$$
K_{89}^{2} \quad = \quad
\begin{bmatrix}
\frac{-3\,U}{t} & \frac{\frac{\mathbf{i}}{2}\,\sqrt{3}\,U^2}{t^2} & 0 & \frac{\frac{\mathbf{i}}{2}\,\sqrt{3}\,U}{t} & -2+2\,\mathbf{i}\,\sqrt{3} & 0 & \frac{\frac{\mathbf{i}}{4}\,(3\,\mathbf{i}+\sqrt{3})\,U}{t} & 0 & \frac{\sqrt{2}\,U}{t} & 0 & \frac{(3-\mathbf{i}\,\sqrt{3})\,U}{4\,t} & 0 & 0 & \frac{\frac{\mathbf{i}}{2}\,(3\,\mathbf{i}+\sqrt{3})\,U}{t} & 0 & \frac{-(U+\mathbf{i}\,\sqrt{3}\,U)}{4\,t} \\
\frac{\frac{-\mathbf{i}}{2}\,\sqrt{3}\,U^2}{t^2} & \frac{-3\,U}{2\,t} & \frac{\frac{-\mathbf{i}}{2}\,(-\mathbf{i}+\sqrt{3})\,U}{\sqrt{2}\,t} & -1-\mathbf{i}\,\sqrt{3} & 0 & 0 & -2 & \frac{-(U+\mathbf{i}\,\sqrt{3}\,U)}{2\,t} & 0 & \frac{U+\mathbf{i}\,\sqrt{3}\,U}{2\,t} & 1+\mathbf{i}\,\sqrt{3} & 0 & \frac{(3+\mathbf{i}\,\sqrt{3})\,U}{2\,t} & 1+\mathbf{i}\,\sqrt{3} & -\left(\frac{U}{t}\right) & 0 \\
0 & \frac{\frac{\mathbf{i}}{2}\,(\mathbf{i}+\sqrt{3})\,U}{\sqrt{2}\,t} & \frac{-4\,U}{t} & \frac{(1-\mathbf{i}\,\sqrt{3})\,U^2}{2\,\sqrt{2}\,t^2} & \frac{(3-\mathbf{i}\,\sqrt{3})\,U}{\sqrt{2}\,t} & 0 & \frac{U^2}{\sqrt{2}\,t^2} & 0 & -3-\mathbf{i}\,\sqrt{3} & 0 & 0 & 1-\mathbf{i}\,\sqrt{3} & 0 & 0 & 0 & 0 \\
\frac{\frac{-\mathbf{i}}{2}\,\sqrt{3}\,U}{t} & -1+\mathbf{i}\,\sqrt{3} & \frac{(1+\mathbf{i}\,\sqrt{3})\,U^2}{2\,\sqrt{2}\,t^2} & \frac{-5\,U}{t} & \frac{-U^2}{2\,t^2} & -\left(\frac{U^2}{\sqrt{2}\,t^2}\right) & \frac{(-7-3\,\mathbf{i}\,\sqrt{3})\,U}{4\,t} & \frac{8\,t^2+(-1-\mathbf{i}\,\sqrt{3})\,U^2}{4\,t^2} & \frac{\sqrt{2}\,U-\mathbf{i}\,\sqrt{6}\,U}{4\,t} & 1+\mathbf{i}\,\sqrt{3} & \frac{U+\mathbf{i}\,\sqrt{3}\,U}{4\,t} & 0 & 0 & \frac{-(U+\mathbf{i}\,\sqrt{3}\,U)}{2\,t} & -1-\mathbf{i}\,\sqrt{3} & \frac{U+\mathbf{i}\,\sqrt{3}\,U}{4\,t} \\
-2-2\,\mathbf{i}\,\sqrt{3} & 0 & \frac{(3+\mathbf{i}\,\sqrt{3})\,U}{\sqrt{2}\,t} & \frac{-U^2}{2\,t^2} & \frac{-4\,U}{t} & 0 & \frac{-U^2}{2\,t^2} & \frac{3\,(3+\mathbf{i}\,\sqrt{3})\,U}{4\,t} & 0 & \frac{U-\mathbf{i}\,\sqrt{3}\,U}{4\,t} & 0 & 0 & \frac{U}{2\,t} & 0 & \frac{-(U+\mathbf{i}\,\sqrt{3}\,U)}{4\,t} & 0 \\
0 & 0 & 0 & -\left(\frac{U^2}{\sqrt{2}\,t^2}\right) & 0 & \frac{-6\,U}{t} & -\left(\frac{U^2}{\sqrt{2}\,t^2}\right) & \frac{\frac{-3}{2}\,\mathbf{i}\,(-3\,\mathbf{i}+\sqrt{3})\,U}{\sqrt{2}\,t} & -1-\mathbf{i}\,\sqrt{3} & \frac{U}{\sqrt{2}\,t} & 0 & -3+\mathbf{i}\,\sqrt{3} & -\left(\frac{\sqrt{2}\,U}{t}\right) & 0 & -\left(\frac{U}{\sqrt{2}\,t}\right) & 0 \\
\frac{\frac{-\mathbf{i}}{4}\,(-3\,\mathbf{i}+\sqrt{3})\,U}{t} & -2 & \frac{U^2}{\sqrt{2}\,t^2} & \frac{(-7+3\,\mathbf{i}\,\sqrt{3})\,U}{4\,t} & \frac{-U^2}{2\,t^2} & -\left(\frac{U^2}{\sqrt{2}\,t^2}\right) & \frac{-5\,U}{t} & 1+\mathbf{i}\,\sqrt{3}-\frac{U^2}{2\,t^2} & -\left(\frac{U}{\sqrt{2}\,t}\right) & 1-\mathbf{i}\,\sqrt{3} & \frac{U}{2\,t} & 0 & 0 & -\left(\frac{U}{t}\right) & -1+\mathbf{i}\,\sqrt{3} & \frac{-U}{2\,t} \\
0 & \frac{\frac{\mathbf{i}}{2}\,(\mathbf{i}+\sqrt{3})\,U}{t} & 0 & \frac{8\,t^2+\mathbf{i}\,(\mathbf{i}+\sqrt{3})\,U^2}{4\,t^2} & \frac{3\,(3-\mathbf{i}\,\sqrt{3})\,U}{4\,t} & \frac{\frac{3\,\mathbf{i}}{2}\,(3\,\mathbf{i}+\sqrt{3})\,U}{\sqrt{2}\,t} & 1-\mathbf{i}\,\sqrt{3}-\frac{U^2}{2\,t^2} & \frac{-5\,U}{t} & 0 & \frac{-U}{2\,t} & 2 & 0 & \frac{\frac{\mathbf{i}}{4}\,(3\,\mathbf{i}+\sqrt{3})\,U}{t} & 2 & \frac{U-\mathbf{i}\,\sqrt{3}\,U}{4\,t} & 0 \\
\frac{\sqrt{2}\,U}{t} & 0 & -3+\mathbf{i}\,\sqrt{3} & \frac{\sqrt{2}\,U+\mathbf{i}\,\sqrt{6}\,U}{4\,t} & 0 & -1+\mathbf{i}\,\sqrt{3} & -\left(\frac{U}{\sqrt{2}\,t}\right) & 0 & \frac{-3\,U}{t} & -\left(\frac{U^2}{\sqrt{2}\,t^2}\right) & \frac{3\,(3-\mathbf{i}\,\sqrt{3})\,U}{2\,\sqrt{2}\,t} & 0 & 0 & 0 & \frac{\frac{-\mathbf{i}}{2}\,(-\mathbf{i}+\sqrt{3})\,U^2}{\sqrt{2}\,t^2} & 0 \\
0 & \frac{U-\mathbf{i}\,\sqrt{3}\,U}{2\,t} & 0 & 1-\mathbf{i}\,\sqrt{3} & \frac{U+\mathbf{i}\,\sqrt{3}\,U}{4\,t} & \frac{U}{\sqrt{2}\,t} & 1+\mathbf{i}\,\sqrt{3} & \frac{-U}{2\,t} & -\left(\frac{U^2}{\sqrt{2}\,t^2}\right) & \frac{-4\,U}{t} & 1-\mathbf{i}\,\sqrt{3}-\frac{U^2}{2\,t^2} & \frac{(1-\mathbf{i}\,\sqrt{3})\,U^2}{2\,\sqrt{2}\,t^2} & \frac{(3-\mathbf{i}\,\sqrt{3})\,U}{4\,t} & -1+\mathbf{i}\,\sqrt{3} & \frac{(-1+5\,\mathbf{i}\,\sqrt{3})\,U}{4\,t} & \frac{\frac{-\mathbf{i}}{4}\,(-\mathbf{i}+\sqrt{3})\,U^2}{t^2} \\
\frac{(3+\mathbf{i}\,\sqrt{3})\,U}{4\,t} & 1-\mathbf{i}\,\sqrt{3} & 0 & \frac{U-\mathbf{i}\,\sqrt{3}\,U}{4\,t} & 0 & 0 & \frac{U}{2\,t} & 2 & \frac{3\,(3+\mathbf{i}\,\sqrt{3})\,U}{2\,\sqrt{2}\,t} & 1+\mathbf{i}\,\sqrt{3}-\frac{U^2}{2\,t^2} & \frac{-4\,U}{t} & 0 & 0 & \frac{U}{t} & \frac{(4+4\,\mathbf{i}\,\sqrt{3})\,t^2+(1-\mathbf{i}\,\sqrt{3})\,U^2}{4\,t^2} & \frac{\frac{-3}{2}\,\mathbf{i}\,\sqrt{3}\,U}{t} \\
0 & 0 & 1+\mathbf{i}\,\sqrt{3} & 0 & 0 & -3-\mathbf{i}\,\sqrt{3} & 0 & 0 & 0 & \frac{(1+\mathbf{i}\,\sqrt{3})\,U^2}{2\,\sqrt{2}\,t^2} & 0 & \frac{-5\,U}{t} & 0 & \frac{\sqrt{2}\,U+\mathbf{i}\,\sqrt{6}\,U}{4\,t} & -\left(\frac{U^2}{\sqrt{2}\,t^2}\right) & \frac{(3-\mathbf{i}\,\sqrt{3})\,U}{\sqrt{2}\,t} \\
0 & \frac{(3-\mathbf{i}\,\sqrt{3})\,U}{2\,t} & 0 & 0 & \frac{U}{2\,t} & -\left(\frac{\sqrt{2}\,U}{t}\right) & 0 & \frac{\frac{-\mathbf{i}}{4}\,(-3\,\mathbf{i}+\sqrt{3})\,U}{t} & 0 & \frac{(3+\mathbf{i}\,\sqrt{3})\,U}{4\,t} & 0 & 0 & \frac{-6\,U}{t} & \frac{\frac{-\mathbf{i}}{4}\,(-3\,\mathbf{i}+\sqrt{3})\,U^2}{t^2} & \frac{\frac{\mathbf{i}}{4}\,(3\,\mathbf{i}+\sqrt{3})\,U}{t} & 2-2\,\mathbf{i}\,\sqrt{3} \\
\frac{\frac{-\mathbf{i}}{2}\,(-3\,\mathbf{i}+\sqrt{3})\,U}{t} & 1-\mathbf{i}\,\sqrt{3} & 0 & \frac{\frac{\mathbf{i}}{2}\,(\mathbf{i}+\sqrt{3})\,U}{t} & 0 & 0 & -\left(\frac{U}{t}\right) & 2 & 0 & -1-\mathbf{i}\,\sqrt{3} & \frac{U}{t} & \frac{\sqrt{2}\,U-\mathbf{i}\,\sqrt{6}\,U}{4\,t} & \frac{\frac{\mathbf{i}}{4}\,(3\,\mathbf{i}+\sqrt{3})\,U^2}{t^2} & \frac{-15\,U}{2\,t} & -1-\mathbf{i}\,\sqrt{3} & 0 \\
0 & -\left(\frac{U}{t}\right) & 0 & -1+\mathbf{i}\,\sqrt{3} & \frac{\frac{\mathbf{i}}{4}\,(\mathbf{i}+\sqrt{3})\,U}{t} & -\left(\frac{U}{\sqrt{2}\,t}\right) & -1-\mathbf{i}\,\sqrt{3} & \frac{U+\mathbf{i}\,\sqrt{3}\,U}{4\,t} & \frac{\frac{\mathbf{i}}{2}\,(\mathbf{i}+\sqrt{3})\,U^2}{\sqrt{2}\,t^2} & \frac{-(U+5\,\mathbf{i}\,\sqrt{3}\,U)}{4\,t} & \frac{(4-4\,\mathbf{i}\,\sqrt{3})\,t^2+(1+\mathbf{i}\,\sqrt{3})\,U^2}{4\,t^2} & -\left(\frac{U^2}{\sqrt{2}\,t^2}\right) & \frac{\frac{-\mathbf{i}}{4}\,(-3\,\mathbf{i}+\sqrt{3})\,U}{t} & -1+\mathbf{i}\,\sqrt{3} & \frac{-4\,U}{t} & \frac{-U^2}{2\,t^2} \\
\frac{\frac{\mathbf{i}}{4}\,(\mathbf{i}+\sqrt{3})\,U}{t} & 0 & 0 & \frac{U-\mathbf{i}\,\sqrt{3}\,U}{4\,t} & 0 & 0 & \frac{-U}{2\,t} & 0 & 0 & \frac{\frac{\mathbf{i}}{4}\,(\mathbf{i}+\sqrt{3})\,U^2}{t^2} & \frac{\frac{3\,\mathbf{i}}{2}\,\sqrt{3}\,U}{t} & \frac{(3+\mathbf{i}\,\sqrt{3})\,U}{\sqrt{2}\,t} & 2+2\,\mathbf{i}\,\sqrt{3} & 0 & \frac{-U^2}{2\,t^2} & \frac{-5\,U}{t}
\end{bmatrix}
$$