This paper presents a novel method to address a Proportional Integral observer design for the actuator and sensor faults estimation based on Takagi–Sugeno fuzzy model with unmeasurable premise variables. The faults are assumed as time-varying signals whose kth time derivatives are bounded. Using Lyapunov stability theory and L_2 performance analysis, sufficient design conditions are developed for simultaneous estimation of states and time-varying actuator and sensor faults. The Proportional Integral observer gains are computed by solving the proposed conditions under Linear Matrix Inequalities constraints. A simulation example is provided to illustrate the effectiveness of the proposed approach