

iProbe

instantaneous flow measurement with a multi-hole probe has never been easier and faster.





-  Digital multi-hole probe, with onboard data processing and direct output of engineering values: a turn-key flow probe
-  Slim design compatible with 1, 3, 5, 7 and 14-hole probe heads
-  Robust design with stainless steel housing and Lemo Connector
-  Data acquisition and Power via USB



Figure 1: iProbe

iProbe	
General	
Weight probe shaft	190 g
Weight probe head	Typical head 60 g
Dimensions probe shaft	Ø20 mm x 240 mm (5-hole probe version)
Dimension probe head	Typical head 100 mm x 20 mm
Probe Options	1, 3, 5 and 14-hole probe heads
Temperature Measurement	PT100
Environmental Conditions	
Operating temperature	-20 ... 70°C (-4 ... 158°F)
Operating medium	Air and other non-corrosive gases
Humidity	0 ... 95%, non-condensing

General

The iProbe is a compact turn-key solution for directional flow and pressure measurements. The setup can be used with any laptop, in field or laboratory environment. The setup comes with VectoVis Pro, which allows to monitor and record engineering data in real time.

Probe head options

The iProbe, is configurable in different multi-hole probe configurations. This includes 2D probes such as 3-hole probes, as well as 3D probes such as 5-; 7; or 14-hole probes. The measurement opening angle increases with the number of holes from 120°, to 140°, to 320°. The pressure distribution on the tip will be correlated to individual wind tunnel calibrations to determine, static pressure, total pressure and the velocity components/flow angles.

The probe can be equipped with freely customized probe shapes, due to the design freedom in additive manufacturing. Shape and size can hence be adapted to any installation or access to flow path situation.



Figure 2: Shape examples (top to bottom: micro probe, cobra probe, straight probe, L-shaped probe)

The iProbe is also available with optical tracker and compatible to Streamwise ProCap System. (<https://www.streamwise.ch/procap/>)

Pressure Acquisition

Pressure acquisition	1 to 14 differential pressure sensors with variable pressure ranges (multiple pressure sensor ranges in one device with automatic switching between the sensors for optimal measurement accuracy at all air speeds)
Pressure sensor accuracy	Max. +/- 0.25% full scale (typical +/- 0.1%)
Absolute pressure acquisition	Barometric or absolute pressure sensor

Sensor options

Differential Pressure Range (kPa)	Max. Mach Number
0.16	0.05
0.25	0.06
0.4	0.07
0.6	0.09
1	0.12
1.6	0.15
2.5	0.19
4	0.24
6	0.29
10	0.37
16	0.47
25	0.59
40	0.75
60	0.91

Measurement errors

Pressures (raw)	0.1% FS (typical)
Flow angles	< 1°
P_{tot} (total pressure)	< 0.5%
P_s (static pressure)	< 0.5%
Velocities	< 0.5 m/s (1.6ft/s) or < 0.5%, whichever is larger
Temperatures	< 1 K
Alt (Altitude)	< 1 m (3.3 ft)
Frequency Response	Default 50Hz, Thin and long probes might require dynamic corrections

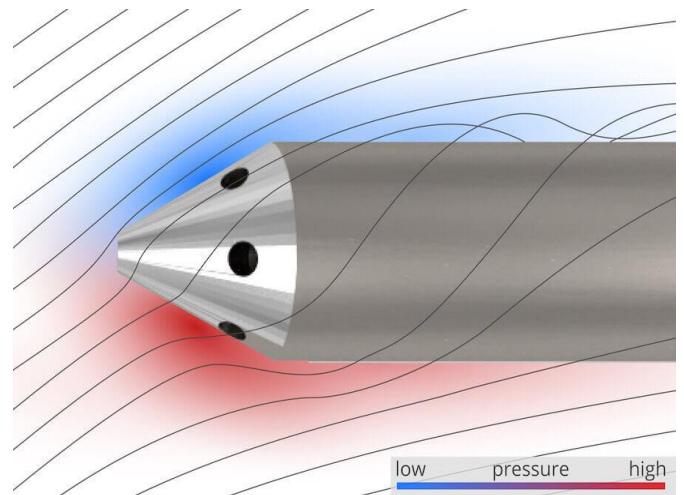


Figure 3: pressure distribution around a multi-hole prob

Interfaces

USB	Communication with host PC (for setup and data acquisition)
Power	5V via USB
Communication	USB
Pressure reference port	Metal tube for reference pressure D=1.3mm
Cable (included)	Lemo (FGG.0B.307.CLAD52Z) to USB

Probe Configuration

Geometry	Straight, L-shaped, Cobra, Drilled elbow
Number of holes	1, 3, 5, 14, plus static ring
Max. length	Up to 280 mm (one part) (>280 mm for multipart designs)
Min. tip diameter	1 mm (Standard 3 mm)
Tip geometry	Conical, spherical or custom
Material	Stainless steel, Titanium, Inconel, plastic
Fastening	Square, hexagonal, one-sided flattened cylinder or custom
Reference	Reference surface normal to Z
Temperature	-20 - 70°C (extension possible)

Sensors and Electronics

The iProbe is equipped with 1 to 14 differential pressure channels, and one absolute or barometric pressure port, which is the reference for the differential sensors at the same time. Each pressure channel range can be individually customized to the prevailing flow conditions. The temperature-compensated

pressure transducers feature high accuracy and a minimal offset drift. Due to the extremely high proof pressure it is possible to overload the sensors without damage.

The sensors can be customized on request, e.g. multiple pressure sensor ranges and automatic switching in between them can be installed to optimize the pressure measurement accuracy and hence the accuracy of the flow values.

A tare function can be triggered by a software command to rezero the pressure sensors.

The grounding of the device is generally recommended.

PC communication

The data can be transmitted via USB or RS232 interface. The transmission rate can be set in the range between 1 and 50 Hz. A 5V power supply can be provided simply via USB.

When connected via USB the pressure scanner identifies itself to the host PC as virtual COM port. Thus, any software supporting serial protocols can be used for communication.

If unknown, the appropriate COM-port can be identified, using the Windows® Device Manager.

We recommend using the HTerm software for the configuration of the probe, see manual. The data acquisition can be done with VectoVis, where e.g. a live view of all data and data recording function in readable file formats such as csv is available.

Outputs

The following output values are available from the device:

Outputs (CAN and USB)	
Name	Unit
P_{1...P₅} [P₁₄] differential	[Pa] or [psi]
P_{abs} absolute	[Pa] or [psi]
T_{tc} (Temperature RTD)	[°C]
Theta (cone angle)	[°]
Phi (roll angle)	[°]
Alpha (angle of attack)	[°]
Beta (yaw angle)	[°]
V_{mag} (abs. velocity)	[m/s] or [ft/s]
u (x component of velocity)	[m/s] or [ft/s]
v (y component of velocity)	[m/s] or [ft/s]
w (z component of velocity)	[m/s] or [ft/s]
P_{tot} (total pressure)	[Pa] or [psi]
P_s (static pressure)	[Pa] or [psi]
ρ (air density)	[kg/m ³] or [lb/gal]
T_{tot} (total temperature)	[°C] or [°F]
T_s (static temperature)	[°C] or [°F]
M (mach number)	[-]
Alt (altitude)	[m] or [ft]
AltAbs (absolute altitude)	[m] or [ft]
Num (counter)	[-]
Error	[-]

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