This paper considers the Fault Tolerant Tracking Control (FTTC) problem for Takagi-Sugeno (TS) fuzzy models based on a healthy model reference. A fuzzy Proportional Integral Observer (PIO) is proposed to estimate the faulty states and the time-varying actuator faults which affect the TS fuzzy models with unmeasurable premise variables. The synthesis of the PIO is based on assumption that the faults kth derivatives are bounded. Then, the knowledge derived from the PIO on the faulty states and the actuator faults are used by the designed FTTC law in order to both compensate the effect of these faults and to stabilize the closed loop system subject to unmeasurable premise variables and faults. Based on Lyapunov stability theory and L_2 performance, sufficient conditions are developed in terms of linear matrix