$$
\begin{aligned}
\Psi_{120} &= C_1\left(|0022\rangle + |0220\rangle + |2002\rangle + |2200\rangle\right) \\
&\quad + C_2\left(|0202\rangle + |2020\rangle\right) \\
&\quad + C_3\left(-|02du\rangle + |02ud\rangle - |0du2\rangle + |0ud2\rangle - |20du\rangle + |20ud\rangle - |2du0\rangle + |2ud0\rangle - |d02u\rangle - |d20u\rangle - |du02\rangle - |du20\rangle + |u02d\rangle + |u20d\rangle + |ud02\rangle + |ud20\rangle\right) \\
&\quad + C_4\left(|dduu\rangle - |duud\rangle - |uddu\rangle + |uudd\rangle\right)
\end{aligned}
$$

$$
C_1 = \frac{48\left(1-i\sqrt{3}\right)t^2 + \left(3-3\,i\sqrt{3}\right)U^2 - 6\,3^{\frac{1}{3}}U\left(36\,t^2U + \sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{1}{3}} + 3^{\frac{1}{6}}\left(3\,i+\sqrt{3}\right)\left(36\,t^2U + \sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{2}{3}}}{2\left(48\left(1-i\sqrt{3}\right)t^2 + \left(3-3\,i\sqrt{3}\right)U^2 + 6\,3^{\frac{1}{3}}U\left(36\,t^2U + \sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{1}{3}} + 3^{\frac{1}{6}}\left(3\,i+\sqrt{3}\right)\left(36\,t^2U + \sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{2}{3}}\right)}
$$

$$
C_2 = \frac{48\left(1-i\sqrt{3}\right)t^2 + \left(3-3\,i\sqrt{3}\right)U^2 - 6\,3^{\frac{1}{3}}U\left(36\,t^2U + \sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{1}{3}} + 3^{\frac{1}{6}}\left(3\,i+\sqrt{3}\right)\left(36\,t^2U + \sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{2}{3}}}{48\left(1-i\sqrt{3}\right)t^2 + \left(3-3\,i\sqrt{3}\right)U^2 + 6\,3^{\frac{1}{3}}U\left(36\,t^2U + \sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{1}{3}} + 3^{\frac{1}{6}}\left(3\,i+\sqrt{3}\right)\left(36\,t^2U + \sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{2}{3}}}
$$

$$
C_3 = \frac{48\,i\,2^{\frac{1}{3}}\left(i+\sqrt{3}\right)t^2 + 3\,i\,2^{\frac{1}{3}}\left(i+\sqrt{3}\right)U^2 - 2^{\frac{1}{3}}3^{\frac{1}{6}}\left(3\,i+\sqrt{3}\right)\left(36\,t^2U + \sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{2}{3}} + 6U\left(216\,t^2U + 6\sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{1}{3}}}{48\,t\left(216\,t^2U + 6\sqrt{3}\sqrt{-4096\,t^6 - 336\,t^4U^2 - 48\,t^2U^4 - U^6}\right)^{\frac{1}{3}}}
$$

$$
C_4 = \frac{1}{2}
$$