The main goal of this Thesis was the manufacture and characterisation of a new type of local probe of quantum turbulence in He II. Our MEMS devices are semicircular loops 3 mm in diameter made of 40 μm superconducting NbTi wire placed in magnetic field, whose motion is driven by applied alternating current. To detect quantum turbulence, we measure the hydrodynamic properties of the probe, in particular changes in its resonant frequency and amplitude depending on the applied external flow. In this work we specifically investigate the generation of quantum turbulence in thermal counterflow of He II for temperatures between 1.45 K and 2.1 K, representing a well-known and understood system suitable for the characterisation of our devices. Additionally, the response of the detectors is calibrated against the intensity of turbulence as given by the vortex line density L, measured simultaneously using second sound attenuation. This technique is more sensitive than the microresonators, but precludes any attempts at local detection of L necessary to study inhomogeneous systems of quantized vortices. Analysis of the results based on the Donnelly number describing instabilities in the normal component has confirmed the sensitivity of the probe to quantized vortices in the superfluid.