ABSTRACT. It is known that Fourier integral operators arising when solving Schrödinger-type operators are bounded on the modulation spaces $M^{p,q}$, for $1 \leq p = q \leq \infty$, provided their symbols belong to the Sjöstrand class $M^\infty$. However, they generally fail to be bounded on $M^{p,q}$ for $p \neq q$. In this paper we study several additional conditions, to be imposed on the phase or on the symbol, which guarantee the boundedness on $M^{p,q}$ for $p \neq q$, and between $M^{p,q} \to M^{q,p}$, $1 \leq q < p \leq \infty$. We also study similar problems for operators acting on Wiener amalgam spaces, recapturing, in particular, some recent results for metaplectic operators. Our arguments make heavily use of the uncertainty principle.