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 units: a plug & play flow measurement device

- Slim design compatible with 3- and 5-hole probe heads

- Robust design with stainless steel housing and Lemo connector

- Data acquisition and power via USB

General	
Mass probe tube	170 g
Mass probe head	Typ. 90 g
Mass total	~400 g (L-shaped version)
Dimensions probe tube	Ø 20 mm x 258 mm *(5-hole probe version)*
Dimension probe head	Typ. 200 mm x 27 mm
Probe options	3- and 5-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 plug & play solution for flow and pressure measurements. The setup can be used with any laptop, in field or laboratory environment. Optionally, the setup can be purchased along with *VectoVis Pro*, which allows you to monitor and record engineering data in real time.

Figure 1: iProbe rendering.

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-hole probes. The pressure distribution on the probe 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 head 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: cobra probe, straight probe, L-shaped probe).

The iProbe is also available with optical trackers and compatible with Streamwise *ProCap* System.

(see: https://procap.tech/)

Pressure Acquisition

Pressure acquisition	up to 5 differential pressure sensors with variable pressure ranges
Pressure sensor accuracy[1]	Max. +/- 0.25 % full scale Typ. +/- 0.1 % full scale
Absolute pressure acquisition	Barometric pressure sensor

[1] *All pressure sensors are calibrated to improve overall accuracy. Uncalibrated sensors would have a full-scale accuracy of max. +/- 2.0 %.*

Sensor Options

Differential pressure range (kPa)	Max. Mach number
0.25	0.06
0.50	0.09
1.25	0.13
2.50	0.19
7.50	0.32

Measurement Errors

Flow angles	< 1°
Velocities	< 1.0 m/s or < 1.0 %, whichever is greater
Temperature	< 1 K

Interfaces

Communication	USB for communication with host PC (setup and data acquisition)
Power	5 V via USB
Pressure reference port	Metal tube for reference pressure with Ø 1,6 mm
Probe end connector	Lemo (EGG.0B.307)
Cable (included)	5m Lemo cable (FGG.0B.307 to USB)
Sampling rate	up to 50 Hz

Sensors and Electronics

The iProbe is equipped with up to 5 differential pressure sensors for the probe tip, and one barometric pressure sensor which is used as a reference pressure for the differential pressure sensors. All differential pressure sensors can be selected by pressure range. The temperature-compensated pressure transducers feature high accuracy and a minimal offset drift. The high proof pressure provides sufficient protection against accidental overloads.

Probe Configuration

Geometry	Straight, L-shaped, Cobra
Number of holes	3 or 5
Max. probe head length	Up to 280 mm (one part) >280 mm (multipart designs)
tip diameter	Typ. 3 mm … 5 mm
Tip geometry	Conical
Material	Stainless steel, Titanium, Inconel
Fastening	Hexagonal, one-sided flattened cylinder
Reference	Reference surface normal to Z axis
Temperature range	-20 … 70°C

PC Communication

The data can be transmitted via USB. The transmission rate can be set up to 50 Hz. A power supply at 5 V can be provided simply via USB.

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

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:

Outputs[2]	
Name	**Unit**
$P_1…P_5$ (differential pressure)	Pa
P_{abs} (absolute pressure)	Pa
Ttc (temperature of RTD)	°C
Theta (cone angle)	°
Phi (roll angle)	°
Alpha (angle of attack)	°
Beta (yaw angle)	°
V_{mag} (velocity magnitude)	m/s
u (x-component of velocity)	m/s
v (y-component of velocity)	m/s

w (z-component of velocity)	m/s
P_d (dynamic pressure)	Pa
P_s (static pressure)	Pa
ρ (air density)	kg/m³
T_{tot} (total temperature)	°C
T_s (static temperature)	°C
M (Mach number)	-
Alt (baro altitude)	m
AltAbs (absolute altitude)	m
Num (counter)	-
Error	-

[2] *Details see Manual*