VECTOFLOW

DATA SHEET

Omniprobe

PRODUCT NAME

Omniprobe

TYPE

14-hole omnidirectional probe

Fig. 1 *Close-up of Omniprobe probe head*

Fig. 2 *Mechanical interface: one-sided flattened cylinder*

DESCRIPTION

The *Omniprobe* from Vectoflow is a 14-hole omnidirectional probe which allows the measurement of flow angles up to 160°. The *Omniprobe* is particularly suited for applications where the flow angle of attack is unknown, or even reverse flows are expected. Like all Vectoflow probes, the *Omniprobe* is produced by addictive manufacturing, making the geometry highly flexible while maintaining robustness.

TYPICAL APPLICATIONS

- Wind tunnel aerodynamic testing with large flow angles
- Swirl and recirculation mapping in turbomachinery
- Aircraft and UAV air-data development
- Automotive and industrial aerodynamic research
- ...as well as further industrial and research applications.

GENERAL

Probe head shape	Straight, L-shaped
Number of pressure ports	14
Maximum length	Up to 200 mm (one part design) > 200 mm (multipart design)
Probe tip diameter	> 7.5 mm
Probe tip shape	Spherical
Materials	Stainless steel, Inconel, Titanium
Fastening options	Hexagonal, square, one-sided flattened cylinder, or custom
Connections	Standard 1 mm tubing
Reference	Reference surface normal to Z axis

OPERATING CONDITIONS

Operating Temperature	Up to 600°C (depending on probe material)
Humidity	0 ... 95 %
Medium	Air and other non-corrosive gases

MEASUREMENT RANGE

Angular range	±160°
Angular accuracy	< ±1°
Velocity range[1]	~4 m/s ... 100 m/s
Velocity accuracy	±1 m/s or 1% of the measured velocity, whichever is higher
Mach number range[2]	Ma 0.01 ... Ma 0.30

[1] *As obtained in ISA conditions (15°C, static pressure 101.325 kPa)*

[2] *Calibration up to Ma 0.3, measurements possible at higher Mach numbers*

ERROR MITIGATION

Like any flow measurement probe, the measurement error of an *Omniprobe* largely depends on the pressure scanner used for the calibration and data acquisition. Vectoflow recommends the use of a scanner whose pressure range just covers the expected dynamic pressure, and whose maximum error is 0.1% full scale (FS) or smaller.

The lower the velocity, the higher becomes the impact of the pressure measurement error on the determination of the flow velocity. An example for a scanner with a maximum error of 0.05% FS is shown in Figure 2. An error of 1 m/s or 1% of the measured velocity whichever is higher— is expected at higher speeds. For lower speeds, the error depends on the pressure scanner.

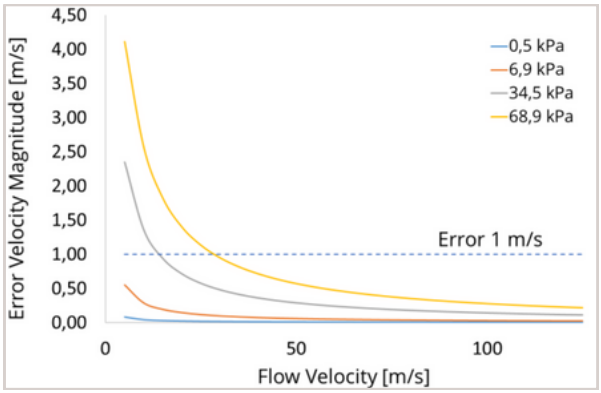

Fig. 3 Velocity measurement error dependence on pressure scanner range (for a scanner with 0.05% FS accuracy)