VECTOFLOW

DATA SHEET

Omni-iProbe

PRODUCT NAME

Omni-iProbe

TYPE

14-hole omni-directional probe with integrated air data system

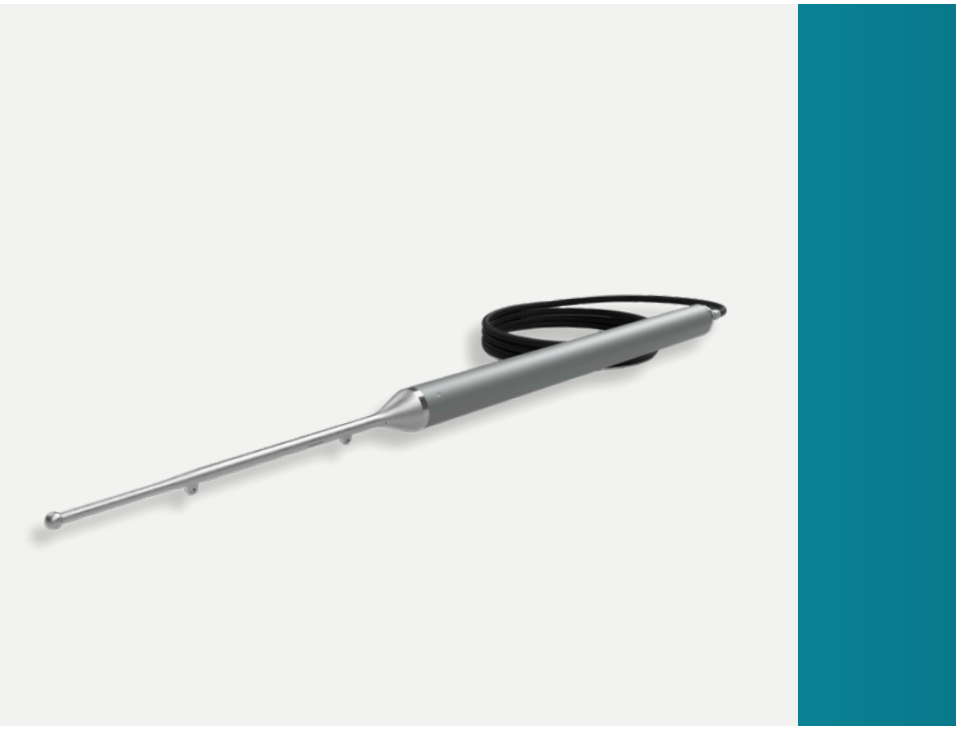

Fig. 1 *Omni-iProbe 14-hole probe head*

Fig. 2 *Close-up of the Omni-iProbe*

DESCRIPTION

The *Omni-iProbe* is a compact plug & play solution for flow measurements. It is a 14-hole probe with sensors and microcontroller for data processing and direct output of digital engineering units. The omnidirectional probe head allows the measurement of flow angles up to 160°, making it particularly useful for applications where the angle of attack is unknown or reversed flows are expected. The setup can be used with any laptop, in field or laboratory environments. Optionally, the *Omni-iProbe* can be purchased along with VectoVis Pro, which allows the user to monitor and record engineering data in real time.

The *Omni-iProbe* is also available with optical trackers, making it compatible with the ProCap System from Streamwise.

GEOMETRY & DESIGN

Probe head shape	Straight
Probe tip geometry	Spherical
Probe head type	14-hole
Mass	~460 g
Extension tube dimensions	302 mm × Ø 25 mm
Head dimensions	200 mm
Probe tip diameter	7.5 mm
Fastening	One-sided flattened cylinder
Reference	Reference surface normal to Z axis
Temperature sensor	Pt100
Material	Stainless steel

OPERATING CONDITIONS

Operating temperature	–20 … 70 °C (–4 … 158 °F)
Operating medium	Air and other non-corrosive gases
Humidity	0 … 95 %, non-condensing

CALIBRATION

The pressure distribution on the probe tip is correlated with individual wind tunnel calibration data to determine the static and total pressures, the flow angle of attack, and the components of the flow velocity. The *Omni-iProbe* can hold calibration data for up to 3 different Mach numbers (maximum Mach 0.3).

SENSORS AND ELECTRONICS

The *Omni-iProbe* is equipped with fourteen calibrated differential pressure sensors which measure the pressures at the probe tip. The reference for these differential measurements is provided by an onboard barometric/absolute pressure sensor. Temperature measurements are provided by means of an integrated Pt100 sensor.

All pressure sensors are temperature-compensated and feature high accuracy and minimal offset drift. They offer a high proof pressure, providing sufficient protection against accidental overloads. The pressure sensor range is configurable based on the customer application.

PRESSURE ACQUISITION

Pressure acquisition	14 differential pressure sensors (customizable ranges)
Absolute pressure acquisition	On-board barometric / absolute pressure sensor
Pressure sensor accuracy[1]	Max. ±0.10% full scale Typ. ±0.05% full scale

[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	0.08
1.00	0.12
2.50	0.18
5.00	0.25
10.00	–

MEASUREMENT ERRORS

Flow angles	< 1° (typical)
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)	5 m (FGG.0B.307 to USB)
Sampling rate	up to 50 Hz

PC COMMUNICATION

Data can be read from the *Omni-iProbe* via USB at a transmission rate of up to 50 Hz. The same USB connection is also used to power the device.

When connected via USB, the *Omni-iProbe* identifies itself to the host PC as a virtual COM port. Thus, any software supporting serial protocols can be used for communication. Data may also be acquired with VectoVis Pro, where e.g., a live view of all data is available and can be recorded in readable file formats such as *.csv.

OUTPUTS[2]

Name	Unit
$P_1 \ldots P_{14}$ (differential pressure)	Pa
P_{abs} (absolute pressure)	Pa
T_{tc} (temperature of Pt100)	°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*