

Datasheet

PU Match

PTN0/9

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PU MATCH (PTN)

New re-designed PU Match Sensor

PTN probes are available in 90 and 0 degree orientation

PU match probes are the smallest of the PU family; they are specially designed for high spatial resolution measurements.

The new probe housing makes them more resistant to shocks and a special anodized aluminum coating makes possible to use the sensor next to electronic components. The ergonomics of the housing has also been improved and made compatible with other accessories in the product family.

The electronics have been re-designed to ensure that the probe is more robust and stable against electric shock.

PTN probes combined with the new MFPA (2 to 24 channel) electronics provide a full solution for high accuracy measurements, allowing the user to measure as close as possible to a surface and provide accurate intensity measurements over the whole frequency range (20 Hz – 10 KHz).

I. PTN SENSORS

THE VELOCITY SENSOR

The particle velocity sensor is a platinum based MEMS. The Microflown™ consists of two tiny wires which are kept heated at a constant temperature of 200 °C degrees. Motion of the air surrounding the sensor produces a temperature shift. This temperature difference is proportional to the resistance of the wires, providing a broadband (0.1 Hz to at least 10 KHz) and linear signal proportional to the particle velocity.

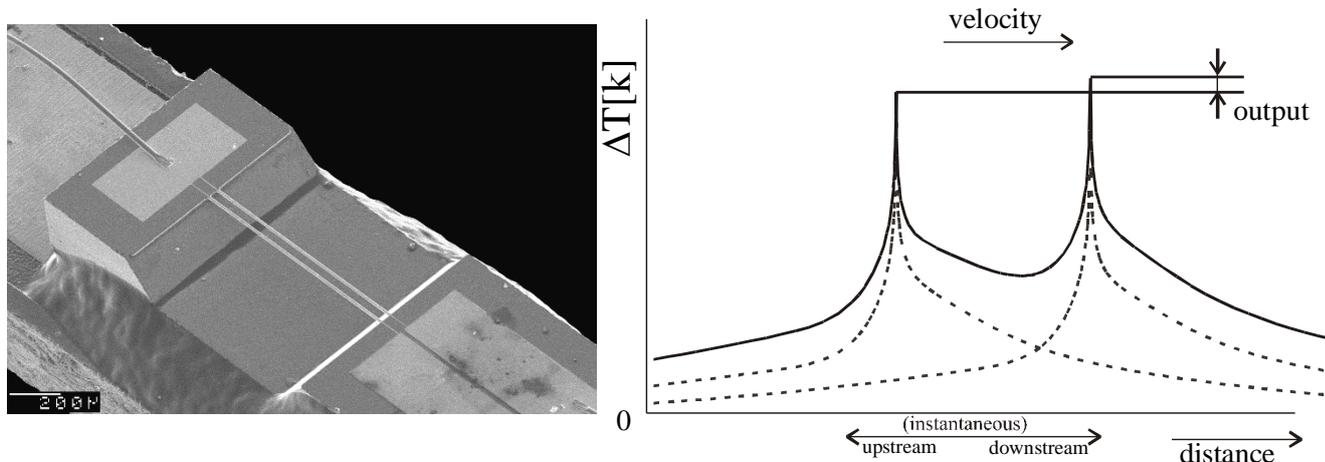


Figure 1. Sensor principle

THE PRESSURE SENSOR

The pressure microphone integrated into the probe is a MEMS Invensens INMP411.

The combination of both sensors enables the direct measurement of sound intensity and acoustic impedance.

II. CHARACTERISTICS TABLE

Parameter	Value	Unit/ note	
Physical			
Connector	4 pin Lemo	Microflown pinning	
Diameter	8.2	mm	
Length	59	mm	
Weight	5.5	g	
Outer body material	Anodized aluminum		
Probe Environmental Parameters			
Operative temperature range	-20 to 85	°C	
Pressure sensor Environmental Parameters			
Sensitivity variation due to humidity (40-80%)	>0.1	dB	
Velocity sensor Environmental Parameters			
Sensitivity variation due to temperature	< 0.015	dB/K	
Sensitivity variation due to humidity: (30-90%)	0.06	dB/%HR	
Sensitivity variation due to pressure: (1-0.82 bar)	<0.5	dB	
Measurement range Pressure sensor			
Maximum level range	131	dB [SPL ref: 20 e-5 Pa]	
Frequency response	28-20.000	Hz	
	0°	90°	
Nominal sensitivity	21	18	mV/Pa @ 1KHz
±1 dB	80-10.000	80-8.000	Hz
±2 dB	20-10.000	20-10.000	Hz

Measurement range Velocity sensor			
Maximum level range	130		dB [PVL ref: 50 nm/s]
Frequency response	0.1 – 10.000		Hz
	0°	90°	
Nominal sensitivity	12	10	V/ m/ s @ 250Hz
±1 dB	30-9.000	30-9.000	Hz
±2 dB	20-10.000	20-10.000	Hz

III. SYSTEM CHARACTERISTICS

DYNAMIC RANGE

The dynamic range of the measurement chain formed by the PU match probe (consisting of one particle velocity sensor and one pressure sensor) connected to the MFPA electronics is described by the following graph:

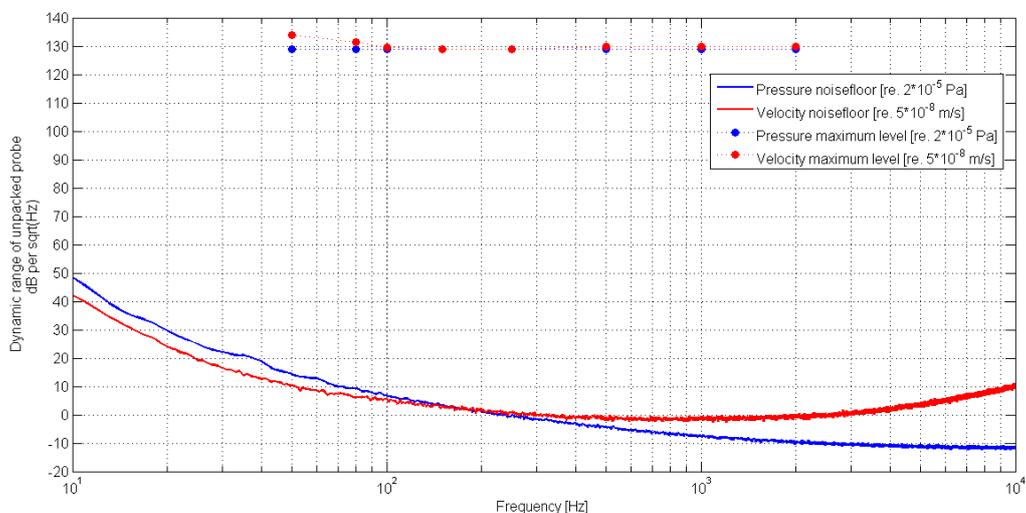


Figure 2. PTN probe and MFPA-2 dynamic range

RESPONSE MODEL

The magnitude and phase response for every probe is calibrated, modeled and compiled in the calibration report.

Below is an example of the response of both sound pressure and particle velocity sensors.

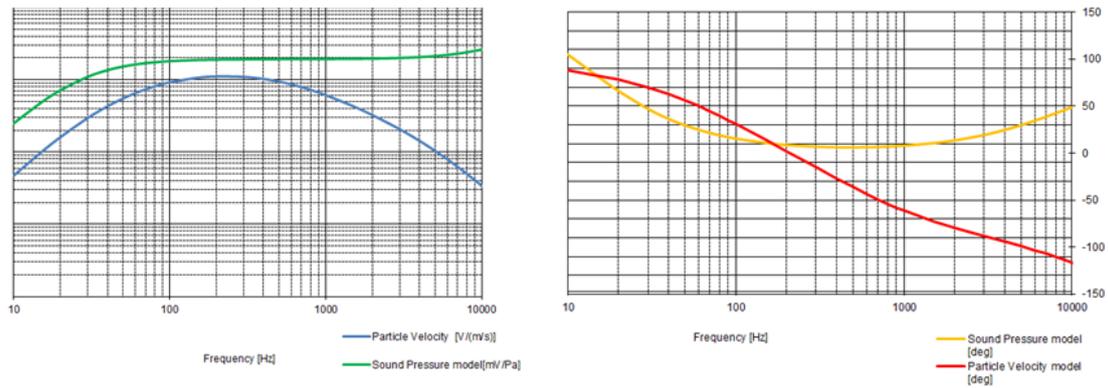


Figure 3. Typical PTN model

To correct for the particle velocity sensor behavior, the model of the inverse response needs to be applied in order to obtain a flat response across the whole usable frequency range.

- Frequency response: Signal [Volts] / S_u or S_p
- Phase response: Signal [Volts] - ϕ_u or ϕ_p

- **VELOCITY SENSOR MODEL:**

$$S_u \left[\frac{V}{m/s} \right] = \frac{S_u @ 250 \text{ Hz} \left[\frac{V}{m/s} \right]}{\sqrt{1 + \frac{f^2}{c_{1u}^2}} \sqrt{1 + \frac{f^2}{c_{2u}^2}} \sqrt{1 + \frac{f^2}{c_{3u}^2}} \sqrt{1 + \frac{f^2}{c_{4u}^2}}}$$

$$\phi_u [deg] = \arctan \frac{c_{1u}}{f} - \arctan \frac{f}{c_{2u}} - \arctan \frac{f}{c_{3u}} + \arctan \frac{c_{4u}}{f}$$

- **PRESSURE SENSOR MODEL:**

$$S_p \left[\frac{mV}{Pa} \right] = S_p @ 1 \text{ KHz} \frac{\sqrt{1 + \frac{f^2}{c_{3p}^2}}}{\sqrt{1 + \frac{f^2}{c_{1p}^2}} \sqrt{1 + \frac{f^2}{c_{2p}^2}}}$$

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

DIRECTIVITY

- **VELOCITY SENSOR:**

The polar pattern of the Particle Velocity sensor has a figure of eight response (green in figure 4).

- **PRESSURE SENSOR:**

The polar pattern of the Sound Pressure sensor has an omnidirectional response as shown by the red line in figure 4.

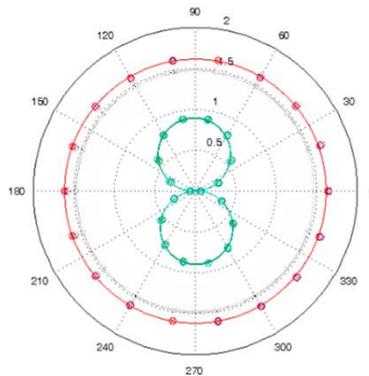


Figure 4: PTN polar pattern

DC-FLOW

The maximum level of DC-flow that the U sensor in the PU match probe can withstand is consistent with 1 m/s wind speed.

RECALIBRATION

The PU sensors require a qualified calibration every 2 years.

IV. USAGE AND PRECAUTIONS



- Do not submerge the electronics in water as this will lead to permanent damage.
- Only use the 4 pin to 7 pin Lemo cable supplied with the kit. Any modifications to this cable or the use of cables of a different brand or type may result in permanent damage to the probe or the signal conditioner.
- The PU match probe must be powered via a Microflown™ signal conditioner, the new MFPA series or the prior MFSC/ Router. Do not power the sensor with any other device; this might cause permanent damage to the system.
- Access exposure to dust/dirt particles could damage the Microflown™ sensor.

V. TECHNICAL SUPPORT

For any problem or doubt with your equipment, please contact Microflown™ Technologies Customer service:

- Mail: cs@microflown.com
- Skype: cs.microflown
- Telephone: +31(0) 88 001 08 11 Monday to Friday, from 9:00 to 17:00 (UTC+1).

VI. WARRANTY POLICY, REPAIRS AND REPLACEMENTS

WARRANTY AND REPLACEMENT OR SUBSTITUTION

During the first two years (24 months) the seller offers a warranty on all its products, except for trading items and third party manufactured items. The seller warrants that all products will be free from defects in materials and workmanship for this period of two years. During this two year period, the seller will repair or replace defect products free of charge. Products damaged by accident, abuse, misuse, natural disaster or by any unauthorized disassembly, repair or modification are not covered by this warranty. The incurred transportation costs of returning the products to seller will be borne by the buyer. The logistical cost for returning the products back to the buyer will be borne by the seller. Several products come with a “VOID if seal is broken” sticker, the warranty is void at all times when this sticker is broken.

GRACE PERIOD (YEAR 3 AND 4)

During the third and fourth year the seller offers a grace period. In the grace period the products purchased at an earlier date can be replaced by completely new state of the art products of the same scope of the original purchase. This applies only for the products known as standard probes and signal conditioners. In the first year of the grace period, (year 3) customers have an option to replace their products for 25 % of the actual ex works end-user price. The full freight and packaging charges apply.

In the second year of the grace period, (year4) customers have an option to replace their products for 50 % of the actual ex works end-user price. The full freight and packaging charges apply.

The new products are accompanied by a new warranty. Both the two years warranty and grace period become applicable again from the date of invoice.

REPAIRS OUTSIDE WARRANTY POLICY

Replaced/repared parts come with a six month warranty under the same conditions as the two year warranty.