This thesis is devoted to the measurement of the anisotropic magnetoresistance (AMR) on a series of samples that were prepared by the molecular beam epitaxy (MBE). The measurements were taken during a rotation of a magnetic field in the sample plane using a vector magnet in a cryostat, which allows to change the working temperature from 1.5 to 300 Kelvin. The dependences of anisotropic magnetotransport parameters on the Mn concentration were evaluated from the measured data. Moreover, the temperature dependence of these parameters was also studied. Identification of experimental artifact in the measured data enabled us to reveal a significant influence of the hysteresis of the magnets on the measurements. Finally, by measuring in weak magnetic fields we studied the magnetic anisotropy of the samples.