The recent detection of HD\textsuperscript{18}O in Orion KL\textsuperscript{b} by the \textit{Herschel Space Observatory} provided a strong motivation to revisit the rotational spectrum in order to obtain more accurate calculations of transition frequencies. Rotational transitions were recorded in the 300 – 2700 GHz frequency range. Analysis of the combined microwave and infrared data sets with an Euler series Hamiltonian\textsuperscript{c} has facilitated determination of a set of precise rotational constants to support precision velocity measurements. The new rotational data also provides a means of evaluating the performance of the MARVEL algorithm used in the recent review of all available HDO data\textsuperscript{d}.