A compact and sensitive AC magnetometer is developed for evaluation of magnetic nanoparticles solution. The developed AC magnetometer consists of two main parts; excitation and detection coil systems. A Helmholtz coil configuration was used as the excitation coil to ensure a high homogeneity of excitation magnetic field. To reduce AC resistance due to eddy current effect in the wire of the excitation coil at a high-frequency region, a Litz wire was used. The Litz wire was composed of 60 strands of copper wires with 0.1-mm diameter. For the detection coil, a first order axial differential coil was used so that environmental noises can be canceled. The detection coil consisted of two 1000-turn copper coils and they were connected in series. The fabricated excitation coil showed a high homogeneity along its axis with the high excitation magnetic field. The sensitivity of the developed system increased with respect to frequency. The magnetic noise of the detection unit showed a 1/f noise characteristic and a sensitivity of 10-10 Am² at 100 Hz was showed by the developed system. To demonstrate the feasibility of the developed system, harmonics of Nickel nanowires was measured. The harmonics generation increased with the increasing amplitude of excitation field. It can be expected that an extremely sensitive characterization of MNP is possible using the developed system.