





## Omni-iProbe

*Instantaneous omnidirectional flow measurement has never been easier and faster.*

Digital 14-hole probe with onboard data processing and direct output of engineering units: a plug & play flow measurement device.

-  Slim, aerodynamic design optimized for omnidirectional measurements
-  Robust with stainless steel housing and LEMO connector
-  Data acquisition and power via USB
-  Compatible with *VectoVis Pro* Software for acquisition, visualization, and evaluation

General	
Mass probe tube	250 g
Mass probe head	Standard-head 150 g
Mass total	~460 g
Dimensions probe tube	Ø 25 mm x 302 mm
Dimension probe head	Typical head 200 mm
Probe Head Type	Spherical 14-hole head
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 Omni-iProbe is a compact plug & play solution for omnidirectional flow and pressure measurements. The setup can be used with any laptop, in a 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: Omni-iProbe

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 Omni-iProbe can be calibrated for up to 3 different Mach numbers at a time.

The Omni-iProbe is also available with optical trackers and compatible with Streamwise's ProCap System.

(See: <https://procap.tech/>)

Pressure Acquisition	
Pressure acquisition	14 differential pressure sensors with variable pressure ranges
Pressure sensor accuracy <sup>1</sup>	Max. +/- 0.10 % full scale Typ. +/- 0.05 % full scale
Absolute pressure acquisition	Barometric pressure sensor

<sup>1</sup> 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. velocity (m/s) <sup>2</sup>
0.25	20.0
0.50	28.5
1.00	40.5
2.50	63.5
5.00	89.5
10.0	125.5

<sup>2</sup> At standard atmosphere

### Measurement Errors

<b>Flow angles</b>	< 1° (typical)
<b>Velocities</b>	< 1 m/s or < 1 %, whichever is greater
<b>Temperature</b>	< 1 K

### Interfaces

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

### Probe Configuration

<b>Geometry</b>	Straight
<b>Number of holes</b>	14
<b>Max. probe head length</b>	Up to 280 mm (one part) > 280 mm (multipart designs)
<b>Tip diameter</b>	Typ. 7.5 mm
<b>Tip geometry</b>	Spherical
<b>Material</b>	Stainless steel
<b>Fastening</b>	One-sided flattened cylinder
<b>Reference</b>	Reference surface normal to Z axis
<b>Temperature range</b>	-20 ... 70°C

### Sensors and Electronics

The Omni-iProbe is equipped with 14 differential sensors for the probe tip pressures and one barometric sensor which is used as reference for the differential sensors. The pressure range of all differential sensors is customizable based on the desired Mach numbers. The sensors are temperature-compensated in a range of 0 to 60°C and feature high accuracy and a minimal offset drift. Moreover, the sensors are calibrated with a high-precision reference to reduce uncertainty and increase accuracy. A high proof pressure provides sufficient protection against accidental overloads.

### PC Communication

The data can be transmitted via USB. The transmission rate can be set up to 50 Hz. Power supply at 5 V may simply be provided 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 several functions are available, such as a live view of all data or a data recording in readable file formats such as CSV.

### Output

The following output values are available:

Output <sup>3</sup>	
Name	Unit
<b>P<sub>1...P<sub>14</sub></sub> (differential pressure)</b>	Pa
<b>P<sub>abs</sub> (absolute pressure)</b>	Pa
<b>T<sub>tc</sub> (temperature of RTD)</b>	°C
<b>Theta (cone angle)</b>	°
<b>Phi (roll angle)</b>	°
<b>Alpha (angle of attack)</b>	°
<b>Beta (yaw angle)</b>	°
<b>V<sub>mag</sub> (velocity magnitude)</b>	m/s
<b>u (x-component of velocity)</b>	m/s
<b>v (y-component of velocity)</b>	m/s
<b>w (z-component of velocity)</b>	m/s
<b>P<sub>d</sub> (dynamic pressure)</b>	Pa
<b>P<sub>s</sub> (static pressure)</b>	Pa
<b>ρ (air density)</b>	kg/m <sup>3</sup>
<b>T<sub>tot</sub> (total temperature)</b>	°C
<b>T<sub>s</sub> (static temperature)</b>	°C
<b>M (Mach number)</b>	-
<b>Alt (barometric altitude)</b>	m
<b>Alt<sub>Abs</sub> (absolute altitude)</b>	m
<b>Num (counter)</b>	-
<b>Error</b>	-

<sup>3</sup> Details see *Omni-iProbe manual*