$$\begin{aligned}
\boldsymbol{\Phi}_r(\mathbf{g},\mathbf{h},\mathbf{k},\mathbf{l};s_0) =\ & R^{\mathbf{gh}[\mathbf{t}(\mathbf{k},\mathbf{l})^{p(\mathbf{gh})}],\,\mathbf{t}(\mathbf{g},\mathbf{h})}(s_0)\,\eta_{\mathbf{gh}[\mathbf{t}(\mathbf{k},\mathbf{l})^{p(\mathbf{gh})}]}(\mathbf{g},\mathbf{h},s_0) \\
& [U_{\mathbf{g}}(\,{}^{\mathbf{g}}[\mathbf{t}(\mathbf{hk},\mathbf{l})^{p(\mathbf{g})}],\ {}^{\mathbf{g}}[\mathbf{t}(\mathbf{h},\mathbf{k})^{p(\mathbf{g})}];s_0)]^* U_{\mathbf{g}}(\,{}^{\mathbf{g}}[\mathbf{t}(\mathbf{h},\mathbf{kl})^{p(\mathbf{g})}],\ {}^{\mathbf{gh}}[\mathbf{t}(\mathbf{k},\mathbf{l})^{p(\mathbf{gh})}];s_0) \\
& [F^{\mathbf{t}(\mathbf{ghk},\mathbf{l}),\mathbf{t}(\mathbf{g},\mathbf{hk}),\,{}^{\mathbf{g}}[\mathbf{t}(\mathbf{h},\mathbf{k})^{p(\mathbf{g})}]}(s_0)]^* F^{\mathbf{t}(\mathbf{g},\mathbf{hkl}),\,{}^{\mathbf{g}}[\mathbf{t}(\mathbf{hk},\mathbf{l})^{p(\mathbf{g})}],\,{}^{\mathbf{g}}[\mathbf{t}(\mathbf{h},\mathbf{k})^{p(\mathbf{g})}]}(s_0) \\
& [F^{\mathbf{t}(\mathbf{g},\mathbf{hkl}),\,{}^{\mathbf{g}}[\mathbf{t}(\mathbf{h},\mathbf{kl})^{p(\mathbf{g})}],\,{}^{\mathbf{gh}}[\mathbf{t}(\mathbf{k},\mathbf{l})^{p(\mathbf{gh})}]}(s_0)]^* F^{\mathbf{t}(\mathbf{gh},\mathbf{kl}),\mathbf{t}(\mathbf{g},\mathbf{h}),\,{}^{\mathbf{gh}}[\mathbf{t}(\mathbf{k},\mathbf{l})^{p(\mathbf{gh})}]}(s_0) \\
& [F^{\mathbf{t}(\mathbf{gh},\mathbf{kl}),\,{}^{\mathbf{gh}}[\mathbf{t}(\mathbf{k},\mathbf{l})^{p(\mathbf{gh})}],\mathbf{t}(\mathbf{g},\mathbf{h})}(s_0)]^* F^{\mathbf{t}(\mathbf{ghk},\mathbf{l}),\mathbf{t}(\mathbf{gh},\mathbf{k}),\mathbf{t}(\mathbf{g},\mathbf{h})}(s_0)
\end{aligned}$$