-4, 4channel signal conditioner. The input is provided by 7pins lemo cable

Environment

Max. temperature: 60 Degrees Celcius

Acoustical properties microphone element

Frequency range : 20Hz - 20kHz
Upper sound level : 110dB
Polar pattern : omnidirectional
Directivity : omnidirectional

Acoustical properties Microflown element

Frequency range : 0.1Hz - 20kHz ± 1dB
Upper sound level : 135dB
Polar pattern : figure of eight
Directivity : directive

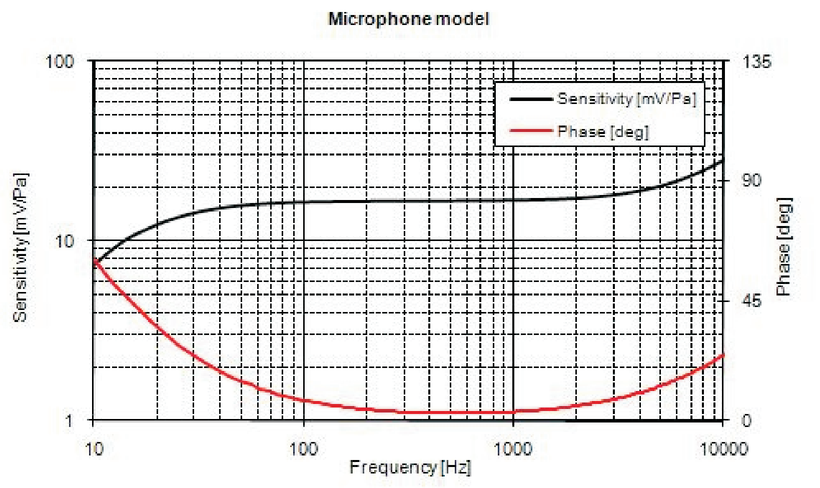
Model sound pressure microphone

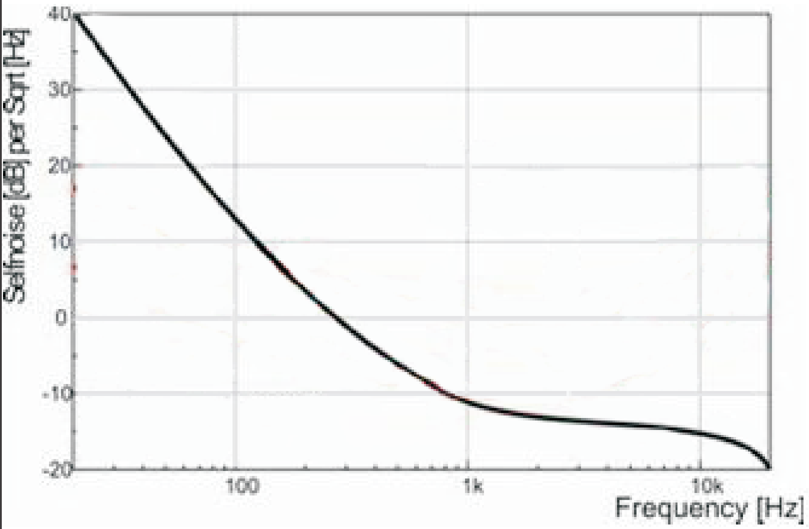
The sensitivity of the pressure microphone (independent of high/low gain or corrected/uncorrectede mode):

$$S_p[mV/Pa] = S_p@1kHz \frac{\sqrt{1+\frac{f^2}{f_{c3p}^2}}}{\sqrt{1+\frac{f_{c1p}^2}{f^2}}\sqrt{1+\frac{f_{c2p}^2}{f^2}}}$$

The phase of the pressure microphone (independent of high/low gain or corrected/uncorrectede mode):

$$\varphi_p[\deg] = \arctan\frac{C_{1p}}{f} + \arctan\frac{C_{2p}}{f} + \arctan\frac{f}{C_{3p}}$$





Parameters pressure equations		
Sensititivity:		
S_p @1kHz=	55,0	[mV/Pa]
Sensitivity cornerfrequencies		
fc1p=	30	[Hz]
fc2p=	15	[Hz]
fc3p=	10000	[Hz]
Phase cornerfrequencies		
C1p=	30	[Hz]
C2p=	15	[Hz]
C3p=	10000	[Hz]

Model Microflown sensor

The sensitivity in uncorrected mode:

$$S_u[mV/Pa^*]=\frac{S_u@250Hz}{\sqrt{1+\frac{f_{c1u}^2}{f^2}}\sqrt{1+\frac{f^2}{f_{c2u}^2}}\sqrt{1+\frac{f^2}{f_{c3u}^2}}\sqrt{1+\frac{f_{c4u}^2}{f^2}}\sqrt{1+\frac{f_{c5u}^2}{f^2}}}$$

The phase in uncorrected mode:

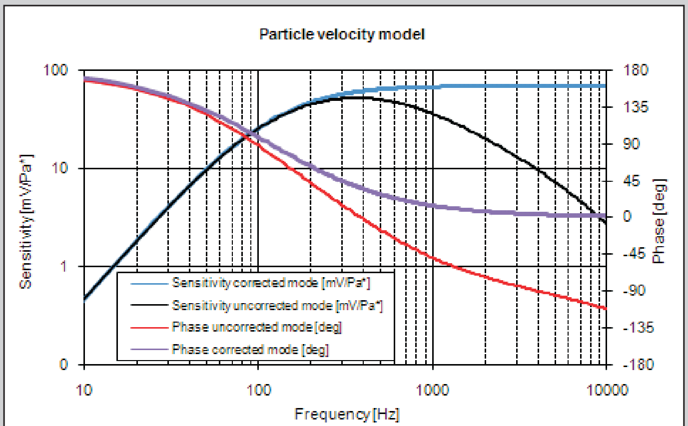
$$\varphi_u[\deg]=\arctan\frac{C_{1u}}{f}-\arctan\frac{f}{C_{2u}}-\arctan\frac{f}{C_{3u}}-\arctan\frac{C_{4u}}{f}+\arctan\frac{C_{5u}}{f}$$

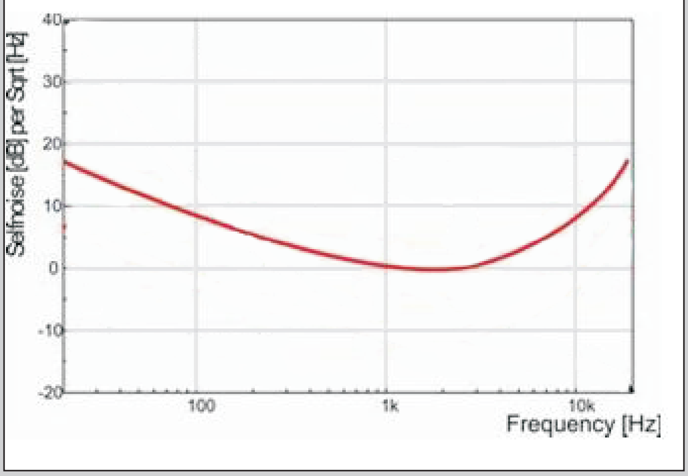
The sensitivity in corrected mode:

$$S_u[mV/Pa^*]=\frac{S_u@250Hz}{\sqrt{1+\frac{f_{c1u}^2}{f^2}}\sqrt{1+\frac{f_{c4u}^2}{f^2}}\sqrt{1+\frac{f_{c5u}^2}{f^2}}}$$

The phase in corrected mode:

$$\varphi_u[\deg]=\arctan\frac{C_{1u}}{f}+\arctan\frac{C_{4u}}{f}+\arctan\frac{C_{5u}}{f}$$





Parameters velocity equations		
Sensitivity in high gain:		
Su @250Hz=	25	[mV/Pa*]
Su @250Hz=	10	[V/(m/s)]
Sensitivity in low gain:		
Su @250Hz=	0,25	[mV/Pa*]
Su @250Hz=	0,1	[V/(m/s)]
Sensitivity cornerfrequencies		
fc1u=	150	[Hz]
fc2u=	600	[Hz]
fc3u=	10000	[Hz]
fc4u=	77	[Hz]
Phase cornerfrequencies		
C1u=	180	[Hz]
C2u=	700	[Hz]
C3u=	20000	[Hz]
C4u	77	[Hz]