DATA SHEET

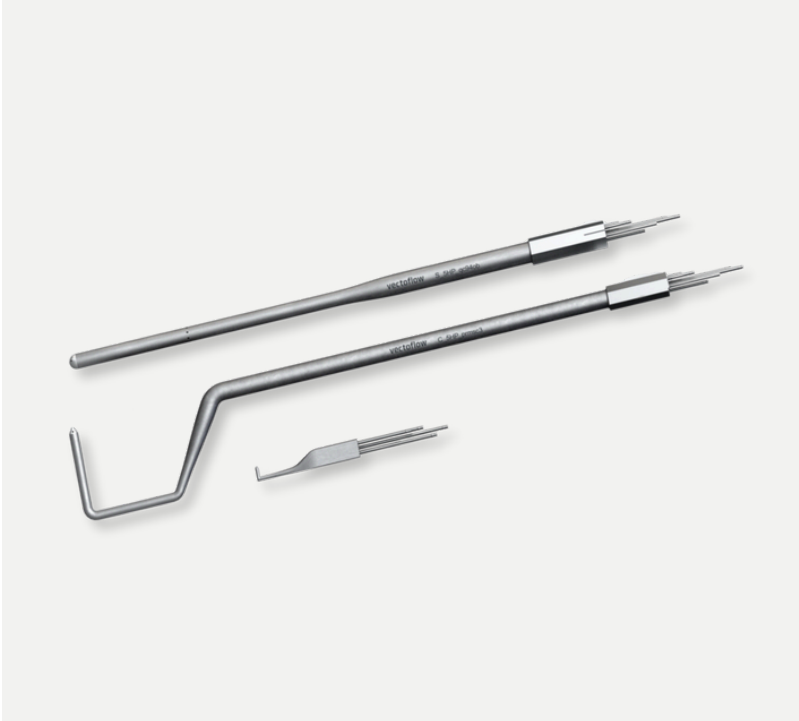
Multi-Hole Probe

PRODUCT NAME

Multi-Hole Probe

TYPE

Multi-Hole Probe



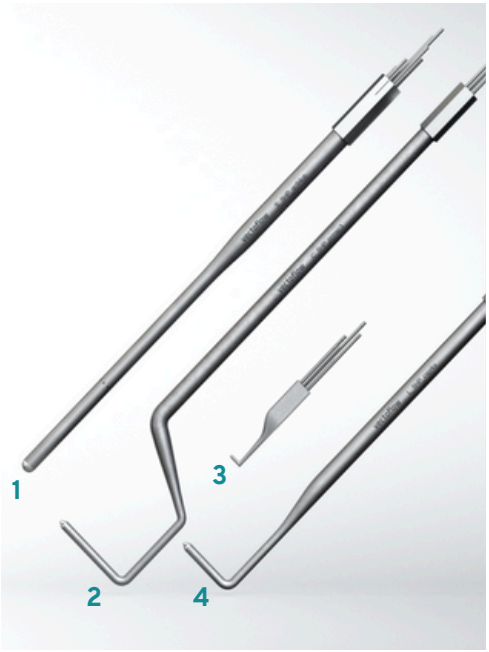


Fig. 1 *Various multi-hole probes: Straight probe (1), Cobra probe (2), Micro probe (3), L-shaped probe (4)*

DESCRIPTION

Fully customizable anemometry probes

The multi-hole probes from Vectoflow range from 3-hole over 5-hole up to 7-hole probes for larger flow angles up to ±60°. They are used in a large variety of applications like motor sports, turbomachinery, and drones.

They are made by additive manufacturing, giving a high geometrical flexibility and a very high robustness at the same time. The probes are generally built out of one piece, with no internal tubing or welding, avoiding any internal leakage and assuring a long lifetime.
Vectoflow offers a high level of customization, allowing our probes to be adapted to every specific use case.

GENERAL

Probe geometry	Straight, L-shape, Cobra, Rake
Head geometry	Cone, 4-sided die, Kiel, hemi-spherical, custom
Max. length	< 100 mm (one part) > 100 mm (multipart designs)
Min. typ. diameter	≥ 3 mm (micro > 1.6 mm)
Material	Stainless steel, Titanium, Inconel
Connections	Ø1 mm, Ø1.6 mm pressure tubes, custom
Fastening	Square, hexagonal, one-sided flattened cylinder, custom shape
Reference surface	Reference surface normal to Z-axis
Optional	Geometry-dependent frequency calibration; Temperature measurements (Thermocouple or Pt100)

MEASUREMENT

Temperature range	> 800°C (higher on request)
Max. angular range	± 60°
Angular accuracy	< 1°
Mach number range	Ma = 0.01 to Ma = 0.95
Velocity range (ISA)	V = 3.4 m/s to V = 323 m/s
Velocity accuracy	< 1 m/s

MEASUREMENT ERROR

The measurement error of a multi-hole probe is highly dependent on the pressure scanner used for the calibration and data acquisition.
We recommend the use of a scanner whose pressure range just covers the expected dynamic pressure, with an accuracy of 0.1% FSS or better.
The lower the velocity, the higher becomes the impact of the pressure measurement error on the determination of the flow velocity, as shown in Figure 2 (for a scanner accuracy of 0.05% FSS).
Generally, 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 and increases the lower the speed.

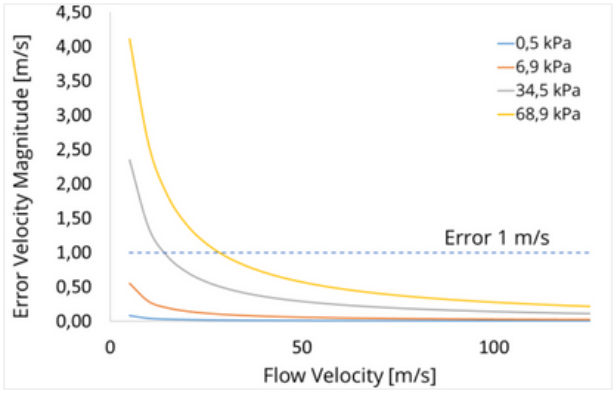


Fig. 2 Velocity measurement error as a function of the flow velocity for pressure scanners with different ranges at 0.05% FSS each