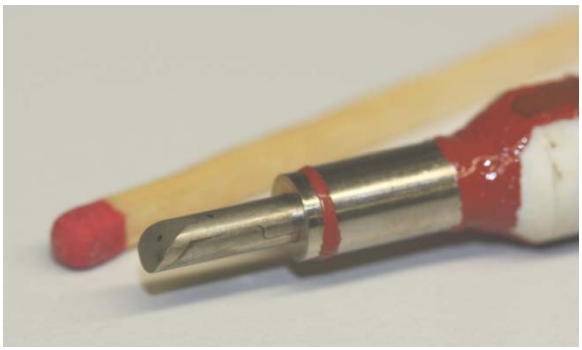
Model FRAP-HTH
Fast-Response Aerodynamic Probe – High Temperature Heated

- Unsteady 3-D flowfield measurements measurements in **wet steam**
- High operating temperature
- High measurement bandwidth
- Miniature size
- Fully compatible with LSc's turnkey system



The unique Fast-Response Aerodynamic Probe – High Temperature Heated (FRAP-HT) is designed for unsteady 3-dimensionnal flowfield measurements in wet steam environment. The FRAP-HTH is a robust measurement tool that has been used in the last stage of industrial low-pressure steam turbine facilities under high wetness fraction and high Mach number conditions.

The probe tip has a diameter of 2.5mm and is equipped with 2 encapsulated piezo-resistive pressure sensors operated in a constant current mode. In order to maintain the pressure taps clear from water contamination, the probe tip is heated uniformly a few degrees above the saturation temperature using an in-house miniature high power density heater located in close vicinity to the tip. By rotating the probe around its stem, the probe is used in a virtual 4-sensor mode similar to a 4-hole probe. It measures flow parameters such as flow angles, total and static pressure, Mach number as well as the streamwise and isotropic turbulence intensities. The probe is also capable of measuring the flow total and static temperature up to a frequency of 1Hz, thus enabling the derivation of the flow 3-dimensionnal velocity field.

The probes are delivered fully calibrated over the intended temperature and pressure range of operation. The FRAP-HTH can be used without cooling up to a flow total temperature of 220° and has a ±30° flow angle range. The pitch angle measurement range can be extended to +55° upon request. The aerodynamic calibration curves and coefficients are available from 20m/s up to Mach 0.8.

General Specifications:

- **Probe tip diameters: 2.5mm**
- **Measurement bandwidth: 25KHz**
- **Aerodynamic calibration range: 20m/s up to Mach 0.8**
- **Compatible with wet steam flows**
- **Calibration Temperature range: 10°C – 220°C**
- **Flow angle range: yaw = ±30°, -24° ≤ pitch ≤ 30° or +55° on request**
- **Unsteady flow quantities: flow angles, total and static pressures, Mach number, streamwise and isotropic turbulence intensity**
- **Steady total and static temperature**

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