A phase-sensitive four-wave mixing (FWM) scheme enabling the simultaneous conversion of the two orthogonal quadratures of an optical signal to different wavelengths is demonstrated for the first time under dynamic operation using a highly nonlinear optical fiber (HNLF) as the nonlinear medium. The scheme is first optimized with respect to the power levels and phases of the four phase-coherent pumps. The successful modulation and wavelength conversion of the two complex quadratures of a quadrature phase-shift keying (QPSK) signal to two binary phase-shift keying (BPSK) signals is then demonstrated experimentally with no power penalty at a bit-error-ratio (BER) of 10−9 compared to direct interferometric demodulation of the QPSK signal.