

```

Zd_ [K_] := Module [ {Cs, φ, n, A, s, i, j, k, Δ, G, d1, Z1, Z2, Z3},
  {Cs, φ} = Rot [K]; n = Length [Cs]; A = IdentityMatrix [2 n + 1];
  Cases [Cs, {s_, i_, j_} := (A[[{i, j}, {i + 1, j + 1}]] += (

$$\begin{pmatrix} -T^s & T^s & -1 \\ 0 & & -1 \end{pmatrix}$$

))] ];
  {Δ, G} = Factor@{T(-Total[φ]-Total[Cs[[All,1]])/2 Det@A, Inverse@A};
  Z1 =
  Exp [Total [Cases [Cs, {s_, i_, j_} := Sum [ed1 rd1,s [i, j], {d1, d}]]] +
    Sum [ed1 γd1,φ[[k]] [k], {k, 2 n}, {d1, d}] /. γ_,0[_] → 0];
  Z2 = Expand [F[{}, {}] × Normal@Series [Z1, {ε, 0, d}]] //.
  F[fs_, {es___}] × (f : (r | γ)ps__ [is__])p- :=
  F[Join [fs, Table [f, p]], DeleteDuplicates@{es, is}];
  Z3 = Expand [Z2 /. F[fs_, es_] := Expand [gPair [
    Replace [fs, Thread [es → Range@Length@es], {2}], Length@es
  ] /. gα,β := G[[es[[α]], es[[β]]]]];
  Collect [ {Δ, Z3 /. εp- → p! Δ2p εp}, ε, T2z ] ];

```